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EDITORIAL

CONSUMPTION AND PASSION IN UNCONVENTIONAL ENTREPRENEURSHIP AS A PROMISING RESEARCH FIELD[1]

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Abstract

Purpose. *In this editorial we examine the issue of the relationship between entrepreneurship and consumption by framing it within the concept of unconventional entrepreneurship. The literature that has addressed the issue, the premises to the definition of the topic, is examined.*
Design/methodology/approach. *The literature has recently identified a promising field of research in the contribution of consumption experiences to entrepreneurship. The processes of consumption and entrepreneurship have long been denied joint observation.*
Findings. *This editorial is intended to emphasize the importance of the path of research on the topic from the perspective of small business studies, since the relationship between the two major processes, those of entrepreneurship and consumption, can take on special significance in generating new businesses and often, though not necessarily, small businesses.*
Practical and Social implications. *The goal of this editorial is to stimulate the observation of phenomena that influence the relationship between consumption and entrepreneurship, while also examining the implications in new directions, such as the analysis of the relationship between entrepreneurship and community in a changing society and policies to support entrepreneurship.*

[1] This editorial incorporates the contents of a keynote speech given at the 6th PISB Workshop "New perspective and interdisciplinary approaches to entrepreneurship", Urbino, May 19-20, 2023. Ideas contained in the editorial have matured as part of a more than decade-long research project shared with Bernard Cova. Thanks to Tonino Pencarelli for comments on an earlier version of the paper.

Originality of the study. *The paper presents some concepts derived from a long shared research path and proposes some key ideas from a perspective defined as tribal and unconventional entrepreneurship.*

Practical and Social implications. *The analysis points out interesting theoretical and empirical perspectives on the new orientations for SMEs made available by humane entrepreneurship and highlights how their leadership and business models might provide a way to help both people and enterprises become engines for social and environmental change. Moreover, it highlights the drivers underlying an SME's ability to cope with systemic crises, the core values of a humanistic orientation in SMEs, how humane entrepreneurship can enhance virtuous behaviors, and the results deriving from responsible policies and actions.*

Originality of the study. *The study contributes to advance a field's theoretical understanding that is still underinvestigated and helps elicit and broaden the discussion on humane entrepreneurship as it pertains to SMEs.*

1. Introduction

Developments in the literature as well as observations of empirical cases testify to a growing focus on the contribution of consumer experiences to entrepreneurship. This editorial is intended to emphasize the importance of the issue in the small business studies perspective, since the relationship between the two major phenomena has a special significance in generating new and often, though not necessarily, small businesses. The goal is to stimulate an observation of the phenomena affecting the relationship between consumption and entrepreneurship among the contributors to Piccola Impresa - Small Business.

The fact that the same person can hold entrepreneurial roles as well as carry out consumption activities has long been insufficient to generate interest in the relationship between the two phenomena. As is well known, economic theory sharply separates the two phenomena, developing a theory of consumer behavior distinct from that of enterprise. This choice has important motivations and corresponds to situations in which skills and motivations in consumption and entrepreneurship traditionally appeared different. However, these differences are not always perceived with the same intensity today, partly because of the growth of consumer skills (Caru and Cova, 2011) and the characteristics of new technologies that can now place entrepreneurs and consumers in similar positions with respect to large technology platforms (Kozinets and Gretzel, 2021).

The processes of consumption and entrepreneurship have long been denied joint observation. Recently, however, the relationship between the two processes is receiving increased attention (Da Fonseca and Campos, 2021). Already the study of user entrepreneurship (Shah and Tripsas, 2007) has pushed to see situations of consumption that were then, later, the basis for

the formation of skills, for the implementation of the innovation process, up to the development of companies with significant market success.

In this strand of the relationships between consumption and entrepreneurship are the phenomena of passion for specific domains (Cardon et al., 2017), entrepreneurial passion (Cardon et al., 2009; Baraldi et al., 2020), and user-generated innovation (von Hippel, 2016). The literature has examined stories of entrepreneurs who move from a passion for a specific domain (sports, early childhood products, food and wine, etc.) to starting paths that give rise to a business, with an emphasis on the implications of consumption as a ground for developing competences and relationships that then become a foundation for entrepreneurship. More recently, the implications of entrepreneurship for consumption, understood as the impact of the entrepreneurial pathway on the consumption experience, has also been examined (Da Fonseca and Campos, 2021). The relationship between consumption and entrepreneurship has thus been associated with bivalent implications, noting the coexistence of different logics, where until now market and tribal logic were perceived as not compatible and this relationship between them was seen as a black box (Cova and Guercini, 2023).

In this editorial we examine the issue of the relationship between entrepreneurship and consumption by framing it within a concept of unconventional entrepreneurship (Guercini and Cova, 2018). This concept is associated with a specific role of passion and the communities that welcome those who share it. We therefore examine these issues in the following sections. As a result, we have the characters of an unconventional entrepreneurial process, which is not without connections to possible policies supporting new entrepreneurship and which can offer, from connections with already developed strands such as user entrepreneurship, new perspectives also for further development of small business research.

2. The emerging subject of unconventional entrepreneurship

The term unconventional refers to what is "not following what is done or considered normal or acceptable by most people; different and interesting synonym unorthodox" (Oxford learner dictionary). Thus, we have "unconventional marketing" (Cova and Soucet, 2014), "unconventional finance" (Buchner and Wilkinson, 2015), "unconventional management" (Clair et al., 2016), and "unconventional research contexts" (Bamberger and Pratt, 2010). In itself, what is unconventional is anyone who does not adhere to an established convention or accepted standards. Can we talk about the emergence of unconventional entrepreneurship (Guercini and Cova, 2018)? Some changes from more conventional standards to approach entrepreneurship driven by research on alertness to profit opportunities is already in the literature (Kirzner, 1973). Reference is made to forms of entrepreneurship that do not start with the issue of profit opportunities such as: accidental entrepreneur (Shah and Tripsas, 2007); user entrepreneur (Haefliger, Jäger and Von Krogh, 2010); lifestyle entrepreneur (Bredvold and Skålen, 2016); tribal entrepreneur (Cova and Guercini, 2016); consum-

er entrepreneurship (Daskalopoulou and Skandalis, 2019).

Connected to this evolution of unconventional entrepreneurship are additional related subjects such as (1) household sector innovation (von Hippel, 2016); (2) passionate entrepreneur (Cardon et al., 2009); (3) technology trends (Puntoni et al., 2021); and (4) consumer competences (Carù and Cova, 2011). Unconventional entrepreneurship thus emerges in a context in which the motivations for entrepreneurial action do not have as their main theme the pursuit of profit opportunities, but rather the pursuit of a different lifestyle or motivation to satisfy a personal need or rebuild one's life path following previous failures. These motivations for entrepreneurship are set in a context of changes in society, escalating economic difficulties with impact on entrepreneurship. In order to cope with the difficulties of the social but also economic environment, people seek to enhance deposits of competences gained in the context of individual and shared passions. These passions may be shared within communities, which in turn are connected to territory or frequentations in digital environments. In these contexts, individual profiles and group identities are developed, with the accumulation of skills in specific domains. Consumption and entrepreneurship are roles that coexist in the same people in the real world but that scholars are used to treating separately. The context with its evolution calls into question the traditional way of treating these two roles (Huefner and Hunt, 1994). The consumption-entrepreneurship relationship changes because of the development of technologies that may tend to reduce the differences between consumers and entrepreneurs, where "... most marketers in the world today are consumers, not creators, of AI technology" (Kozinets and Gretzel, 2021, p. 156).

In the tradition of entrepreneurship studies, the entrepreneur has been seen as one who assumes certain functions (of innovation and development, political and organizational in nature) (Schumpeter, 1934; Fazzi, 1982). Alternatively, entrepreneurship has been taken as a field of study about such themes as (Gartner, 1990): (1) personality of entrepreneur; (2) innovation; (3) organization creation; (4) creating value; (5) profit or nonprofit; (6) growth; (7) uniqueness; (8) the owner and/or manager. In this area, unconventional entrepreneurship examines additional aspects related to motivation and process, focusing on the role of passion for a domain. That may be associated with membership in a community of enthusiasts in which the foundations are laid and skills are formed that may later foster emergence into new enterprises.

3. Passion before opportunities for profit

About the relation between passion and opportunities for profit, in unconventional entrepreneurship, consumer-entrepreneur stories tell paths in which passion for a particular domain precedes the discovery of opportunities for profit (see cases presented by Cova and Guercini, 2023; Milanesi, 2018; Pagano et al., 2018; Ranfagni and Runfola, 2018). Coming before is

understood in a temporal logic, whereby the former emerges in the process previously, but it can also be understood in a logic of importance, because preceding also tends to establish a prevalence of the original logic to which the entrepreneurial actor may remain attached. It can also condition the organizational dimension, where the growth of the enterprise may no longer make it possible for the entrepreneurial actor to make direct contact with the object of his passion that led him to generate the enterprise. Passion is not new in entrepreneurship. It is hard to picture a real entrepreneur without passion, that is, as a strictly rational individual driven solely by a calculative pursuit of profit. "*Iconic entrepreneurs such as Virgin's Richard Branson, Apple's Steve Jobs, IKEA's Ingvar Kamprad, Luxottica's Leonardo del Vecchio or The Body Shop's Anita Roddick all shared a deep passion and a strong emotional engagement not only with their businesses but also with broader societal and personal issues, ranging from the environment to living conditions and poverty. But, despite the salience of deep passions in the professional life of so many entrepreneurs, only quite recently has passion surfaced as a core topic in entrepreneurship studies*" (Baraldi et al., 2020, pp. 1-2). In unconventional entrepreneurship, the theme of passion, for contexts already experienced, precedes that of seeking and pursuing profit opportunities or creating and developing a new organization.

The topic of passion in entrepreneurship has been the subject of extensive literature, even remaining to the field of management alone (Cardon et al., 2009; Cardon & Kirk, 2015; Cardon et al., 2017; Chen et al., 2009; Murnieks et al., 2014; Thorgren & Wincent, 2015). Emblematic in this regard is the Go Pro case. Its founder recalls how *"… I first really started developing the idea back in 2002 while on surf trip in Australia with a couple of friends. We were living out of a Toyota van, putting in about 5,000 miles surfing the East, South and West Coasts. I was spending most of my time in the water, sharing amazing moments and waves with my friends. I was also shooting photos (this was pre-YouTube!) from the beach, but from that distance my shots weren't doing the surf or my friends justice. Some of the most intense and memorable moments in cranking surf were just that, memories. I'd kill for some GoPro footage of that trip! Ironically, that trip is what fired me up to come home and finally start GoPro to create 'the invisible camera,' a wearable camera so convenient that you forget you've got it on*"[2].

We can distinguish between an "entrepreneurial passion" (EP) and a "domain passion" (DP) (Cardon et al., 2017), where EP leads to seeking to become an entrepreneur because one is passionate about the entrepreneurial process, while DP is to be understood as a passion for activities in a particular field with respect to which entrepreneurship is a vehicle for pursuing one's passion. These logics can result in different combinations, not necessarily appearing to be opposed to each other (Baraldi et al., 2020, p. 13). We can imagine that DP and EP can be differently mixed on a continuum in the experiences of real entrepreneurs (Baraldi et al., 2020, p. 18). If the latter is placed on the continuum between individual and group

[2] Nick Woodman, interview - https://www.malakye.com/news/3518/gopro-with-founder-inventor-nick-woodman

dimensions, we can hypothesize different situations combining these dimensions with the continuum between EP and DP.

4. Community before market

Cambridge dictionary defines community as: "a group of people living in the same place or having a particular characteristic in common" and "the condition of sharing or having certain attitudes and interests in common" (e.g.: "the sense of community that organized religion can provide"). The role of community is related to the idea of belonging, territoriality, culture.

Related to community are concept like "conviviality" (Oxford Dictionary) that is about an atmosphere or event (friendly, lively, and enjoyable) or about a person (jovial, cheerful and friendly). Conviviality has been defined as "friendship/socializing for joyfulness" in comparison to "friendship/socializing for convenience" (Illich, 1973). The theme of conviviality is interesting because it is within the reach of people regardless of organizational size (Guercini and Ranfagni, 2016), connecting entrepreneurship to the community dimension.

We thus have a shift in consumption from "communities of users" to "communities of enthusiasts." User communities are known to support innovative activities (Franke and Shah, 2003) that can create successful commercial products (Baldwin et al., 2006) and even standard equipment in industry (Hienerth and Lettl, 2011). Enthusiastic consumer communities (Cova et al., 2007) are a specific type of user community with its own capabilities to support innovation and entrepreneurship.

The sharing (of interests, territory, culture etc.) produce community. Sharing passion consists in moments of exchange and creation through personal interaction, enrichment through experiences and thus motivation formation, generating a form of proximity. In this sense, passion works similarly to other traditional proximity generators (physical, cultural, psychic, etc.). This generates a sense of belonging/membership and corresponds to a form of proximity (physical, cultural, etc.). The community is heterogeneous (there are juniors and seniors) yet integrated, it is a place of learning and comparison, it is only made possible by sharing that feeds it.

Unconventional entrepreneurship, as highlighted in the literature (Da Fonseca and Campos, 2021) is linked to the study of the impact of consumption on entrepreneurship development, but the study of the impact of entrepreneurship on consumption experience is also noted (Cova and Guercini, 2023).

5. The unconventional entrepreneurial process as a research opportunity

Passion can be seen as a context, the sharing of which produces social ties and a sense of community, with effects comparable to those of sharing

in another context of importance for the generation of entrepreneurship, as the territorial context of industrial districts (Becattini et al., 1990). The changing society, learning in a community, and "passion as a context" can be similarly to other the ones associated with other forms of proximity. Learning in a community of enthusiasts can be compared with cases of the atmosphere in the "Mashallian" industrial district. The consumption-entrepreneurship relationship can thus be considered for future research on entrepreneurship, addressing questions such as: Can support for passion formation in consumption be the basis for new public policies for entrepreneurship development? Can research on unconventional entrepreneurship also be examined for implications on consumption processes?

The formation of new enterprises from the experience of passion and community in consumption is described through a multi-stage process (Guercini and Cova, 2022).

In the first stage, individual resources are produced from the investments in passion and skills that are formed. Along with these, there is the generation of community resources in relation to the sharing of collective experiences, the sense of belonging to the community of enthusiasts based on the sharing of passion as context, access to common and individual member assets, and interests and practices that may involve organizations. Collective identities, experiences and capabilities, situated learning in such communities through social processes are then produced.

In a second phase, we see the emergence of innovation and the formation of prototypes of objects, products, through multiple community memberships. Individuals use the community dimension as an asset and as a context for definition of needs, in which then solutions are formulated and tested as prototypes or new tools are developed.

In a third stage there is the emergence of the entrepreneurial dimension through the recognition of opportunities and the exploitation of learning outcomes described earlier. It is at this stage that an overcoming of the dimension of passion and community might appear, but this in many cases does not take place in the sense of a shift to one logic and the abandonment of the previous one, but rather in the sense of the coexistence of the different logics, even in spite of situations of opposition or conflict that might be perceived by some member of the community. Prototyping is recognized, in this phase, as an opportunity, and the individuals in the community exploit the results of the previous phase with risks of value slippage.

Finally, in a fourth and final phase, market emergence is noted, with market testing and the formation of a market that crosses the community boundary. Prototypes are developed through new product versions. Market development corresponds to the emergence of word-of-mouth outside the enthusiast community (Guercini and Cova, 2022).

This process of unconventional entrepreneurship is not without problematic implications (Guercini and Cova, 2018). One aspect concerns the conflict between this process and the enthusiast's main activity of professional growth, which, however, can be resolved through entrepreneurial initiative. More significant, on the other hand, is the risk of alienation due

to the totalizing nature of entrepreneurship originated from the consumer experience, such that it absorbs the person who develops from passion an entrepreneurial opportunity that also absorbs his or her professional and work dimension (Guercini and Cova, 2018). This is precisely why the unconventional entrepreneur has a strength in the particularly advanced ability to read consumers, sharing their same passion and originally being one of them. Similarly in the analogy with the district context, in the context of communities of enthusiasts, economies of belonging can emerge that include this ability to read as a target market, as well as the greater ease in being able to achieve their collaboration.

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UNIVERSITIES AND SECONDARY SCHOOLS TEAMING UP FOR A DIFFERENT ENTREPRENEURSHIP EDUCATION: BARRIERS, ENABLERS, AND OUTCOMES OF AN OPEN AND COLLABORATIVE PROCESS TO CO-DESIGN ENTREPRENEURIAL COMPETENCES DEVELOPING EXPERIENTIAL LEARNING ACTIVITIES

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Abstract

Purpose. *This study explores the collaboration between universities and secondary schools in co-designing experiential learning activities for fostering entrepreneurial competences applying the EU Entrepreneurship Competence Framework.*
Methodology. *Participatory action research involved sixty secondary school teachers from Italy and Switzerland.*
Findings. *The study reveals barriers (lack of strategy, collaboration ecosystem, and competence monitoring), enablers (active tutoring, shared language, and digital technologies), and outcomes (teacher, learner, and bridging school-job gap).*
Practical and social implications. *This study contributes a process framework for collaborative innovation between universities and secondary schools, informing the design of effective entrepreneurship education programs.*
Originality*. The study is among the first to adopt a collaborative rather than a complementary view of universities and secondary schools in the development of entrepreneurship education.*

1. Introduction

In an increasingly complex, dynamic and uncertain world, where different challenges (such as technological, social, environmental, political, economic, etc.) are in a continuous transformation, an entrepreneurial society may represent a powerful collective answer (Audretsch, 2009; Hoppe & Namdar, 2023). The introduction of the EU EntreComp framework (European Commission, 2018) highlights the EU's commitment to defining and promoting entrepreneurial skills. In fact, the Council of the European Union, in its recommendation on key competences for lifelong learning, laid out on 22 May 2018, underlines the need for member states to nurture entrepreneurial competences. Entrepreneurial competencies are defined as a combination of knowledge, skills, and attitudes that are particularly needed to identify and exploit entrepreneurial opportunities (Mitchelmore and Rowley, 2010). A relevant integration of this recommendation is about exploring the role of (1) universities, and (2) primary and secondary schools in entrepreneurship education. In fact, cases of entrepreneurship education at any level of education have become more common and researched over the past few years (Brüne & Lutz, 2020; Fejes et al., 2019; Hoppe, 2016; Kirkley, 2017). However, most studies focus on these two actors separately. The recent literature on entrepreneurship education in universities assessed the challenges and opportunities of entrepreneurship education (Hameed & Irfan, 2019; Liguori & Winkler, 2020), and the impact of entrepreneurship education on university students' entrepreneurial skills and entrepreneurial intention (Hahn et al., 2020; Jena, 2020). As entrepreneurship education has entered the curriculum of primary and secondary schools, extant literature has focused on the contents of such programs - presenting cases, best practices and policy implications (Dorji, 2021; Floris & Pillitu, 2019; Kilar & Rachwał 2019; Toutain et al., 2019). This brings out two main research gaps. Firstly, we found no previous studies that aim at understanding the barriers, the enablers, and the impact/outcome of the process of developing educational content that fosters entrepreneurial competences in pupils. Secondly, most studies consider universities and primary and secondary schools as independent actors in entrepreneurship education (Brüne & Lutz, 2020; Jardim et al., 2021). Therefore, we found that little attention has been paid to the collaboration between universities and schools to co-design educational activities that foster entrepreneurial competences.

Consequently, our research question is twofold: "(1) how do entrepreneurship scholars and secondary school teachers co-design educational activities that foster pupils' entrepreneurship competences?; and (2) how do barriers, enablers, and impact/outcomes influence this co-design process?". Our study explores the barriers, the enablers, and the outcomes of

the co-design process that we ran with sixty secondary school teachers (i.e., who teach 11–15-years-old pupils), with the specific goal to co-develop a concrete educational activity that stimulates the development of entrepreneurial competences. Our approach does not focus on teaching pupils how to start a company. Instead, we aim to develop experiential learning activities to help them develop the skills required to act as entrepreneurs and promote enterprising behavior (Edwards-Schachter *et al*., 2015; Fayolle *et al*., 2006). Drawing upon recent research, it is evident that leveraging experiential learning in entrepreneurship education proves to be a potent tool for designing effective entrepreneurship education programs (Cerquetti et al., 2021; Hahn et al., 2021). The need to develop entrepreneurship competences is highlighted by the recent trend of the gig economy, and the rise of digital business models such as Uber or Airbnb - which are producing new forms of entrepreneurship. An Uber driver or an Airbnb host needs to master entrepreneurship competences even if they do not own the company. Similarly, the employees are also requested to be more proactive in innovation activities. Recent innovation approaches, such as the lean startup, innovation labs, corporate acceleration and incubation programs give space to employees to act as corporate entrepreneurs or intrapreneurs (Honig, 2001; Martiarena, 2013). Therefore, teaching entrepreneurship at universities is not enough anymore. As some countries have established that entrepreneurship education must be present at the upper secondary level (Fejes *et al*., 2019), we argue that keeping in mind the COVID-19 crisis, entrepreneurship competences should be trained and developed during lower secondary education. This does not mean the curriculum must create a new subject called "entrepreneurship"; rather, it implies that all teachers, regardless of the discipline taught, should rethink their curriculum in order to develop entrepreneurial competences, as well as the most technical and subject-related skills. Rather than being a challenge, this represents an opportunity for entrepreneurship scholars to help and transfer their knowledge, that could be matched with the expertise of the teacher and his or her technical knowledge of the subject taught. The present study aims to contribute to the entrepreneurship education literature and policy by exploring new opportunities for collaboration between universities and secondary schools, in order to co-design curricular activities that foster entrepreneurial competences.

In the remainder of the article, we review the relevant literature, present our experience of the course where we applied the EU EntreComp framework within a backward instructional design model, and also present our results. At the same time, we discuss how to enhance the collaboration between universities and secondary schools in order to improve the development of entrepreneurial competences for pupils.

2. Theoretical background

In our study, we aim to use the concept of open and collaborative innovation applied to entrepreneurial education. In fact, we merge two literature streams, which may shed new light on how to improve entrepreneurship education, both theoretically and in practice. We refer to entrepreneurial competences and open and collaborative innovation. We found a connecting gap between these two themes that we aim at addressing in our study.

2.1 Entrepreneurial competences according to EntreComp Framework

Entrepreneurial competencies encompass a comprehensive spectrum of knowledge, skills, and attitudes that serve as the fundamental pillars for initiating or expanding a business venture (Mitchelmore and Rowley, 2010). Entrepreneurial competences are present in the different aspects of entrepreneurship, which has become a multifaceted and interdisciplinary topic for scholars. Some researchers are interested in the entrepreneurial process and its relative challenges (Bitetti, 2022; Dimov and Pistrui, 2020; Venkataraman, 1997). Others focus on the role of the entrepreneur, its cognition and behavior (Bitetti and Gibbert, 2022; Caputo and Pellegrini, 2020; Mitchell *et al*., 2014). Moreover, scholars are increasingly considering entrepreneurship an academic and teachable subject (Henry *et al*., 2005; Neck *et al*., 2014; Rasmussen and Sørheim, 2006). Nevertheless, these approaches mainly consider entrepreneurship as the creation of a new organization. Contrariwise, the present study adopts the view of entrepreneurship as a mindset (Morris *et al*., 2013). In this field, Cubico *et al*. (2010) developed "the entrepreneurial aptitude test" to determine the profile of entrepreneurs. Further, the literature on entrepreneurial thinking and learning complements other elements that are important in educational programs to develop better entrepreneurial minds (Cope, 2005; Corbett, 2007; Krueger, 2007; Peris-Ortiz *et al*., 2014; Politis, 2005). More recently, literature on entrepreneurship mindset has revealed the importance of the development of entrepreneurship competences for the growth and innovativeness of countries (Kuratko and Morris, 2019).

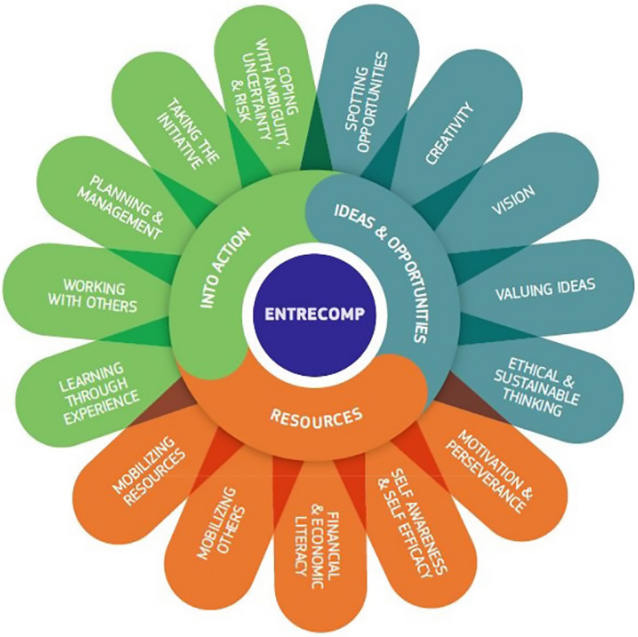
Entrepreneurial competences are assessed under different theoretical lenses, such as psychological traits theory, behavioral theories, and social cognitive theory (Edwards-Schachter *et al*., 2015). Entrepreneurial intentions are shaped by a combination of individual personality traits, such as attitude towards entrepreneurship and self-efficacy, as well as situational factors, including educational and social context, and personal background (Gabbianelli et al., 2021; Hussein et al., 2021; Sedita and Blasi, 2021). However, the good news is that competences can be developed through training (Mwasalwiba, 2010). In Europe, there are already many practices aimed at developing entrepreneurship competences (European Commission, 2016).

However, Gianesini *et al*. (2018) assessed different entrepreneurial competences models and identified the core personality variables, entrepreneurial knowledge, and skills that compose a meta-competence on entrepreneurship. Moreover, Cubico and Favretto (2018) emphasize the value of education to develop such entrepreneurial competences.

Among practices aimed at developing entrepreneurship competencies, one relevant model is the EU Entrepreneurship Competence (EntreComp) Framework (Bacigalupo et al., 2016). Figure 1 shows the components of the EntreComp Framework, which is the reference model for our study. The Framework suggests that entrepreneurial competences involve the ability to transform ideas and opportunities into action, by mobilizing resources. EntreComp is more than a list of competences. EntreComp is a set of cognitive and practical tools for all people interested in learning, teaching and coaching the knowledge, skills and behaviors that portray the entrepreneurial spirit. EntreComp's three main areas (i.e., Ideas & Opportunities, Resources, and Into action) are divided into five competences, that together form the fifteen key entrepreneurship competences. In the EntreComp Framework, there is no hierarchy among competences, as all of them are important and it is recommended to apply the competences flexibly to be adapted to the specific context. Many communities around the world have emerged to spread and apply to EntreComp Framework, accordingly to the state of the art of entrepreneurship education literature. In particular, Edwards-Schachter *et al*. (2015) determine three educational approaches to developing entrepreneurial competences: (1) content-driven education; (2) exposure to entrepreneurs and their role; and (3) action-based and experiential learning, which is at the core of our approach. Moreover, Cerquetti et al. (2021) assessed that the "IMpresa INaula" training programme solidifies the notion that engaging in experiential learning activities has a positive impact on fostering openness, confidence, and trust among students, in contrast with those who do not participate in experiential learning activities.

Nevertheless, despite the clustering of different entrepreneurship education approaches, there is still a general lack of understanding on how to develop effective experiential learning - and more precisely, in secondary education. This builds on the relevant poor knowledge about the role of teachers in entrepreneurship education, especially when it comes to entrepreneurial competences development. Although a few cases of playbooks and frameworks exist (Bacigalupo *et al*., 2020; Grigg, 2020), there is still a general need to systematize the efforts and make them consistent with the pedagogical goals of the single subject taught by the teacher. In practice, finding spots in secondary schools' timetables is difficult. Therefore, instead of adding activities, reflection should be more about how to revise the current ones in order to develop entrepreneurial competences, by also favoring student centricity in entrepreneurship education (Aparicio *et al*., 2019).

Fig. 1. EntreComp Framework



Source: European Commission (2018)

Gibb (2011) determines that teachers are relevant to develop entrepreneurial competences, especially those who personally possess entrepreneurial competences (Peltonen, 2015). However, García *et al*. (2017) assert that teachers and pupils cannot achieve these results without interacting with other actors, such as universities. In contrast, outsourcing entrepreneurship competence-developing activities to entrepreneurship scholars is not a very effective strategy. This is because pupils build a relationship with their teachers, which facilitates learning (Bressoux and Bianco, 2004).

2.2 Open and collaborative innovation in school contexts: co-creation and co-design approaches

Open and collaborative innovation refers to a paradigm shift in the traditional model of innovation that has typically been driven by a single organization or firm developing innovation in isolation (Chesbrough, 2003). Instead, open and collaborative innovation involves seeking input, knowledge, and resources from a diverse group of individuals and organizations - both within and outside the firm boundaries, in order to co-create and bring new ideas to the market (von Hippel, 2005). This lens extends

beyond the scope of businesses and encompasses collaboration for innovation within the school context. For instance, certain collaborative initiatives, such as providing teachers with opportunities to serve as visiting lecturers at universities, have proven highly effective in facilitating their professional development (Perry et al., 1998), as well as the substantial impact of university faculty on educational reforms in secondary schools (Kersh and Masztal, 1998).

This concept originated in the early 2000s and has gained increased attention in recent years due to the growing recognition of the benefits of tapping into a wider pool of knowledge and expertise to drive innovation. The importance of open and collaborative innovation lies in its ability to leverage the collective intelligence and diversity of perspectives of a broad range of stakeholders, which can lead to more creative and impactful solutions (von Hippel, 2005) as well as reducing the risk of false positives and false negatives when it comes to an innovative solution (Chesbrough, 2004). In fact, by working together, organizations and individuals can share risks and resources, leading to more efficient and effective use of resources and a faster pace of innovation (West & Bogers, 2014). Open and collaborative innovation is usually applied through a variety of mechanisms, such as open innovation challenges, crowdsourcing, and open-source initiatives (Chesbrough, 2003). These approaches involve actively engaging with external stakeholders and tapping into their expertise, knowledge, and networks to drive innovation (Lakhani & von Hippel, 2004). Innovation is increasingly considered a collaborative process involving multiple actors (Etzkowitz and Leydesdorff, 2000). Carayannis and Campbell (2009) developed the Quadruple Helix approach, highlighting the importance of the culture-based public and civil society as additional actors to complement the relations between universities, industry, and governments (Etzkowitz and Leydesdorff, 1995). Although open and collaborative innovation mainly originates in the business and corporate contexts (Van der Meer, 2007), in the context of entrepreneurial education, open and collaborative innovation can play a critical role in supporting the development of new ventures and businesses (Bissola et al., 2017; Iglesias-Sánchez et al., 2019; Wynarczyk et al., 2013). By involving students, faculty, alumni, and industry experts in the entrepreneurial process, educational institutions can create a dynamic and inclusive environment that fosters creativity, innovation, and entrepreneurial thinking. This means that for example, universities can organize hackathons and startup competitions that bring together students, alumni, and industry experts to co-create and develop new ideas and businesses. They can also provide students with opportunities to work on real-world projects with companies and organizations, providing them with hands-on experience and access to a network of potential partners and collaborators. Further, these opportunities are strongly linked to the call for universities

to their "third mission" about contributing to the socio-economic development of the territory (Colasanti et al., 2017).

The collaboration for innovation between universities and secondary schools is not an entirely new topic. The university faculty has a significant role in the educational reforms of secondary schools (Kersh and Masztal, 1998). Some initiatives of collaboration comprise giving teachers the chance to be visiting lecturers at a university and have been particularly effective in achieving professional development (Perry *et al*., 1998). Nevertheless, scant attention has been given to the curriculum co-design opportunities for collaboration. Sanders and Stappers (2008) define co-design as creative cooperation during design processes. The broader concept of co-creation is particularly relevant in the field of innovation management (Gemser and Perks, 2015; Romero and Molina, 2011) as well as marketing (Cova *et al*., 2011; Grönroos, 2011), but we found no literature about co-creation processes within universities and schools. In general, value co-creation sessions are seen as a win-win strategy for all parts (Martinez, 2014) and the poor attention given to co-creation in educational settings stimulated our reasoning.

Putting all these considerations into the education sector, we see that the same may apply to innovation activities for schools and universities. Usually, designing new educational activities involves members of the same community only. Many lecturers already have formal or informal exchanges with people outside their context in order to broaden their horizons. Nevertheless, a structured collaboration in which each involved actor brings his or her own expertise and ideas with the goal of generating higher value is currently under-investigated. In our study, we take the angle of considering secondary schools as focal organizations and we observe and assess how the opening of secondary schools to universities as external actors may help in the development of innovation (i.e., new courses and pedagogical activities that develop entrepreneurial competences). Therefore, we adopted an approach of "teaching the teacher," who will then act as an enabler of entrepreneurship competences development with their pupils.

3. Methodology

The research questions of the present study are "(1) how do entrepreneurship scholars and secondary school teachers co-design educational activities that foster pupils' entrepreneurship competences; and (2) how do barriers, enablers, and impact/outcomes influence this co-design process?". Given the novelty of the topic and the opportunity to work with secondary school teachers in a large applied research project between Switzerland and Italy, we adopted an action research methodology. Action research is a cyclical and reflective process that enables researchers to work

collaboratively with participants to identify and solve educational problems (Creswell et al., 2011). As Greenwood and Levin (2006) describe, action research is a methodology where researchers aim at solving practical problems while reflecting on and studying a research topic with the goal of generating new knowledge.

Our study utilized a participatory action research design, which involves a collaborative effort between the researcher and the participants to co-create knowledge (Carr & Kemmis, 1986). The participants in this study were 60 secondary school teachers, spread in the regions of Piedmont, and Lombardy, in Italy, and in the Italian-speaking part of Switzerland (i.e., Ticino). The teachers were selected based on their interest in including entrepreneurial competences development in their courses, and their willingness to participate in the action research process that lasted three years. The selection was helped by the chambers of commerce that linked the researchers of the present study to different schools in the area.

As is customary, the action research process consisted of four stages: (1) problem identification, (2) planning, (3) implementation, and (4) evaluation (Casey, 2013; Kemmis *et al*., 2013). During the problem identification stage, the researchers worked with 60 teachers and education leaders in Switzerland and in the Northern part of Italy to identify the need for developing entrepreneurial competences. In this stage, we run five workshops to capture the need of the teachers and schools' directors in order to design a course to co-develop some activities that enhance the entrepreneurial competences of pupils.

In the planning stage, the researchers and the participants had a series of sessions to design pedagogical activities that develop entrepreneurial competences. In practice, we develop a course that we replicated 8 times in different geographical areas. The course entailed four lectures in a workshop setting. The first lecture consisted of an introduction to entrepreneurship and a role-playing exercise to trial a possible activity. We provided an introduction to what being an entrepreneur means today. The main goal was to overcome preconceptions on entrepreneurship that teachers with a non-business background may have had, such as that entrepreneurship only means founding a start-up, or that entrepreneurship means working with technology or building huge firms. The role-play was about solving a practical problem about how to reduce congestion through alternative mobility. We provided some cards containing the needs of the companies, workers, and society, along with some global trends and existing solutions. Teachers played the role of students and we acted as teachers in order to experience a possible situation. The second lecture was about the choice of the core entrepreneurial competences to be developed through the activity. To guide this activity, we used the EntreComp Framework and applied it as an example to a previous experience in the context of an activity on

the topic of reducing food waste. The third and fourth lectures involved planning the activities and some peer discussion. We facilitated the sessions and acted as mentors for designing the activities. The educational activities developed had to be designed to favor an experiential approach, as these are more effective in the development of entrepreneurial competences (Cesaroni and Sentuti, 2014; Fayolle, 2013). Given that the goal of the course was to co-design some teaching activities to develop entrepreneurship competences with teachers of any subject, we adopted the backward instructional design model (Wiggins and McTighe, 1998). This model is considered as a proper approach in competence-based education (Bitetti, 2019). The backward design starts with the identification of the core competences to develop far before the planning of the contents of the activity (Wiggins and McTighe, 1998). Research has shown that the backward instructional design model can be an effective approach for developing educational content and is widely used and recommended in educational settings (Dick et al., 2015; Morrison et al., 2004). For example, Leupen et al. (2019) assert that using backward design resulted in better alignment between learning outcomes, instruction, and assessments – as compared to using a traditional approach. Kim and Hannafin (2011) found that using backward design enhances relevant and meaningful instruction to learners. The authors suggest that starting with learning outcomes can help teachers to focus on what their pupils need to know and be able to do, rather than simply covering content. Given that determining appropriate learning outcomes and assessments may be a particularly difficult and time-consuming process (Hmelo-Silver and Barrows, 2006), the reference framework of EntreComp was particularly effective in limiting the options for participants. We proposed to the teachers a template to guide the co-design process. In this template, the following questions and themes were present: (1) The context and the constraints of the activity (i.e., subject taught; the number of pupils participating in the activity; the time at disposition to run the activity); (2) The target entrepreneurial competences (from EntreComp); (3) The pre-requisites in terms of knowledge and skills; (4) Some key questions to guide the activity; (5) The challenge/situation provided to the pupils; (6) How to assess the pupils; and (7) detailed step-by-step planning of the activity, including the implementation plan.

The implementation stage involved the delivery of the activity and data collection. Not every one of the 60 teachers was able to implement the activity in full, but all of them initiated it. During the implementation, teachers acted as facilitators, who are often forgotten by entrepreneurship education literature (Jones and Underwood, 2017). The limited studies on the role of educators in promoting entrepreneurship education are mainly focused on their perceptions (Teerijoki and Murdock, 2014), attitude (Peltonen, 2008), creativity (Wibowo and Saptono, 2018), entrepreneurial be-

havior (Joensuu-Salo et al., 2020), and experiences (Diegoli and Gutierrez, 2018). We also collected information about the negative experiences for the final stage of evaluation.

In practice, the participants co-designed a potential activity to be implemented in their classes the next semester with us. Three exemplary projects are described next. First, a geography lecturer with a passion for social media designed an experiential learning path to deepen the knowledge of the region (in this case, the Italian-speaking part of Switzerland). The idea was the creation of a social media-protected profile where the lecturer and his pupils had to publish content linked to the knowledge of the local region and its characteristics. Pupils had the chance to experiment with the safe usage of digital tools within the digital society, while at the same time being at the center of their learning. The structure of the activity included the active participation of pupils and a competitive approach. In fact, the activity involved gamification techniques (i.e., the use of typical concepts and methods of gaming, fostering experiential learning and active involvement). The pupils, via the ideation and the design of challenges, quizzes, games, etc. had the chance to explore, know, and deepen knowledge about where they live in terms of economic activities as well as socio-demographical, environmental, and artistic factors. Second, three mathematics teachers together developed a project that asked students to transform an unexploited room into something important for all pupils of the school. Pupils first had to explore and assess different exploitation options through surveys and interviews. Besides some mathematics, statistics, and geometry skills, pupils also developed several significant entrepreneurial competences in customer-orientation. Moreover, they also had to think about investments, operating costs, and the governance of the room. An interesting element of the activity involved the fact that it ran over two different academic years. The first year was about the analysis of the room, while the second was about the testing and implementation. Third, a robotics lecturer developed an activity in which students had to develop a prototype of a robot able to sort objects in different locations. Pupils did not only focus on the technological aspects of the robot but needed to study business concepts by analyzing macro trends and defining the value proposition, customer journey and uniqueness of the product. These reflections conducted the development of a Minimum Viable Product (MVP), to be tested with the target market in order to understand if a real interest exists and, if so, in which market.

In the evaluation stage, the researchers and the teachers reflected on the results and made changes to the co-design process based on their findings.

3.1 Data collection and analysis

We conducted a comprehensive approach to gather rich and diverse insights into the study. The data collection process involved multiple methods, including diaries, reflective analysis, semi-structured individual and group interviews with the teachers, and observations during the implementation stage.

During the problem identification and planning stages, we developed a set of guiding questions for our reflective analysis and wrote the answers in a diary after every session with the teachers. After each session with the teachers, we carefully documented our activities, participants' behaviors, encountered challenges, positive aspects, key learnings, and potential changes for the subsequent sessions. We described accurately (1) what we did in the session; (2) what participants did and how they behaved; (3) the positive aspects we encountered; (4) the critical issues we encountered; (5) the main learnings we had; and (6) what changes would be required in the next session.

To enhance the credibility of our findings, we employed triangulation by incorporating multiple sources of data. In addition to the diary entries and reflective analysis, we conducted semi-structured interviews with the teachers. These interviews served as primary sources of information, allowing us to gather in-depth insights and interpretations directly from the participants. To ensure a thorough understanding of the teachers' experiences and perspectives, we conducted both individual and group interviews. To begin with, we conducted a total of 60 individual interviews, each lasting approximately 30 minutes, with all the teachers involved in the course. These interviews provided us with valuable one-on-one interactions, allowing us to delve into the teachers' personal experiences, perspectives, and perceptions related to the course and its contents. The individual interviews served as a foundation for understanding the participants' unique insights and uncovering nuanced details that may not have emerged in a group setting, especially concerning the personal project developed by the teacher. Following the individual interviews, we further expanded our data collection efforts by conducting four group interviews. These group interviews specifically targeted teachers from the same region, providing an opportunity for collaborative discussion and the exploration of shared experiences. Group interviews allowed us to tap into the collective knowledge of teachers, uncovering common themes, patterns, and regional perspectives regarding the course. This is particularly relevant as the education system is slightly different among the different regions, especially between Switzerland and Italy. Therefore, by conducting group interviews, we aimed to gather additional information and insights that may have been influenced by the collective dynamics and shared context among the

participants. These group interviews facilitated rich discussions, allowing participants to build upon and challenge each other's ideas, fostering a deeper exploration of the course's impact within the specific region and across the different subjects taught by the teachers.

To further ensure the validity of our data, we involved other researchers - who are not authors of this study - in the data analysis process to mitigate confirmation bias. These additional researchers independently reviewed and analyzed the data, providing alternative perspectives and interpretations, mitigating the risk of our biases due to the participatory approach we employed.

During the implementation and evaluation phases, we primarily conducted observations to carefully observe and document both the positive aspects of the implementation and any issues that emerged. These observations were an integral part of our data collection process and were closely connected to the diary we maintained. During the implementation phase, our observations involved actively monitoring and noting various aspects of the project. We observed the participants' behaviors, interactions, and engagement levels, as well as the overall progress and effectiveness of the implementation. We paid particular attention to identifying positive elements such as successful strategies, effective teaching methods, and instances of student enthusiasm or achievement. Simultaneously, we diligently documented any challenges or issues that arose during the implementation. These could include difficulties encountered by the teachers, unexpected obstacles, or areas where improvements were needed. By systematically recording both positive aspects and issues in our diary, we ensured a comprehensive and accurate account of the implementation process. The diary served as a central repository for our observations, allowing us to capture our real-time impressions and detailed descriptions. It acted as a logbook where we documented our observations, providing a chronological record of events, behaviors, and emerging patterns in terms of barriers, enablers, and outcomes. The connection between our observations and the diary was crucial in maintaining a thorough and reliable record of the implementation. By consistently noting our observations in the diary, we established a transparent and traceable link between the data collection process and our reflections on the project. This connection enabled us to refer back to specific instances, compare observations over time, and support our analysis and conclusions with concrete evidence.

At the end of the implementation, together with the teachers, we engaged in a critical reflection (both through individual and group interviews), discussing strengths, weaknesses, opportunities and threats about the entire activity. In order to thoroughly examine the barriers, enablers, and outcomes of the implemented experiential learning activities, we conducted a total of 20 individual interviews with the participating teachers

and organized two group interviews to facilitate critical reflections. These group interviews were conducted separately, with one taking place in Italy and the other in Switzerland, allowing for a cross-regional perspective on the subject matter.

The individual interviews provided us with valuable insights into the teachers' personal experiences and perspectives regarding the experiential learning activities. Additionally, the group interviews served as platforms for collective critical reflection. By bringing together teachers from the same region, we created a space for collaborative discussion and the exploration of shared experiences. The group interviews fostered a rich dialogue among participants, enabling them to critically analyze and discuss the barriers, enablers, and outcomes of the experiential learning activities. Moreover, by conducting separate group interviews in Italy and Switzerland, we sought to capture any contextual differences or regional variations that might influence the experiences and perspectives of the teachers.

To strengthen the credibility of our observations, we cross-referenced them with the insights obtained from the interviews with the teachers. By triangulating the data from multiple sources, we aimed to establish convergence and consistency in our findings, thereby enhancing the reliability of the study.

Throughout the study, our role as researchers involved facilitating the sessions and interactions with the teachers. We provided guidance, support, and expertise to ensure the smooth progress of the activities. However, we remained mindful of the potential influence of our presence and sought to minimize any impact on the participants' behaviors or responses. We strived to maintain an unbiased stance, allowing the teachers to express their thoughts and experiences freely.

The data was analyzed using thematic analysis as used in participatory action research (Kemmis and McTaggart, 2005; Reason & Bradbury, 2008; Wallerstein & Duran, 2010). In particular, after collecting the data, we reviewed and discussed the data to identify themes and patterns that emerged, together with the teachers. We used an iterative process of analysis and feedback, where you continuously refined the themes and patterns until a final set of themes emerged that accurately represented the data. Firstly, the teachers and the researchers reviewed the interviews and observation notes. We discussed any discrepancies or issues with the data and made sure that everyone agreed on the accuracy of the transcriptions. Secondly, we read through the transcriptions and our diaries and highlighted important words or phrases that stood out. We then generated a list of initial codes, based on these highlights. Thirdly, we worked together to group the codes into themes based on their similarities and differences. We discussed the themes and refined them until we had a set of overarching themes that captured the key issues that emerged from the data. This was a

particularly significant step as the different backgrounds between teachers and researchers emerged. Therefore, we refined the themes to make sure they accurately represented the data.

In the subsequent section, we highlight our findings, by describing the themes analyzed and discussing their implications for the development of teaching activities aimed at developing entrepreneurial competences.

4. Results

The present action research reveals that the approach produced some insights regarding three main themes: (1) barriers; (2) enablers; (3) outcomes.

4.1 Barriers to an open and collaborative process to co-design entrepreneurial competences developing educational activities

We identified three main barriers that hindered the co-design of the educational activities suggested by the teachers. The first insight of our study reveals the lack of an institutional strategy regarding how to include entrepreneurship education in secondary schools as a key barrier. During the planning phase, researchers and teachers worked together. However, during the implementation, the lack of support, commitment and clear strategy from the education institutes sometimes hindered the full implementation of the activity designed. This emerging theme was consistently identified through both individual and group interviews, highlighting its significance in shaping the outcomes of the study. During the individual interviews, participants expressed their concerns and frustrations regarding the absence of a clear institutional strategy to support and guide the implementation of experiential learning activities. They highlighted the lack of overarching goals, guidelines, and resources dedicated to integrating such practices into the curriculum. Teachers emphasized that without a well-defined strategy, they faced difficulties in effectively implementing experiential learning and realizing its full potential. Furthermore, there were instances where the activities proposed by the teachers were found to be in direct conflict with the school program and its established goals.

> *"When the subject expert has been informed of our activity, s/he said that it was difficult to find connections with the school program and goals. I needed to quit the activity"*
> *(Teacher, Switzerland).*

The group interviews further substantiated this finding as participants engaged in collective critical reflections. Teachers from different regions, representing diverse perspectives, echoed similar sentiments regarding the absence of institutional strategies. They emphasized the need for comprehensive institutional support, including policy frameworks, professional development opportunities, and collaborative networks, to address the barriers and maximize the benefits of experiential learning activities. These findings shed light on the crucial role that institutional strategy plays in shaping the success of experiential learning initiatives. The lack thereof poses significant challenges for teachers and limits the potential impact of these activities on student learning outcomes. Based on the collective insights gathered from both individual and group interviews, it is evident that establishing a robust institutional strategy is essential to overcome barriers and effectively harness the benefits of experiential learning. These results underscore the importance of advocating for the development and implementation of institutional strategies that provide clear guidance, support, and resources to educators. By addressing this critical gap, educational institutions can create an enabling environment that promotes the successful integration of experiential learning approaches, ultimately enhancing teaching practices and fostering meaningful learning experiences for students.

A second significant barrier identified in our study was the lack of a collaborative ecosystem involving the university, teachers, their institute, and other institutional actors, such as the Ministry of Education. Throughout our research, we primarily engaged with highly self-motivated teachers. However, to ensure a successful implementation of the approach, it is crucial to involve teachers who may initially perceive entrepreneurship education as irrelevant. The co-design stage plays a pivotal role in addressing fears and prejudices, enabling a more inclusive and effective implementation.

These findings emerged not only from our direct observations but were also substantiated by individual interviews conducted during the critical reflection phase. By combining these two data sources, we obtained a comprehensive understanding of the barrier and its impact on the implementation process.

"During the implementation, I missed the support of my other colleagues that did not trust in these kinds of activities" (Teacher, Italy).

It is worth noting that the absence of a collaborative ecosystem hindered the full potential of the approach. The absence of active involvement from key stakeholders limited the support, resources, and guidance available to teachers. This, in turn, impeded the holistic integration of entrepreneurship education into the curriculum and prevented the realization of its intended

benefits. Therefore, our study underscores the significance of fostering a collaborative environment that encourages the active participation of all relevant institutional actors.

A third significant aspect that emerged from our study was the need for monitoring pupils' and teachers' entrepreneurial competences. Throughout our research, we did not conduct a survey or utilize other detection methods to assess the pre-existing and post-treatment levels of entrepreneurship competences. However, we recognize the importance of such monitoring in evaluating the effectiveness of the approach and identifying areas that require further improvement. By actively monitoring the entrepreneurial competences of both pupils and teachers, we would have gained valuable insights into the impact of the approach used. This type of monitoring enables a comprehensive assessment of the effectiveness of the implemented activities and helps identify any challenges or areas in need of refinement. Incorporating the expertise of professionals in the measurement of entrepreneurial competences would provide further support in this monitoring process. These findings were derived from the combination of individual and group interviews conducted throughout the study. Participants emphasized the significance of pre- and post-treatment monitoring as a means to enhance the implementation stage of such projects. By monitoring the growth and development of entrepreneurial competences, educators can gain a clearer understanding of the progress made by both pupils and teachers, enabling targeted interventions and continuous improvement.

"I am currently uncertain about the development of my pupils' competences and the extent to which they have progressed. While we typically conduct initial assessments to measure pre-existing knowledge in new subjects, assessing entrepreneurial competences presents a unique challenge, and I lack the necessary resources to accurately evaluate these skills" (Teacher, Switzerland).

4.2 Enablers of a better open and collaborative process to co-design entrepreneurial competences developing educational activities

We identified three particular enablers that (may) make the entire co-design process stronger. The first enabler we identified was active tutoring following the course, aimed at facilitating the successful implementation of co-designed teaching activities. We observed that in cases where we only

offered technical support without ongoing guidance, teachers faced greater challenges in sustaining the activities. It became evident that our role should resemble that of mentors, similar to coaches for entrepreneurs in startup acceleration programs. By providing encouragement and assistance during difficult situations, we discovered that maintaining high motivation among teachers was essential. This insight emerged from both individual and group interviews, as it became apparent that many teachers still harbored insecurities about the technical aspects of entrepreneurship. Recognizing their concerns, we realized the importance of offering ongoing support and guidance throughout the implementation process. By adopting a mentorship approach, we aimed to instill confidence, provide guidance, and help teachers navigate obstacles they encountered while fostering a positive and motivating environment. The mentorship role we embraced, inspired by entrepreneurial coaching practices, proved beneficial in addressing teachers' insecurities and keeping their motivation high. The insights gained from individual and group interviews underscored the need for ongoing support, ultimately contributing to the successful implementation of entrepreneurial competences developing educational activities.

"The key to the successful implementation of the activity was that researchers were also present during the implementation in class, mainly to support me emotionally" (Teacher, Italy).

The second key enabler pertains to the teachers' realization that they do not need to acquire an entirely new set of skills. Through the utilization of backward design as a common language with the teachers, we successfully fostered an awareness of the importance of developing entrepreneurship competence. Teachers came to understand that they had already been implementing various activities that aligned with entrepreneurship competences, albeit in a fragmented manner. Our approach enabled them to systematize these activities, creating a more cohesive framework. Furthermore, the individual interviews conducted during the design phase shed light on how the activities closely resembled initiatives that the teachers had previously implemented, even though they had not explicitly identified them as entrepreneurship-related. This discovery served to validate their existing efforts and further contributed to their understanding and acceptance of entrepreneurship education. Remarkably, our approach not only enabled teachers to develop systematized activities but also facilitated the improvement of their entrepreneurial mindset. As a result, they emerged as enthusiastic ambassadors of entrepreneurship education within their schools, despite facing criticism from some of their colleagues. This valuable insight emerged from the individual interviews, which highlighted the

teachers' recognition of the parallels between the activities designed and the initiatives they had previously undertaken. This realization fostered a sense of confidence and ownership among the teachers, empowering them to embrace entrepreneurship education and advocate for its value within their educational settings.

"You are an expert in entrepreneurship and you call these skills entrepreneurial competences. I call them soft skills, and I have learnt some new vocabulary for my profession" (Teacher, Switzerland).

The third enabler that emerged from our study revolved around leveraging digital technologies for educational purposes as a means to foster entrepreneurial competences. Numerous activities were implemented during the COVID-19 pandemic, and surprisingly, the use of digital tools proved to be an invaluable asset in nurturing skills associated with entrepreneurship, such as flexibility, adaptability to change, and resilience in the face of uncertainty. Interestingly, the adoption of digital tools was not perceived as a barrier; rather, it served as a powerful support system in enabling the development of entrepreneurial competences. This insight emerged from our observations, which were recorded in our diaries, and further reinforced through in-depth discussions during the group interviews conducted after the implementation phase. In particular, various digital tools, such as *miro*, shared documents, mind maps, and others, played a pivotal role in cultivating entrepreneurial competences. In fact, these tools offered collaborative spaces, enhanced communication and information sharing, facilitated creativity and problem-solving, and provided opportunities for real-time feedback and reflection. The seamless integration of these digital resources into the educational process contributed to the development of entrepreneurial skills among both teachers and students. It is noteworthy to mention that our study did not observe any hindrance in the development of entrepreneurial skills caused by the use of digital tools. On the contrary, these tools served as catalysts for fostering entrepreneurial competences, empowering individuals to adapt to changing circumstances, think innovatively, and navigate uncertainties effectively.

"Both teachers and pupils were in difficulty because of the COVID-19 situation that obliged us to teach remotely. However, I realize that my pupils and I improved a lot in dealing with uncertainty and seeing the unknown positively rather than with fear" (Teacher, Italy).

Outcomes of an open and collaborative process to co-design entrepreneurial competences developing educational activities

We also assessed some impact and outcomes at three levels: the lecturers and their pedagogy, the learners, and professional associations around the schools.

Our study unveiled a profound impact on the pedagogical practices of teachers, highlighting a notable shift in their approach to planning and conceptualizing the subjects they teach. Integrating experiential learning activities aimed at fostering entrepreneurial competences triggered a transformative evolution in their pedagogical strategies. This shift was evident across multiple stages, including planning, implementation, and subsequent discussions regarding the future trajectory of the activities. During the planning phase, teachers actively engaged in co-designing the activities, drawing upon their expertise and creativity to craft meaningful learning experiences. They became more intentional in aligning the activities with the development of entrepreneurial competences, ensuring a comprehensive and immersive educational journey for their students. This shift in planning involved considering real-world scenarios, problem-solving tasks, and opportunities for critical thinking and decision-making, all aimed at nurturing entrepreneurial mindsets. In the implementation stage, teachers embraced a more facilitative role, creating an environment conducive to experiential learning. They fostered collaboration, encouraged students to take ownership of their learning, and provided guidance when needed. The incorporation of entrepreneurial competences into the curriculum led to dynamic classroom interactions, where students actively explored and applied their knowledge in practical contexts. Teachers observed how this shift empowered students, cultivating their confidence, resilience, and adaptability. Subsequent discussions about the future of the activities further solidified the impact on pedagogy. Teachers engaged in reflective dialogue, exchanging insights, and sharing best practices. They recognized the value of integrating experiential learning and entrepreneurial competences into their teaching repertoire. This realization prompted them to explore new instructional methodologies, seek professional development opportunities, and collaborate with colleagues to continually refine their pedagogical approaches.

"Integrating experiential learning activities for entrepreneurial competences has completely reshaped how I approach my teaching. I now view my role as a facilitator, guiding students on their journey of discovery of the subject, while empowering them o apply their learning in meaningful ways" (Teacher, Switzerland).

While our study did not involve a formal measurement of the level of competences attained, our comprehensive observations and insights gleaned from individual and group interviews provided compelling evidence of a significant impact on the learners. The carefully designed activities aimed at fostering entrepreneurial competences effectively ignited a heightened level of engagement among the pupils, resulting in a transformative learning experience. Moreover, the positive impressions expressed by parents further reinforced the effectiveness of these activities in promoting their pupils' development. Throughout the implementation of the activities, we observed an evident increase in pupils' motivation and enthusiasm. They actively embraced the challenges presented by the experiential learning tasks, displaying a remarkable level of involvement and commitment. The activities created a dynamic learning environment that stimulated students' curiosity, encouraged their exploration of entrepreneurial concepts, and nurtured their critical thinking and problem-solving abilities. Pupils were observed engaging in collaborative discussions, displaying creativity in generating innovative ideas, and demonstrating less fear of failure. Moreover, the feedback received from parents during the meeting the teachers had with them underscored the positive impact of the activities. Parents expressed satisfaction with their children's increased engagement and enthusiasm towards learning. They recognized the value of the experiential approach in fostering a broader set of skills beyond disciplinary knowledge, equipping their children with essential competences for future success. Parents also highlighted the improved confidence and self-belief exhibited by their children, which extended beyond the classroom into various aspects of their lives.

"Contrary to my initial concerns, it became evident that parents not only embraced the program but also expressed deep appreciation for the valuable skills their children were equipped with, essential for their future in the ever-evolving world of work" (Teacher, Italy).

The impact of the project extended beyond the school walls and resonated within the professional associations surrounding the educational community. The integration of entrepreneurship education sparked considerable interest among entrepreneurs and business owners, eliciting a wave of curiosity that led them to visit the classroom and observe the innovative approach and activities firsthand. This heightened attention from professionals in diverse industries signifies a transformative shift in bridging the longstanding gap between educational institutions and the dynamic world of work. Entrepreneurs and business owners recognized the value and

relevance of equipping students with entrepreneurial competences from an early age. They saw the potential of nurturing these skills as a means to foster innovation, adaptability, and an entrepreneurial mindset among the future workforce. The enthusiastic response from professionals further validated the importance of integrating entrepreneurship education within the school curriculum.

> *"Witnessing the integration of entrepreneurship education in the classroom has been truly inspiring. I believe this initiative will play a significant role in bridging the gap between schools and the job market" (Entrepreneur, Italy).*

The growing interest and support from professional associations underscore the potential long-term impact of the project. By forging meaningful connections between the school and the broader community, the project not only enriched the educational experience but also opened doors to future collaborations, mentorship opportunities, and internships for students. This symbiotic relationship between the school realm and the professional world has the potential to create a more seamless transition for students as they embark on their career paths.

5. Discussion

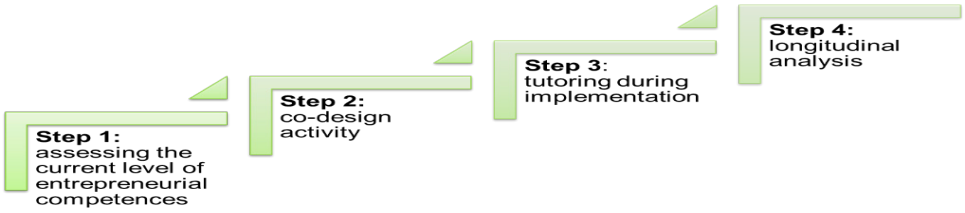
The barriers, enablers, and outcomes identified in our study have important theoretical implications for the field of entrepreneurship education and the open and collaborative innovation processes. These findings contribute to the existing literature by shedding light on key factors that influence the successful implementation of educational activities aimed at fostering entrepreneurial competences. First, we highlighted the role of an institutional strategy and the need to collaborate with the school ecosystem. The lack of an institutional strategy regarding the inclusion of entrepreneurship education in secondary schools and the absence of a collaborative ecosystem involving multiple stakeholders, such as the university, teachers, their institute, and the Ministry of Education, are significant barriers identified in our study. These findings align with the work of Brüne and Lutz (2020) and Jardim et al. (2021), who also emphasize the importance of institutional support and collaboration between different actors in entrepreneurship education. The theoretical implication is that a cohesive and well-defined institutional strategy, along with a collaborative ecosystem, is crucial for creating an enabling environment that supports the co-design process. Second, our study highlights the lack of monitoring of pupils' and

teachers' entrepreneurial competences as a barrier to the co-design process. This finding underscores the need for ongoing assessment and evaluation of competences to track progress and identify areas for improvement. The work of Nabi et al. (2017) is relevant here, as they emphasize the importance of longitudinal analysis in entrepreneurship education. Our study underscores the recognition that continuous monitoring and assessment are essential for understanding the effectiveness of educational activities and facilitating competence development. Third, the identification of active tutoring following the course as an enabler in the co-design process aligns with previous research. Perry et al. (1998) highlight the effectiveness of providing opportunities for teachers to engage in professional development and serve as visiting lecturers at universities. The present study goes beyond that and implies that active tutoring and ongoing support contribute to the successful implementation of co-designed teaching activities between university scholars and secondary schools' teachers. Additionally, the utilization of backward design as a common language with teachers is an enabler that fosters an awareness of the importance of developing entrepreneurship competence. This finding resonates with the instructional design literature, particularly the work of Wiggins and McTighe (1998), emphasizing the significance of backward design in curriculum development. Fourth, the observed shift in teachers' pedagogical practices, reflecting a change in their approach to planning and conceptualizing subjects, has theoretical implications for the field of entrepreneurship education. This finding aligns with Bacigalupo et al. (2016), who emphasize the transformative impact of entrepreneurship education on teachers' practices. The theoretical implication is that co-design activities can influence teachers' pedagogical approaches, promoting more student-centered and experiential learning methods (Cerquetti et al., 2021; Hahn et al., 2021), also enhanced by digital technologies implemented during the Covid-19 pandemics (Liguori and Winkler, 2020). Furthermore, the significant impact on learners and professionals in diverse industries signifies a transformative shift in bridging the gap between educational institutions and the dynamic world of work. This finding resonates with the literature on entrepreneurship education's broader societal impact and the need for educational programs to prepare students for real-world challenges (Morris et al., 2013).

By discussing our main insights, we have determined that in order to collaboratively design educational activities aimed at cultivating entrepreneurship competences among secondary school pupils, a systemic framework can be suggested. This framework encompasses the following steps. Firstly, it is essential for entrepreneurship scholars to assess the existing level of entrepreneurship competences among both teachers and students. To effectively evaluate these competences, the entrepreneurial aptitude test (TAI) (Cubico et al., 2010) could be employed as a potential tool, as it offers

the advantage of employing quantitative methods for inference-making. Additionally, assessing competences requires the utilization of qualitative methodologies. In fact, evaluating participants' performance in realistic tasks provides an ideal context for assessing competence development (Tardif, 2006). Secondly, teachers and entrepreneurship scholars need to engage in co-design activities. By employing the EntreComp Framework as the conceptual foundation and utilizing the instructional design method of backward design (Wiggins and McTighe, 1998), interesting experiential learning activities can be developed, as outlined in the methodology section. However, in line with Gianesini et al.'s (2018) analysis, it is advisable to adopt a comprehensive perspective that encompasses not only skills and knowledge but also personality traits when considering the components of entrepreneurial competences. Thirdly, teachers should implement these activities with the guidance and support of entrepreneurship scholars. Throughout the implementation process, researchers can provide a suitable framework for conducting the activities, ensuring that the goal of developing the selected entrepreneurial competences remains a priority. This approach expands the co-design process into an open and collaborative innovation landscape, which is also present during the implementation phase in the classroom. Fourthly, university researchers, secondary school teachers and directors, as well as institutional actors like the Ministry of Education, should collaborate to establish an observatory to validate the outcomes of the various activities. Longitudinal analysis can be conducted and supplemented with new data and experiences to validate the most effective activities. This addresses the significant concern raised by Nabi et al. (2017) regarding the lack of longitudinal analysis in entrepreneurship education. As a summary, Figure 2 represents our framework.

Fig. 2. Entrepreneurial Competences Development Co-Creation Framework



Source: Developed by authors

6. Conclusion

Entrepreneurial competences are at the core of entrepreneurship education (Cubico and Favretto, 2018; Edwards-Schachter *et al*., 2015). In particular, these competences are embedded in experiential entrepreneurship education that aims at developing the competences to think and act as an entrepreneur, beyond the competences required to found a company (Fayolle *et al*., 2006; Kuratko and Morris, 2019; Morris *et al*., 2013). However, despite entrepreneurship education being an increasingly relevant topic among entrepreneurship scholars, scant attention has been paid to the role of universities and secondary schools in developing entrepreneurial competences (Aparicio *et al*., 2019; Jones and Underwood, 2017). Moreover, no prior studies examine the opportunities for collaboration between universities (i.e., entrepreneurship scholars) and secondary school teachers in the co-design of educational activities that foster pupils' entrepreneurial competences. In response to the research questions "How do entrepreneurship scholars and secondary school teachers co-design educational activities that foster pupils' entrepreneurship competences?" and "How do barriers, enablers, and impact/outcomes influence this co-design process?", our study provides explicit answers. By contributing to the existing literature on entrepreneurship education, we assert that experiential learning in entrepreneurship education proves to be a powerful tool for designing effective entrepreneurship education programs (Cerquetti et al., 2021; Hahn et al., 2021). Moreover, we extend our knowledge about this field by incorporating the EntreComp Framework (European Commission, 2016). Moreover, we tested the application of the backward design (Wiggins and McTighe, 1998) as an approach to design educational activities that actually foster desired entrepreneurial competences in all kinds of subjects in secondary schools. In other words, our approach contributes to the literature on entrepreneurial competences and entrepreneurship education by providing a practical tool to secondary school teachers - highlighting the need for doing things differently and not re-inventing the wheel.

Furthermore, our study contributes to the existing literature on open and collaborative innovation in school contexts, particularly co-creation and co-design approaches. We developed a co-design process framework, by understanding its barriers, its enablers, and its outcomes within an open and collaborative innovation approach. Hence, we contribute by suggesting a process of reconsidering the collaborative, rather than complementary, role of universities and secondary schools in the development of entrepreneurial competences (Perry et al., 1998). We applied an open and collaborative innovation framework, specifically in relation to the ecosystem of entrepreneurship education, to facilitate the co-design process (Brüne and Lutz, 2020; Jardim et al., 2021). This framework drew upon the

principles of open innovation, which emphasizes the importance of external collaboration and the integration of diverse perspectives and expertise (Chesbrough, 2003). In the context of entrepreneurship education, the application of this framework fostered a dynamic and inclusive approach by involving multiple stakeholders, including entrepreneurship scholars, secondary school teachers, university researchers, and institutional actors such as the Ministry of Education. By embracing the principles of open and collaborative innovation, we created a conducive environment for knowledge sharing, idea generation, and co-creation that sheds new light on the substantial impact of university faculty on educational reforms in secondary schools (Kersh and Masztal, 1998). This approach recognized that the process of designing educational activities to foster entrepreneurship competences requires the collective effort and expertise of various actors within the entrepreneurship education ecosystem.

The present study also has practical implications. Firstly, as universities are increasingly called for their "third mission" about contributing to the socio-economic development of the territory (Colasanti *et al*., 2017), we see opportunities for the implementation of an open innovation ecosystem, involving universities, teachers, schools, and institutional actors, with the aim of improving the (entrepreneurship) education of tomorrow. Secondly, in the long run, we could also suggest that entrepreneurship could be part of the curriculum of aspiring secondary school teachers during their training, by adding a phase 0 to our framework. Thirdly, one of the main added values of our approach lies in the consistency of the teaching activities developed, keeping in mind the pedagogical goals of every subject. In fact, we do not substitute the teachers while implementing the activities. Rather, we facilitate a revision of their current educational practice and make them responsible for the development of entrepreneurship competences. In this way, pupils do not see the activity as a stand-alone moment. Pupils will develop subject-related competences while simultaneously developing entrepreneurial competences with the very same teacher they are used to. Lastly, our study has implications for designing and implementing effective project policies that involve secondary schools and universities are significant. Based on our findings, we can offer several suggestions to enhance the collaboration between these two entities and promote the development of entrepreneurship competences among students. It is crucial to establish a clear institutional strategy that outlines how entrepreneurship education will be integrated into secondary schools. This strategy should emphasize the importance of collaboration between universities and schools, providing a framework for joint initiatives and shared goals. Then, building a collaborative ecosystem involving secondary schools, universities, teachers, and other institutional actors, such as the Ministry of Education, is essential. This ecosystem should facilitate regular communication, knowl-

edge sharing, and collaborative efforts to co-design educational activities. Additionally, it is crucial to emphasize teacher professional development. Teachers should be made aware that they do not need to acquire an entirely new set of skills to incorporate entrepreneurship education into their teaching practices. By using backward design as a common language and providing training opportunities, teachers can develop the confidence and competence needed to effectively deliver entrepreneurship education. Moreover, digital technologies can play a pivotal role in fostering entrepreneurial competences. Integrating digital tools and platforms into educational activities can enhance engagement, collaboration, and creativity among students. Therefore, it is important to leverage digital technologies for educational purposes, creating a digital learning environment that supports the development of entrepreneurship competences.

Our study also has several limitations that could serve as focus areas for future research. We did not entirely solve the question of how to measure the development of entrepreneurial competences. Given the already existence of quantitative tools such as surveys (Cubico *et al*., 2010), we suggest that scholars engage in the development of qualitative evaluations of entrepreneurial competences. Interdisciplinary work with pedagogy experts may help develop innovative evaluation tools. Moreover, we only engaged with very motivated teachers. Results may have been different by engaging in a co-design process with reluctant teachers and may require a revision of the process, by adding some sense-making activity to establish a stronger connection with teachers.

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BLOCKCHAIN TECHNOLOGY FOR SUPPLY CHAIN TRACEABILITY: THE CASE OF SMES OF THE MADE IN ITALY

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Abstract

Purpose. *This research aims at investigating why and how blockchain technology (BCT) is used for supply chain (SC) traceability in SMEs of the Made in Italy.*
Methodology. *Expert interviews with managerial and technical staff of Italian SMEs adopting BCT for SC traceability of Made in Italy products and tech companies providing it.*
Findings. *BCT is used to increase transparency in SC traceability and trust among stakeholders, however, not many firms and consumers know about this technology or how to use it, and there is a lack of clear regulations. Most SMEs of the Made in Italy use BCT in their SCs for B2C marketing purposes. Many of the blockchain solutions provided notarize on public 3rd generation blockchains the hashes of the off-chain documents in which the adopters state the traceability information about their products, which is accessible via the provider's App. This kind of solution brings some risks to data reliability.*
Practical implications. *Managerial implications are presented, helping firms understating if they need BCT for traceability and what solution they can adopt based on their objective.*
Originality of the study. *The study provides empirical evidence on a novel topic which has not been thoroughly addressed in the academic literature.*

1. Introduction

Supply chains (SCs) have become increasingly complex, stretching globally and involving many actors (Zhang *et al.*, 2020), and have been affected by severe disruptions, such as those brought by the Covid-19 pandemic (Pujawan and Bah, 2022). At the same time, consumers have become more demanding of the provenance of the products they purchase, increasing the pressure on retailers and distributors to provide products with transparent traceability information attached (Kittipanya-ngam and Tan, 2020). Access to traceability information by SC stakeholders (i.e., suppliers, producers, distributors, retailers, authorities, certifiers, and customers) is recognized as a mechanism to ensure product quality and safety (Manzini and Accorsi, 2013) and increase customers' trust (Gharehgozli *et al.*, 2017). Hence, traceability systems that enable transparency in complex SCs are needed.

Companies usually store traceability information about their products in their centralized databases, making such information inaccessible to SC stakeholders (Agrawal *et al.*, 2021) and modifiable or removable by malicious actors (Haq and Muselemu, 2018). Centralized data management causes low transparency, information asymmetry (Mao *et al.*, 2018), lack of trust among SC stakeholders (Chan *et al.*, 2019), and makes it difficult to detect counterfeit products (Abbas *et al.*, 2020), increasing the chances of frauds on product quality and identity (Dabbene *et al.*, 2014).

Blockchain technology (BCT) has been proposed as a tool for companies to store and share their products' traceability information transparently by making it visible to SC stakeholders and immutable (Mahyuni *et al.*, 2020; Saberi *et al.*, 2019).

However, BCT has not been implemented extensively in SCs and there is a lack of empirical data on its applications (Gonczol *et al.*, 2020; Rogerson and Parry, 2020)blockchain, the technology behind the cryptocurrency, has been gaining increasing scientific and industrial interest. Due to the technology's innate distributed and immutable features, the adoption of blockchains on supply chains is one of the most promising recent applications. In this survey, we review academic researches and implementations of distributed ledgers on supply chains. We present the current state of research on the subject and summarize the benefits and the challenges of the distributed organization and management of supply chains. Focusing on industrial practices and use cases, we discuss the technical characteristics and maturity of the various industrial projects. Our goal is to assess the applicability of blockchains in the supply chain domain and to provide a foundation for practitioners and researchers to direct their future projects towards improving the technology and its applications.",",container-title":"IEEE Access",",DOI":"10.1109/ACCESS.2020.2964880",",ISSN":"2169-3536",",journalAbbreviation":"IEEE Access",",page":"11856-11871",",source":"DOI.

org (Crossref and benchmarking between different blockchain solutions (Sund *et al.*, 2020). Thus, there is a need for more case studies of real implementations of BCT (Antonucci *et al.*, 2019).

The adoption of BCT in SCs is a particularly relevant case study in Italy, due to the importance of Made in Italy products in the Italian economy (EU Blockchain Observatory & Forum, 2020). Indeed, BCT could be used by companies of the Made in Italy for business-to-consumer (B2C) marketing (Violino *et al.*, 2020)Frantoio and Leccino and against counterfeiting of their products (Caldarelli *et al.*, 2020). Small and medium-sized enterprises (SMEs) of the Made in Italy could benefit the most from applying this innovative technology since they usually do not have the means to fight the counterfeiting of their products (OECD, 2018).

Given the lack of evidence on the use of BCT for SC traceability and its possible implications for SMEs of the Made in Italy, this research aims at gathering primary data by conducting interviews with managerial and technical staff of Italian SMEs adopting BCT for SC traceability of Made in Italy products and tech companies providing it, in order to answer two research questions:

RQ1: What issues of supply chain traceability of Made in Italy products can blockchain technology address?

RQ2: Which blockchain solutions for supply chain traceability can SMEs of the Made in Italy use, according to their objectives?

The results contribute to the literature on BCT for SC traceability and provide practical insights for companies and policymakers to make informed decisions.

The paper first presents the theoretical framework on BCT for SC traceability. Then, the methodology is provided, followed by the findings. The results are discussed. Finally, the conclusions summarize the findings, propose managerial implications, and provide suggestions for future research.

2. Literature review

2.1 Transparency in supply chain traceability

SC traceability refers to access to information about a product (Olsen and Borit, 2013), like weight and temperature, energy and resource consumption, batch quantity and size, production, transformation, and distribution (Casino *et al.*, 2020). Transparency in a SC is the extent to which the SC's stakeholders have access to the information about a product (Hofst-

ede *et al.*, 2004). Companies can make the traceability information about their products visible to SC stakeholders for several purposes: assure them of the safety and quality of the products (Sun and Wang, 2019); attest product provenance and identity against frauds and counterfeiting (Dabbene *et al.*, 2014); foster trust among SC partners (Casino *et al.*, 2020; Kittipanyangam and Tan, 2020); increase customers' brand loyalty and trust by giving them the possibility to check the quality and safety of the food they buy (Yu *et al.*, 2018). Contrarily, when companies do not share their SC traceability information, they create low transparency, information asymmetry (Mao *et al.*, 2018), and a lack of trust in their relationship with all SC stakeholders (Chan *et al.*, 2019). This can damage both products' buyers and sellers. As Akerlof (1970) explained, the lack of transparency about products causes information asymmetry, meaning that buyers cannot assess the actual quality of products which is known by the sellers. This creates mistrust and leads buyers to prefer buying products of certain low quality rather than uncertain high quality. The consequence is that buyers end up having lower-quality products overall, while sellers of high-quality products do not sell as much as they could if the information asymmetry had been reduced by product transparency, which is defined as the disclosure of traceability information concerning a product (Ospital *et al.*, 2022). Moreover, when consumers perceive a high risk due to information asymmetry, they can choose not to buy a product altogether (Zhou *et al.*, 2018). Consequently, ensuring transparency in SCs is beneficial both to consumers and companies.

2.2 Blockchain technology

BCT is a kind of distributed ledger technology (DLT) where a ledger containing transactions between peers is structured in blocks that are concatenated one to the other, forming an unbreakable chain of blocks (Chowdhury et al., 2019). As Nakamoto (2008) explained, a blockchain enables transactions to have the following characteristics: peer-to-peer, without intermediaries; digitally signed by the issuer and the receiver; timestamped, proving their existence at a certain point in time; can be appended only, without the possibility to change or remove them, making the ledger immutable; can contain text strings, making BCT useful to share textual information among peers; visible to all stakeholders. Immutability and visibility combined enable transparency, thus removing the need for intermediaries or trusted third parties to conduct and validate the transactions. Since any kind of data can be written inside the transactions, blockchains are a valid alternative to centralised databases to ensure data transparency and security (Bianchini and Kwon, 2020). Indeed, the centralised databases usually employed by firms are siloed, i.e., not visible to stakeholders interested in

accessing the data they contain (Chowdhury et al. 2019). Also,blockchains are more secure than centralised databases because the ledger containing the transactions is copied in all the nodes of the blockchain network, thus eliminating the problem of the single point of failure caused by the single node's malfunctioning or hacking (Viriyasitavat and Hoonsopon, 2019). However, this technical feature also requires that new information is distributed to all the nodes of the network before any other additional information can be written in the database, making blockchains not as scalable as centralised databases (Gobel and Krzesinski, 2017), meaning that blockchains are generally unable to store huge amounts of data in a short time (The European Union Blockchain Observatory & Forum, 2019) unless the number of nodes is decreased, in which case the blockchain's decentralisation and security would be hindered (Del Monte et al., 2020).

Despite its technical limitations, blockchains still allow more data transparency than siloed centralised databases and are preferable to them when multiple parties wanting to share data between them do not trust each other and cannot (or do not want to) find a trusted third party to ensure the validity and immutability of such data (Chowdhury et al., 2018). The trust deficit is the most important requirement for choosing to use blockchains rather than centralized databases. As theorized by Sternberg et al. (2020), if trust between parties is already present, then the adoption of BCT would not create more trust and is ultimately unnecessary.

2.3 Blockchain for supply chain traceability

BCT enables transparency by making the products' traceability information immutable and visible to SC stakeholders (Mahyuni et al., 2020). Companies can store on a blockchain their products' traceability information stating the provenance of raw materials, components, or ingredients (Westerkamp et al., 2020), and proving their products' originality (Islam and Kundu, 2019). Once the traceability information is uploaded to a blockchain, a tag (e.g., RFID, NFC, QR code) is applied to the product and can be scanned by SC stakeholders to access the blockchain and audit the product's traceability information (Tan and Ngan, 2020; Violino et al., 2020).

Transparency in SCs is one of the most important applications of BCT for companies since it brings them many benefits (Alawi et al., 2022).

First, it can increase the accountability of all SC partners. Since the traceability data on a blockchain is immutable and visible, companies are discouraged from any misconduct (e.g., sharing false or inaccurate data) because of fear of reputational damage (Longo et al., 2019).

Second, the fact that the information in a blockchain is transparent enables trust between SC stakeholders (Wang et al., 2019). Nevertheless, while BCT can make the information uploaded to a blockchain tamper-proof

(Mirabelli and Solina, 2020), it cannot ensure that the information itself is correct, so it does not eliminate the risk of fraudulent behaviour (Violino et al., 2020). Hence, SC partners cannot fully trust that the traceability data uploaded to a blockchain by other SC partners are correct (Violino et al., 2020). Data could be incorrect due to voluntary tampering or human error. The solution proposed is to use the Internet of Things (IoT) to automate the processes of collecting and uploading traceability information to a blockchain, thus removing human intervention (Iftekhar et al., 2020). For example, Cocco et al. (2021) developed a SC traceability system for an agrifood SME combining BCT and the IoT to guarantee a reliable, transparent, and auditable product traceability.

Third, BCT in SCs can facilitate origin tracking and help identify counterfeit products (Hosseini Bamakan et al., 2021). Current anti-counterfeiting systems are inadequate because they rely on centralised databases to store the products' traceability information, which SC stakeholders cannot access to verify a product's originality; also, these databases are not secure and the data they contain can be changed to commit frauds in SCs (Abbas et al., 2020). Instead, with BCT-enabled SC traceability, the consumers can scan a tag on a product to recover immutable proof of its originality (Haq and Muselemu, 2018). In this way, consumers are involved in anti-counterfeiting (Ma et al., 2020), helping companies reduce their losses due to counterfeiting (Abbas et al., 2020) and build customers' trust and brand loyalty (Dujak and Sajter, 2019). This is especially relevant for SMEs because they usually do not have sufficient resources and capacities to monitor the threat of counterfeiting or to develop effective countermeasures against it (OECD, 2018).

Fourth, companies implementing BCT-enabled SC traceability allow consumers to get the information to make informed decisions (Bumblauskas et al., 2020). This could lead to an increase in revenues, both from an increase in sales by customers who value product transparency (Kittipanya-ngam and Tan, 2020) and from persuading them to pay a higher price compared to similar products that are not traced with BCT (Guido et al., 2020; Violino et al., 2019). These benefits could be higher for products for which consumers value provenance more (Rogerson and Parry, 2020).

Fifth, product transparency enabled by BCT can be used for marketing to consumers who value transparency in their purchasing process (Zhou et al., 2018). When consumers scan a tag, they access a webpage containing the product's traceability information, allowing companies to use that webpage to do storytelling about their products (Violino et al., 2020). Galati et al. (2021) and Compagnucci et al. (2022) found that Italian SMEs use BCT for agrifood SC traceability as a B2C marketing tool to present themselves as reliable and trustworthy to consumers, showcase their products as high-quality and safe, and have a more direct relationship with costumers.

Other benefits come from digital tools enabled by BCT: smart contracts

and non-fungible tokens.

A smart contract is a self-executing program that digitally verifies and carries out traceable and irreversible agreements among peers when certain conditions specified in the contract are met, without the intervention of a trusted third party to execute the clauses of the contract; smart contracts run on a blockchain, making their code immutable and auditable (Zheng et al., 2020). Smart contracts can be applied to SC traceability to track products and automatically execute conditions (e.g., payments from the producer to its suppliers) when materials or products reach certain steps in a SC (Prause, 2019).

BCT also allows using non-fungible tokens (NFTs) to tokenize assets. Westerkamp et al. (2020) describe an NFT as a non-reproducible cryptographic token that stays on a blockchain and acts as a digital representation of a material or immaterial asset, constituting proof of authenticity and ownership; information about the changes of ownership of the asset and the money transactions involved is written in the NFT when these occur. NFTs can be used in SCs to tokenize and track products, their change of ownership and related payments (Chiacchio et al., 2022).

Despite the benefits of using BCT for SC traceability, some challenges could limit its adoption. Finding solutions to these challenges is crucial since the benefits of using BCT in SCs depend on the adoption of BCT by a critical mass of SC partners (i.e., suppliers, transporters, producers, distributors, retailers, and others) (Sternberg et al., 2020) and cannot be achieved if some of them do not share their traceability data since this would create gaps in traceability (Laforet and Bilek, 2021).

Some challenges relate to the lack of knowledge and regulations and some others to the technical features of BCT itself.

A lack of digital knowledge inside companies could limit their capacity to adopt BCT for SC traceability (Garrard and Fielke, 2020; Sternberg et al., 2020). This could be a problem especially for Italian SMEs that have low internal knowledge of digital tools (Bianchini and Kwon, 2020; Compagnucci et al., 2022). Bumblauskas et al. (2020) noted that BCT can benefit SCs only if traceability is well-practised by each SC partner, which depends also on the degree of digitalisation of the tracking process; although, while some companies are highly digitalized in the collection and storage of traceability data, many still use paper records (Garrard and Fielke, 2020). Moreover, companies that are already digitalized need to integrate BCT with their internal management software, such as Enterprise Resource Planning (ERP) (Tan and Ngan, 2020), and could encounter problems doing so (Al-Jaroodi and Mohamed, 2019). Additionally, companies may not be willing to adopt BCT in their SCs due to uncertainties caused by the lack of clear legal frameworks (Iftekhar et al., 2020), for example regarding data standardisation (Aung and Chang, 2014).

Other limitations to the adoption of BCT could come from two technical features of BCT. The first limit comes from the blockchains' low scalability, which can prevent companies from writing big quantities of data in a blockchain in a short time (Wang et al., 2019; Westerkamp et al., 2020). The second limit comes from the fact that the visibility of traceability data to the public, which is a feature of BCT, may not always be desirable for companies that value data confidentiality (Behnke and Janssen, 2020).

To overcome the negative effects of the two features of low scalability and lack of data confidentiality, "off-chain storage" can be used instead of "on-chain storage" to store SC traceability data. Hepp et al. (2018) explain that due to the low scalability of blockchains, storing a heavy file like a document, picture, or video in a blockchain with on-chain storage is too expensive and time-consuming. Instead, with off-chain storage, the file is first stored in a private database, while the file's hash is stored in the blockchain for reference. Since all hashes have the same light weight regardless of the size of the files they are derived from, uploading hashes on a blockchain instead of the actual files greatly increases scalability. A stakeholder having access to both the original file on the private database and its immutable hash on the blockchain can use the hash to verify that the file's content has not been modified. Additionally, hashes enable data confidentiality: they point to the file stored off-chain, but say nothing about the actual content of the file, which can be kept private in the off-chain database and made accessible to authorised users (Hepp et al., 2018; Shahid et al., 2020). However, a fundamental problem with off-chain storage is the risk of data loss. If a company stores a file off-chain in its private database and shares on-chain the hash pointing to it, then a malfunction of the database would make the content impossible to retrieve (Hepp et al., 2018). To enhance data integrity and retrievability, some researchers proposed using decentralized peer-to-peer databases for off-chain storage (Shahid et al., 2020), such as IPFS (Inter Planetary File System) (Salah et al., 2019).

The two challenges of low scalability and lack of data confidentiality have also led to the development of permissioned blockchains as a possible solution to both issues. Blockchains can be permissionless or permissioned, depending on their ownership and writing and reading rights (Song et al., 2019): permissionless blockchains are not owned by anybody and are public, meaning that everyone can write and read data on them (e.g., Bitcoin and Ethereum). Permissioned blockchains are private if they are owned by one actor or consortium if ownership is shared among multiple parties (Xu et al., 2017). Permissioned blockchains are more scalable (Dib et al., 2018) and preserve data confidentiality by allowing the owners to give access to sensitive business information only to certain actors (Bumblauskas et al., 2020; Chan et al., 2019; Mao et al., 2018). However, higher scalability in blockchains is usually achieved at the cost of lower decentralisation and

security (Del Monte et al., 2020): permissionless public blockchains are the most distributed and secure, but the least scalable; private and consortium blockchains are more scalable but sacrifice decentralisation and security (Chowdhury et al., 2019; Dib et al., 2018).

A possible way to ensure scalability, decentralisation, and security, while ensuring also data confidentiality, could be using hybrid blockchains, where data is written on one blockchain and then passed to one or multiple other blockchains. For example, Wu et al. (2017) proposed a hybrid blockchain architecture where permissioned blockchains are used for sharing private business information among partners in a SC and information of public interest is then uploaded from these blockchains to a permissionless blockchain. The use of multiple interconnected blockchains is ideal for simplicity, adaptability, and extensibility, but interoperability between them must be ensured (Sparer et al., 2020), which remains a challenge (Laforet and Bilek, 2021).

3. Methodology

Given the lack of empirical data on the use of BCT for SC traceability, this research aims at gathering primary data from SMEs using it and providers of BCT solutions. The objective is to understand what issues of SC traceability of Made in Italy products can blockchain technology address (RQ1) and which blockchain solutions for supply chain traceability can SMEs of the Made in Italy use, according to their objectives (RQ2).

The expert interview methodology is used as qualitative empirical research conducted to explore a specific field (Döringer, 2021) by gathering the interviewees' perspectives on a topic (Edwards and Holland, 2013) as experts, i.e., persons who hold a certain status or exercise a function in decision-making processes in a particular field of action and, therefore, own specific knowledge of the field of interest (Bogner and Menz, 2009).

This research is based on the exemplary case of SC traceability of Made in Italy products. The Made in Italy refers to high-quality Italian products and has evolved into a brand with a global reputational capital (Schmitz and Knorringa, 2000) that gives the companies exploiting it a competitive advantage in the global market (Festa *et al.*, 2020). Companies of the Made in Italy could use BCT applied to SC traceability for B2C marketing (Violino *et al.*, 2020)Frantoio and Leccino and against counterfeiting (Caldarelli *et al.*, 2020).

Thus, the aim of this study was to collect first-hand empirical data by interviewing managerial and technical staff of Italian SMEs adopting BCT for SC traceability of Made in Italy products and tech companies providing it. The choice to interview both adopters and providers was taken because their insights complete and compensate each other. While the adopters

tell their experience as users of blockchain solutions for SC traceability, the providers are able to give better insights on the technical aspects of the blockchain solution they offer and information on multiple use cases from their clients. Even though the providers alone may have given a sufficiently detailed picture of how BCT is used by SMEs of the Made in Italy, interviewing only them could have biased the answers towards exalting the advantages of BCT and belittling its disadvantages, thus it was deemed necessary to interview the adopters too.

A web search was conducted to identify providers and adopters of BCT for SC traceability of Made in Italy products, using keywords both in English and Italian, specifically "Made in Italy", "blockchain", "traceability", "supply chain", and "Made in Italy", "tracciabilità", "catena di fornitura", "filiera". The keywords were not enclosed in quotations to allow for the inclusion of similar terms. Information about providers and adopters was retrieved mainly from online blogs and news articles, which led to identifying a total of 19 providers and 14 adopters.

The providers and adopters identified were contacted for an interview via email, using the contact information provided on their websites. If no response was received, a message was sent to the firm and/or its management on the social media LinkedIn. Six providers and three adopters accepted to be interviewed via calls online or by telephone. The providers interviewed offer blockchain solutions mainly, but not only, to SMEs of the agri-food sector. Of the three adopters, two produce food and one furniture.

The interviewees were assured of anonymity and confidentiality to reduce bias and increase the reliability of the results. The six providers are named P1, P2, …, and P6. The three adopters are A1, A2, and A3. The two tables below show some key characteristics of the providers (Table 1) and the adopters (Table 2) interviewed. All the providers and adopters that accepted being interviewed are micro and small-sized firms, while no medium-sized firms accepted to participate in the study. No additional details about the firms interviewed can be mentioned here without putting their anonymity at risk.

Table 1 Key characteristics of the providers interviewed.

Provider	Type of firm	Size of the firm	Interviewee's role
P1	Startup	Small	Project Manager
P2	Joint-stock company	Micro	Project Manager
P3	Startup	Micro	CEO
P4	Ltd	Micro	CEO
P5	Ltd	Small	Project Manager
P6	Ltd	Small	CEO

Table 2 Key characteristics of the adopters interviewed.

Adopter	Type of firm	Size of the firm	Interviewee's role
A1	Joint-stock company	Small	Marketing Manager
A2	Ltd	Micro	Sales Manager
A3	Ltd	Small	CEO

The interviews took place between November and December 2021 and were 40 minutes long on average. The interviews were semi-structured, with open-ended questions allowing greater flexibility for the respondents to enrich the description of the underlying context, thereby providing a wider picture of the phenomenon under investigation (Seidman, 2006). Expert interviews were based on a topical guide regarding the specific knowledge of the expert in the field of interest (Döringer, 2021). The interviews addressed the following topics: issues in SC traceability that BCT is expected to solve; technical features of the BCT solutions provided/adopted; challenges faced in providing/adopting BCT solutions; collaborations with academic institutions to develop/adopt BCT solutions. The interviews were integrated with follow-up emails to the experts interviewed to gain additional information and to cross-check the findings. The interviewees' answers were grouped by topic and are presented in the findings.

4. Findings

The findings from the interviews describe why and how BCT can be applied for SCs traceability of Made in Italy products. The following paragraphs illustrate the benefits, challenges, technical features, and potential risks for data reliability of the blockchain solutions provided and adopted.

4.1 Benefits

All providers and adopters interviewed underlined that BCT increases data transparency and, consequently, accountability since it is easy to verify who declared what and when, even after a long time, without the risk of such information being tampered with. Accountability safeguards SC partners in case of scandals about their SC: "the attribution of responsibility guarantees the producer because, in case of a scandal regarding its product, the producer can blame the single supplier responsible for providing the false or incorrect information. It also protects the other suppliers from being wrongfully accused" (P5). Accountability can indirectly improve data correctness: "with a blockchain, you cannot edit the information you stored, so you have to be more careful and take responsibility for what you write

[…] the advantage for a company using blockchain technology in its supply chain is that of a higher guarantee that the traceability data is correct" (P5); since data are visible to SC stakeholders and auditable, "companies storing incorrect information on a blockchain would suffer from reputational damage, so they are incentivized to upload the data correctly" (P1).

Transparency and accountability enabled by BCT enable trust between SC stakeholders. Nevertheless, pre-existing trust can make BCT useless: while all providers and two of the three adopters confirmed the role of BCT in creating trust in SCs, A2 stated that "our customers are prevalently local entrepreneurs who know us directly and trust the provenance and quality of our products, so the blockchain for us is not necessary [to build trust in our relationship with them] and gives no advantages from that point of view".

Another advantage of using BCT for SC traceability is anti-counterfeiting. Transparency and immutability of the traceability information stored in a blockchain can help individuate counterfeit products. In centralised traceability systems companies usually use, the traceability information does not often reach the consumer and, even if it does, it can be changed at any time (P5). Instead, with BCT consumers can be involved in anti-counterfeiting activities by giving them the possibility to verify the products' originality (P3). However, this is possible only if the distribution is tracked: "if in the blockchain we put the information about the shop or wholesaler to which it is delivered, together with the status of the product (sold/in circulation), we can guarantee that the goods are authentic to the final customer. If by scanning a tag on a product the customer sees that the product is supposed to be in another shop or that it has been sold already, then she will have the certainty that the product is a counterfeit" (P2). Counterfeiting is an important issue for SMEs of the Made in Italy, in fact, all the providers except for P6 stated that their solution is used against counterfeiting. P3's solution also enables consumers to report the existence of a counterfeit product, which is then blacklisted. As for the adopters, A1 decided to use BCT to give its B2C and B2B customers a guarantee that the company's products are real Made in Italy. This is essential for them since they get much of their revenue from selling abroad to customers who otherwise could not distinguish a Made in Italy product from a fake one.

Using BCT to give SC stakeholders the possibility to verify the products' originality can increase the adopter's revenues. A3 uses BCT because their customers prefer to buy BCT-traced products and pay a higher price compared to products not traced with BCT. All providers and adopters agree that this benefit is especially relevant for high-quality products. All the providers and adopters interviewed use BCT for high-quality Made in Italy products of which consumers value the provenance. Moreover, A3 uses BCT also because distributors are asking companies like theirs to register more traceability information about the entire production process

transparently. Companies using BCT to trace their products "can demonstrate the originality and genuineness of their products transparently and benefit from a competitive advantage because large-scale distributors and retailers will prefer to buy from them" (P2).

All providers and adopters remarked that BCT can be used for B2C marketing to promote their products to consumers who value product transparency and as a tool to do storytelling about products. A3 said that "during the Covid-19 pandemic, our company had difficulties connecting to the customers because we couldn't meet them in person, while thanks to the blockchain we were able to reconnect with them by allowing them to learn about our products". Additionally, when consumers scan a tag on a product, they land on a webpage where web analytics software can collect data about their characteristics and preferences that companies can use to make informed decisions (P6). The advantages of BCT for B2C marketing are so relevant, that in the providers' opinion many companies in Italy use BCT for marketing to increase the willingness of consumers to buy their products rather than to enable transparency in SC traceability: "our clients use our blockchain solution mainly for marketing" (P6); "for companies in Italy, blockchain is a matter of marketing to ride the blockchain trend" (P1); "many companies want to use blockchain only for marketing reasons and not for traceability […] [So,] many providers build solutions that provide a good user experience and a suggestive storytelling for a consumer who is not aware of what traceability with blockchain is" (P2).

Finally, BCT enables using smart contracts and NFTs. P2, P3, and P5 use smart contracts to track products and keep together the otherwise scattered information that is uploaded by each partner of a SC on a blockchain. As for NFTs, these can be used to create unique digital representations of assets, trace them, and transfer their ownership between SC partners (P2). Nevertheless, the interviews showed that no providers or adopters use NFTs to tokenize products. P1 uses NFTs only to tokenize documents containing information declared by the producer about its product. P5 states that the complexity of using NFTs to tokenize every single product does not come from BCT, but from the tag printing phase: "you would need a printer that manages to create many labels in a fast way, each having a different QR code identifying a single product". Instead, A3 does not plan to use NFTs to tokenize its products anytime soon, because "the recent hype on NFTs has created a bad reputation around these tools, so using them could damage the image of our company. We will likely use them when consumers can understand their potential".

4.2 Challenges

SMEs of the Made in Italy are getting interested in BCT but are still confused about how to use it in SCs (P5) and do not know its benefits (P4), especially SMEs (P1). Sometimes, they do not want to put their traceability data on a blockchain because they fail to understand the benefits of doing so (P6). For proper BCT-enabled SC traceability, it is necessary that all SC partners put their data on a blockchain (P5). Convincing all the SC partners to be in a blockchain network can be challenging: "it is very complicated to ensure that a product is traced along the entire supply chain. Already for a small artisanal company, nearly fifteen supply chain partners may have to agree to be part of the network and put their data on the blockchain" (P1). Effective communication of what BCT is and the benefits it brings to SCs is crucial to incentivize companies to adopt it. A2 had problems explaining BCT to its suppliers and was unable to communicate the benefits of increased trust, bargaining power towards distributors, turnover, and earnings for all the players involved in the SC. As for the providers, "the problem of technology companies that offer blockchain services is that they focus on creating solutions that are good on a technical level, but then they fail in communicating the benefits to companies" (P3).

Providers diffuse the knowledge on BCT during exhibition fairs and other events. Instead, diffusion by universities remains marginal. While all providers collaborated on blockchain-related projects with universities, none of the adopters found out about BCT from universities. A1 discovered BCT thanks to a consulting company. A2 learned about BCT while having a conversation with a PhD student who was using their company as a case study. A3 became aware of BCT and developed some prototypes thanks to contacts with people they knew for professional reasons.

Apart from the lack of knowledge on BCT, SMEs of the Made in Italy could be reluctant to adopt BCT for SC traceability because of the lack of regulations in Italy, which might be creating a situation of uncertainty. "Regulators should clarify what data must be put on blockchains, in what way, and in what format it must be recorded" (P6). As P5 argued: "if some data are not present on a blockchain, then you cannot say it is traceability" and "the intervention of regulators should ultimately lead to the standardization of the traceability data". Nevertheless, P6 stated: "While there are no laws for traceability with blockchain technology, the blockchain makes up for the lack of regulations because it is built to give a mathematical proof that something was written at a certain time [i.e., it enables data notarization], so in a certain way is replaces laws on traceability".

Another factor that could limit the adoption of BCT is the lack of digitalisation. P5 stated that most companies do not collect traceability data in digital form. A1 declared: "for many of our supply chain partners, traceability is a handwritten paper document that they send to us [as produc-

ers] together with the goods. However, the second generation of younger entrepreneurs is starting to use Industry 4.0 tools such as the IoT that allow the automatic collection of data from multiple sources and storage of data in a database shared with us".

Moreover, few companies use management software like ERP that would enable efficient storage of digital traceability data, and that is why some providers offer a BCT solution that can be used as management software (P2, P5). If companies already have internal management software, the providers offer customised integration with their BCT solution. However, P5 notes that "if the company is already using a management software, the software's provider can sometimes ask for up to ten thousand euros to the company to provide the data [necessary for proper integration with blockchain technology]; this is an investment that many SMEs are not willing to make".

4.3 Technical features

Off-chain storage is used by all the providers and adopters interviewed to enable scalability, reduce storage costs, and ensure the confidentiality of sensitive business information. Since off-chain storage exposes to a risk of data loss, the actors holding the data in their private databases are responsible for data retrievability: "the file is uploaded to the cloud database we own, so we are responsible for correctly storing the file" (P4). To enhance data integrity and retrievability, P2, P3, P4, and P5 store the traceability files in the decentralised storage InterPlanetary File System (IPFS). The files' hashes are then uploaded to a blockchain where they are visible to all interested parties. The files themselves can be accessed only by authorised parties that have access to the off-chain database, thus preserving data confidentiality, P1 declared.

Differences in the technical features of the blockchain solutions provided emerged in the architecture used. P4's solution involves a consortium blockchain type, which brings two advantages compared to a public one: the predictability of operational costs, which instead fluctuate in public blockchains, and the fact that known SC partners own the nodes of the network, which are usually not known in public blockchains. However, all providers agreed that companies looking for data immutability should upload their data only on public blockchains. Even in P4's solution, once the data is uploaded on the consortium blockchain it gets aggregated, hashed, and notarized on a public blockchain to ensure transparency against tampering with the data on the consortium blockchain. This hybrid architecture is adopted by A3.

Apart from P4 and A3, all the other providers and adopters use public blockchains only. When asked about the problem of low scalability and lack of data confidentiality of public blockchains, the providers using them

replied that these are not critical issues anymore. If a company does not need to make the data visible in real-time, then low scalability is not a problem (P6). If more scalability is required, 3rd generation public blockchains can be used. These are capable of faster data validation at a lower cost, compared to public blockchains of the 1st generation (e.g., Bitcoin) and 2nd generation (e.g., Ethereum). To ensure the confidentiality of data on a public blockchain, the data can be stored off-chain and their hashes on-chain, so that only selected actors in possession of the rights to access the off-chain database can retrieve the data.

4.4 Risks for data reliability

Blockchains make the data almost impossible to tamper with. Nevertheless, the data itself can be incorrect due to human error or fraudulent manipulation. Additionally, the data could be correct but an incorrect version of them could be displayed to stakeholders. Potential sources of unreliable data have been individuated in the interviews.

SC partners could have an interest in declaring false traceability information even if they know it will become immutable and visible on a blockchain. Alternatively, the data could be incorrect because mistakes have been made during the collection or registration of data. All the providers said that nobody can be sure that the data uploaded to a blockchain are reliable and recommended applying the Internet of Things (IoT) so that data about materials, temperature, manufacturing processes, chemical analysis, transportation, and others are automatically collected and uploaded without human intervention.

Further risks of poor data reliability could come from the producers. A product is made of components or ingredients that pass through different stages of a SC, including its distribution. In many of the BCT-enabled solutions provided and adopted, each supplier collects the traceability data about its SC stage and sends them to the producer to be stored in the producer's private database. Then, the producer creates a digital document declaring all the traceability data received by the suppliers, which is then notarized in a blockchain. This BCT-enabled solution could be called "notarization of the producer's declaration". In P2's opinion, this solution does not ensure that the traceability data was not changed by the producer before being notarized on a blockchain.

A further potential source of data unreliability comes from the providers if they are the ones receiving the traceability data from the adopters and uploading them to a blockchain. In this case, the providers act as gateways for the passage of data from the SC partners to the blockchain and have access to them. P1, P4, and P6 collect data from the SC partners and put them on the blockchain.

Instead, P2, P3, and P5 enable SC partners to autonomously put their

traceability data on the blockchain, thus enabling more accountability in SCs and avoiding the problem of the data being tampered with by the producer or provider. In this case, SC partners must have and use a blockchain wallet. Also, since the data referring to a product is uploaded to the blockchain by different SC partners at different times, it must be kept together with smart contracts.

Even if the solution involving blockchain wallets and smart contracts could enable more accountability and data reliability, all providers state that the notarization of the producer's declaration is the most adopted BCT-enabled solution by SMEs of the Made in Italy. Indeed, all the adopters interviewed used it. This solution is adopted when it is neither considered necessary, feasible, or desirable that SC partners upload their traceability information autonomously. The lack of necessity of using blockchain wallets and smart contracts to allow adopters to upload data to a blockchain autonomously was underlined by P5, who declared: "even though our solution enables each actor in the supply chain to put the data on the blockchain, it is not always necessary because the producer can put in the data provided by the suppliers". Additionally, using wallets and smart contracts may not be feasible because many companies lack the necessary knowledge to operate and maintain their blockchain wallets (P6). P1 had to replace some digital wallets because their customers lost the access keys of. Finally, there are cases in which the wallets and smart contracts solution is not desirable, as underlined by P1: "sometimes the suppliers are not willing to upload their sensitive data and make them public. In this case, the notarization of the producer's declaration, even with incomplete traceability data, is the only blockchain-enabled solution that a producer can hope to adopt in its supply chain". Moreover, the lack of desirability could be caused by unawareness of what blockchain and traceability are, both from companies and customers. "We, as producers, give the data to be put on the blockchain. The data are not entered by suppliers even if the platform gives this possibility because there is a cultural obstacle to overcome in our suppliers that do not understand blockchain" (A1); "the average entrepreneur has no idea what blockchain and traceability with blockchain are, so they opt for these kinds of solutions" (P2); "the small companies we turn to for some phases of the production process do not understand the blockchain and asking them to enter data on the blockchain would be useless" (A2). Other than the aforementioned factors, the higher desirability of the notarization of the producer's declaration over the wallets and smart contracts solution may depend on why the company wants to adopt BCT. As P6 said, "if the adopter wants the blockchain only for marketing reasons, then a simple notarization of documents containing traceability information by the producer may be sufficient". In fact, according to all providers, most companies in Italy use BCT for B2C marketing rather than to enable

transparency in SC traceability, and that is why the notarization of the producer's declaration is the most adopted blockchain solution even though it does not ensure data reliability.

A final risk for data reliability comes from using the provider's centralised App to display the traceability information to SC stakeholders. Most of the BCT-enabled traceability solutions analysed involve a Mobile or Web App as a trusted channel between the user scanning the tag and the information stored in the blockchain. This is deemed necessary because a counterfeiter could apply a tag to its fake product, directing the stakeholder scanning the tag to a webpage containing false traceability information which would induce the stakeholder to believe that the product is original. In this case, BCT could be used by the counterfeiter to store false traceability information, making it visible and immutable and deceitfully increasing the stakeholders' trust that the information is true just because it is on a blockchain. Since the provider's App work only when scanning legitimate tags pointing to the original traceability information, users are safeguarded because scanning the counterfeiter's tag with the provider's App is not possible. However, P2 argues that the Mobile or Web App channel cannot be completely trusted as it runs on a database owned by the provider. The provider or hackers could manipulate the database to display false information on the App's interface. P2 and P3 use a DApp (Decentralised Application) that runs on a public blockchain as a more trustworthy channel. The DApp is a smart contract combined with a front-end user interface. The code that makes the DApp work is stored on the blockchain and is open source, thus it is immutable and visible to whoever wants to audit it. This means that users can know exactly what the DApp does (if they have the necessary programming skills to be able to read the functions written in the DApp). The DApp allows each SC partner, provided with a blockchain wallet, to upload its traceability data on the blockchain. When a user scans a tag to access a product's traceability data, the smart contract of the DApp retrieves the pieces of notarized information that were uploaded to the blockchain by each SC partner and displays them to the user in an organic way. The DApp is more trustable that an App because it "leads the user directly from the tag to the blockchain containing the information on the product, and not to a static webpage where the info can be edited [by the provider] […] moreover, [for us, as providers of a DApp solution,] it would be necessary to attack the entire blockchain to change the traceability data" (P2).

5. Discussion

The interviews conducted showed why and how BCT is used in SMEs for SC traceability, confirming the literature on the topic and adding novel findings about its application to Made in Italy products. The interviewees confirmed that BCT can increase transparency in SCs (Mahyuni et al., 2020) and accountability of SC partners, incentivizing them to upload correct data (Longo et al., 2019). Transparency and accountability enable trust between SC stakeholders (Wang et al., 2019). If trust is already present, then adopting BCT does not bring any additional benefits in terms of trust, as noted by Sternberg et al. (2020) in their case study. Transparency also helps with anti-counterfeiting, as outlined by Hosseini Bamakan et al. (2021). On this matter, BCT is especially useful to protect the Made in Italy brand (Caldarelli et al., 2020). Also, enabling SC stakeholders to verify a product's originality involves them in the process of anti-counterfeiting (Ma et al., 2020), but this only works if the product distribution phase is tracked. The interviewees confirmed the benefit of increased revenues from an increase in sales by customers who value product transparency (Kittipanya-ngam and Tan, 2020) and from persuading them to pay a higher price compared to similar products not traced with BCT (Guido et al., 2020). Traceability with BCT is especially beneficial in the case of products of which consumers value provenance more, as Rogerson & Parry (2020) theorized, such as those Made in Italy. Additionally, using BCT for SC traceability can increase the competitiveness of SMEs because it assures distributors about the products' originality. Another key benefit is that of B2C marketing (Violino et al., 2020): the interviews show that BCT is used by SMEs of the Made in Italy mainly for consumer marketing and to do storytelling about their products. Finally, smart contracts can be used to store the hashes of single traceability events and relate them to a specific product (Chang et al., 2019; Prause, 2019), while NFTs can be used to uniquely identify products and track their change of ownership and related payments, as presented by Chiacchio et al. (2022). However, no providers and adopters use NFTs for these purposes: the bad reputation surrounding NFTs and limits in the speed of label printing were mentioned as barriers to the intention to use them.

As for the challenges to the diffusion of BCT for SC traceability in Italian SMEs, there is a lack of clear legal frameworks on BCT (Iftekhar et al., 2020) and its application to SC traceability, specifically on the standardisation of traceability data (Aung and Chang, 2014). The second problem is the lack of knowledge, as found by Bianchini & Kwon (2020). Effective communication of what BCT is and what benefits it brings is considered crucial to making companies interested in the potential of this technology.

As for the role of public and private academic institutions as knowledge promoters (Hausman, 2012), they do not seem to be active in spreading the knowledge of BCT among companies in Italy. The further challenge deriving from the lack of digital knowledge inside SMEs which limits their capacity to adopt BCT for SC traceability, as theorized by Garrard & Fielke (2020) and Sternberg et al. (2020), was confirmed by the providers. BCT can benefit SCs only if traceability is well-practised by each SC partner, which depends also on the degree of digitalisation of the tracking process (Bumblauskas et al., 2020). However, many companies still use paper documents for tracking, as underlined by Garrard and Fielke (2020). As for the challenge of integrating BCT with the companies' internal business application software such as ERP, mentioned by Tan & Ngan (2020) and deemed problematic by Al-Jaroodi & Mohamed (2019), this did not emerge as an issue since all the providers interviewed offer such integration. However, for successful integration, the adopter must first have control of the data stored in its internal management software, which is not always the case and could be very expensive for adopters to obtain from the management software provider.

Regarding the technical aspects of the solutions analysed, all providers and adopters implement off-chain storage to provide scalability and data confidentiality, as advised by Shahid et al. (2020) and Behnke and Janssen (2020). To increase data integrity, some interviewees store data off-chain in peer-to-peer decentralized databases (Shahid et al., 2020) such as IPFS (Salah et al., 2019). One provider and one adopter use a hybrid blockchain combining a consortium blockchain for scalability (Dib et al., 2018) and data confidentiality (Bumblauskas et al., 2020; Chan et al., 2019; Mao et al., 2018) with a public blockchain for data immutability, similar to that proposed by Wu et al. (2017). Instead, most providers use only public blockchains. Scalability is not an issue because they use 3rd generation public blockchains, while data confidentiality is ensured with off-chain storage. Hence, the benefits of permissioned blockchains can be obtained by combining 3rd generation public blockchains for enhanced scalability with off-chain storage to ensure data confidentiality.

Finally, this research found some risks to the reliability of the traceability data in certain BCT solutions. The primary source of data incorrectness can be any SC partner. Nobody can be sure that the data provided by SC partners is correct, as noted by Violino et al. (2020). The providers recommended using the IoT to automate the collection and upload of traceability data to a blockchain to remove any human intervention in these processes, as proposed by Iftekhar et al. (2020). Other sources of data incorrectness could come from the producers or the providers if they are the ones responsible for uploading to a blockchain the traceability data they receive from the SC partners since they could manipulate or omit data before storing it. The BCT-enabled solution of the notarization of the producer's dec-

laration brings these risks, whereas using blockchain wallets and smart contracts to allow every single SC partner to upload its data autonomously eliminates them. Even if the latter solution increases data reliability, the former is the most adopted in Italy when it is not necessary, desirable, or feasible that each SC partner uploads its traceability data on a blockchain, for reasons that include a lack of awareness on BCT and traceability and lack of knowledge on how to use and maintain a blockchain wallet. Moreover, many companies in Italy use BCT for B2C marketing reasons rather than to enable transparency in traceability, thus the notarization of the producer's declaration might be sufficient for their scope. A final risk for data reliability could come from the providers showing on their App's interface different information than that stored on a blockchain. Some providers use a DApp running on a public blockchain to create a direct connection between the user and the data on the blockchain. Thus, DApps might enable more transparency, accountability, and trust in SCs, compared to Mobile or Web Apps.

6. Conclusions

In recent years, BCT has been proposed as a tool for increasing transparency and accountability in SCs. Researchers have addressed the benefits and challenges of using BCT in SCs, but there is a need for more evidence based on real applications. To address the lack of empirical data and building on the assumption that SMEs of the Made in Italy could benefit particularly from using BCT for SC traceability, this research aimed at collecting first-hand data from expert interviews with managerial and technical staff of Italian SMEs adopting BCT for SC traceability of Made in Italy products and tech companies providing it.

This research tries to answer two questions: what issues of SC traceability of Made in Italy products can BCT address (RQ1), and which blockchain solutions for SC traceability can SMEs of the Made in Italy use, according to their objectives (RQ2)? The findings are grouped by topic, describing the benefits, challenges, technical features, and risks for data reliability in the use of BCT for SC traceability in SMEs of the Made in Italy. As for RQ1, this research confirms the results of other studies on BCT for SC traceability which have been addressed in the discussion. BCT can be used for SC traceability to increase transparency and accountability, thus improving trust among SC stakeholders. BCT can help firms of the Made in Italy to fight counterfeiting and promote their products. Some challenges remain, namely the lack of digital knowledge in firms, clear regulations, and consumer awareness of the advantages of BCT-enabled traceability. Regarding RQ2, this research introduces some novel findings regarding how BCT for

SC traceability is used by SMEs of the Made in Italy: a) public 3rd generation blockchains combined with off-chain storage to provide transparency, scalability, and data confidentiality are mostly used, while the use of permissioned blockchains is marginal; b) BCT-enabled traceability is used mainly for B2C marketing; c) the most adopted BCT solution for SC traceability is the notarization of the producer's declaration, while using blockchain wallets and smart contracts to enable every SC partner to upload its traceability data to a blockchain is much less used despite bringing more accountability in SCs.

Some managerial implications can be suggested. The study provides valuable information to SMEs to understand if they need a BCT solution in their SC and what solution fits their needs. In other words, firms can use the results of this study to answer the questions of "why does the firm need BCT?" and "what BCT solution is the most suited to the firm's needs?". As for the "why" question, BCT is useful in situations where there are multiple parties that want to share data among them (e.g., products' traceability data shared among SC stakeholders) but do not trust each other with data handling (i.e., safely storing the data and ensuring that it will not be modified or cancelled) and cannot or do not want to find a trusted third party to handle the data. Thus, firms should first assess if trust is missing among the stakeholders involved in their SCs. If trust among them is present, BCT will not be useful. The firms interviewed use BCT to enable trust in their SC for B2C marketing purposes. Their assumption is that consumers would prefer to buy a product traced with BCT because they would trust the firm more for storing the product's traceability data on an immutable and visible database such as a blockchain. This positive effect was also mentioned by the providers interviewed. However, firms should be aware that there is no clear evidence yet of the profitability of using BCT to increase the willingness of consumers to buy BCT-traced products or pay a premium for them. Specifically, there has not been extensive research benchmarking the benefits and costs of using BCT for SC traceability compared to other existing non-blockchain technologies that enable traceability in SCs and allow consumers to access traceability data by scanning a tag on a product's label. If the firms decide to use BCT in their SCs, they need to answer the question of "what" BCT solution to adopt based on their needs. Firms that want to use BCT just for B2C marketing purposes may find it convenient to adopt a simple blockchain solution allowing the notarization of documents stating the products' traceability information, which is accessible via the provider's App. This solution poses some risks to data reliability, so it is not the most suited to create trust among SC stakeholders. Instead, if the main objective is to enable trust among SC stakeholders, then the blockchain solution adopted should ideally have all the following characteristics: a) all SC partners should be able to upload their traceability

data to the blockchain autonomously, without needing to send the data to an intermediary that uploads them; b) the hashes of the traceability data should be uploaded to public blockchains that are not owned by anyone and are beyond anyone's control; c) the IoT should be used to automatically collect traceability data from their sources and upload them on the blockchain without human intervention; d) if the blockchain solution's provider is not trusted, a decentralised application (DApp) should be used to write and read the traceability data to and from a blockchain. These aspects call for two considerations. First, all SC partners must be willing to be involved in the blockchain traceability solution to upload their traceability data to the blockchain themselves. Otherwise, the producer or the provider must be the ones gathering the traceability data and uploading them on the blockchain, exposing to the danger of data manipulation by these actors. Second, since on-chain storage is not possible due to the low scalability of public blockchains, firms need to define who is responsible for correctly storing the data off-chain and ensuring that it is always accessible. Usually, this role is covered by the blockchain solution's provider, but this solution reinstates centralisation in situations where decentralisation enabled by BCT is desirable to create trust. Indeed, in such situations, the provider is a third party that is trusted with handling the traceability data. If the provider is not trusted, then a DApp may be a more trustworthy tool than the provider's App to write and read the traceability data to and from a blockchain.

This research faces three main limitations. First, it is a qualitative research based on a small sample of six providers and three adopters from Italy, so the results cannot be generalised. Second, interviewing the providers of the BCT solutions for SC traceability in Italy may have biased the answers towards exalting the advantages of using BCT and belittling its disadvantages; however, this bias was mitigated by interviewing the adopters too. Third, although the objective of this study was to gather evidence from SMEs, the adopters and providers that accepted being interviewed were all micro and small-sized firms, so no medium-sized firms were interviewed. Thus, all evidence collected on the use of BCT for SC traceability by Italian medium-sized enterprises comes from the declarations made by the providers and cannot be checked against those from medium-sized adopters.

Based on the key findings of this research, future research should integrate the results by systematically comparing the cost and benefits in terms of increased revenues of the different blockchain-enabled solutions individuated in this paper. This would give companies more relevant information to understand the profitability of the different blockchain solutions and what profit margin they need to cover the costs of implementing BCT in their SC. Additionally, researchers should address the implications of adopting BCT for SC traceability for the adopters' competitive strategy. It

would also be of interest for researchers to investigate what the perception of NFTs is among companies and see how it affects the choice of providers and adopters to use them or not. All these studies should consider the differences between firms in sector and size. Longitudinal case studies could be developed to follow the evolution of the implementation and use of BCT in SMEs throughout time. Moreover, evidence is needed on whether, how, and to what extent the lack of clear legal frameworks is limiting the diffusion of BCT for SC traceability, also providing a comparative analysis between different countries.

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RELEVANCE OF THE LEGAL FORM OF COMPANIES FOR BANKRUPTCY PREDICTION

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Abstract

Purpose. *This study aimed to understand whether a general bankruptcy prediction model for small Italian companies having any legal forms has a different predictive capacity than specific bankruptcy prediction models for those having specific legal forms. On the one hand, it focuses on cooperative companies, and on the other, joint-stock and limited-liability companies.*
Design/methodology/approach. *A general bankruptcy prediction model and two specific bankruptcy prediction models (one for cooperative companies and one for joint-stock and limited-liability companies) were constructed and compared regarding predictive capacity.*
Findings. *The overall accuracy levels of the general and specific models were the same, but the percentage of companies correctly predicted to be in crisis out of the total number of companies effectively in crisis (sensitivity) of the latter (in particular, referring to joint-stock and limited-liability companies) was higher than that of the former. Considering the high economic and social costs that can derive from the predictive errors of companies in crisis, specific models should be preferred to the general model.*
Practical and social implications. *This study offers to those who may be interested in evaluating the financial health of a company (stakeholders, such as banks, suppliers, customers, etc., as well as the management and control bodies of the company) bankruptcy prediction models having a high predictive capacity differentiated according to its legal form.*
Originality of the study. *No previous study has verified whether a general bankruptcy prediction model for companies having any legal forms has a different predictive capacity than specific bankruptcy prediction models for companies having specific legal forms. At the same time, in the Italian context, no previous study has proposed a bankruptcy prediction model for cooperative companies.*

1. Introduction

The literature shows that there is a great interest in bankruptcy prediction models (Daubie and Meskens, 2002; Balcaen and Ooghe, 2006; Bellovary et al., 2007; Verikas et al., 2010; Lin et al., 2011; Marques et al., 2013; Sun et al., 2014; do Prado et al., 2016; Chen et al., 2016; Alaka et al., 2018; Veganzones and Severin, 2021). This is mainly due to the awareness of the relevant negative economic and social impacts that bankruptcy can generate.

Nevertheless, the impact of the legal form of companies on the predictive capacity of these models appears to have been overlooked, except for a few studies that do consider them implicitly (Berg, 2007; Amendola et al., 2011; Slefendorfas, 2016; Herman, 2017; Giriuniene et al., 2019; Poli, 2020), i.e. as a sample selection criterion; in others, it is considered explicitly, i.e. as a variable taken into consideration in the construction procedure of the bankruptcy prediction model (Amendola et al., 2013; Camacho-Miñano et al., 2015; Pierri and Caroni, 2017; Papik and Papikova, 2023). However, previous studies have not verified the different predictive capacities of a general model, i.e. built based on, and intended to be applied to, all companies independent of their legal forms, and specific models, i.e. built based on, and intended to be applied to, companies having specific legal forms.

Moving from these considerations, this study aims to understand whether a general bankruptcy prediction model for companies having any legal form has a different predictive capacity than specific bankruptcy prediction models for companies having specific legal forms. Specifically, on the one hand, this study focuses on cooperative companies ('società cooperative'), and on the other, joint-stock (*società per azioni*) and limited-liability companies (*società a responsabilità limitata*). These two groups of companies were chosen to maximise the differences between legal settings. In fact, cooperative companies are mainly characterised by the adoption of cooperative principles and have a mutualistic purpose, while joint-stock companies and limited-liability companies are mainly characterised by the adoption of for-profit principles and have a for-profit purpose. From a practical point of view, this has effects not only on their organisation and management but also on their financial structure and social policies (Mateos-Ronco and López-Mas, 2011)[1].

Considering the research aim, this study can be included among those investigating the different predictive capacities of general (unfocused)

[1] For an analysis of the differences between the legal forms, especially in terms of purposes, it is possible to consult the Italian legal manuals. With reference to cooperative companies, the Legislative Decree n. 6/2003 abolished the 'unlimited liability' cooperative companies. Consequently, since its enforcement, all of them have become 'limited-liability' cooperative companies. With reference to this aspect, therefore, the legal forms considered in this study are homogeneous.

and specific (focused) models. These studies are inspired by the idea that a general model (built based on an overall sample of companies that assume any way of being of a given characteristic, such as economic sector, size, age, etc.) should perform less than a specific model (built based on a sample of companies that assume a specific way of being of a given characteristic, such as a specific economic sector, a specific size, a specific age, etc.) because the latter should reflect the higher level of homogeneity of the companies considered (Varetto, 1999). However, these studies mainly focus on the economic sector of companies (Varetto, 1999; Branciari et al., 2022), neglecting many other characteristics of companies, such as the legal form, considered in this study.

To achieve the research aim, a general model – built based on a sample of companies having different legal forms (cooperative, joint-stock and limited-liability companies) – and specific models – built on the basis of sub-samples of companies having specific legal forms (one for cooperative companies and one for joint-stock and limited-liability companies) – will be constructed and compared in terms of predictive capacity.

The focus of this study is on small Italian companies. This choice depends on the fact that the legal and accounting characteristics of companies can be specific to a country (Korol, 2013) and that small companies are largely prevalent in the Italian economic context and have specific organisational and strategic characteristics (Altman and Sabato, 2007; Ciampi, 2015; Cesaroni and Sentuti, 2016)[2]. In addition, the financial data and ratios

[2] Here, small companies refer to those that prepare financial statements in the short form. According to Italian law, the short form may only be drawn up by companies that, during the first financial year or, following that, for two consecutive financial years, have not exceeded two of the following limits – total assets 4,400,000 €, total revenue from sales and services 8,800,000 € and average number of employees during the financial year 50. Comparing it with the traditional classification criteria (those established at the European Union level), the companies taken into consideration include micro-sized companies (total assets or total revenue from sales and services less than or equal to 2,000,000 €; average number of employees during the financial year less than 10 persons) and exclude companies that could prepare the financial statements in the short form but opt to prepare them in the ordinary form and companies that, although small-sized according to the traditional criteria (total assets or total revenue from sales and services less than or equal to 10,000,000 €; average number of employees during the financial year less than 50 persons), are obliged to prepare the financial statements in the ordinary form (because they exceed the previously mentioned dimensional parameters that the civil law has established for the possibility of preparing financial statements in the short form). Regarding the inclusion of the micro-sized companies, the criterion adopted appears to reflect the most common-sized category of companies in the Italian economic context. Moreover, with respect to the small-sized companies that opt for the preparation of financial statements in the ordinary form, their exclusion appears appropriate because the information base for building the financial ratios would otherwise be uneven. To get an idea of the size and relevance of the phenomenon under investigation, it should be considered that a query made in September 2019 to the AIDA database (in its full configuration) on the financial statements for the financial year 2016 showed that 852,000 deposited financial statements (corresponding to 94% of the total) were prepared in the short form (Poli, 2020).

that can be used for the construction of bankruptcy prediction models for small companies are less numerous and are often proxies for those usually suggested for larger companies (Poli, 2020).

The structure of the paper is as follows. In the next section, an analysis of the state-of-the-art literature and the development of the research hypothesis are presented. Sections 3 and 4 are dedicated, respectively, to the illustration of the research methodology and the presentation and discussion of the results. Finally, a summary of the achieved results together with the implications, limitations and research avenues suggested by this study are highlighted.

2. State of the art and research hypothesis

Previous studies that have considered the legal form can be divided into two groups. Most of the studies fall into the first group.

In the first group of studies, the legal form was considered among the selection criteria of the sample of companies. In other words, the authors of these studies have excluded from the sample compaines having a legal form different from the chosen one (Berg, 2007; Amendola et al., 2011; Slefendorfas, 2016; Herman, 2017; Palazzi et al., 2018; Giriuniene et al., 2019; Poli, 2020). The first group includes the studies proposed by Mateos-Ronco and López-Mas (2011), Dietrich et al. (2005) and Cruz and Sabado (2022). These authors, distinguishing between cooperative companies and traditional companies, have built bankruptcy prediction models using samples of companies composed exclusively of companies belonging to the first category. The models obtained would seem to have a predictive capacity superior to the pre-existing general models (i.e. focused on both for-profit and mutualistic companies) and would suggest the idea that the legal form could have an impact on the predictive capacity of bankruptcy prediction models. In all the mentioned studies, the legal form of the company has been implicitly recognised as relevant. However, the potential effect of the legal form has not been explicitly observed. In addition, the proposed bankruptcy prediction models assume the nature of specific models, i.e. built on the basis of, and intended to be applied to, companies having specific legal forms.

The second group of studies, also numerically limited, instead contemplated the variable 'legal form' among the independent variables of the models. However, they did not arrive at any concordant or conclusive results. Therefore, these studies have verified the impact of the legal form on the predictive capacity of bankruptcy prediction models. In the study by Pierri and Caroni (2017), the variable, although initially contemplated, was excluded in the variable selection phase because it was not statisti-

cally significant. In the studies of Amendola et al. (2013), Camacho-Miñano et al. (2015) and Papik and Papikova (2023), the variable was included in the model, but it was not statistically significant. Ptak-Chmielewska (2019) proposed three bankruptcy prediction models obtained by applying three analysis techniques (logistic regression, random forests and neural networks). Among these, only the model obtained through logistic regression contemplated the legal form as an explanatory variable; the other two models did not contemplate the legal form as an explanatory variable because it was not statistically significant. In the study by Ptak-Chmielewska and Matuszyk (2020), the variable was included in the model obtained through the Cox regression, while it was excluded from the model obtained through the random forests. The legal form was identified as a statistically significant variable in the bankruptcy prediction models proposed by Amendola et al. (2015), Lohman and Ohlinger (2017), Ptak-Chmielewska and Matuszyk (2018), Gemar et al. (2019) and Kou et al. (2021).

In all, the literature review did not bring to light studies aiming to verify the different predictive capacities of general models, i.e. built on the basis of, and intended to be applied to, companies having any legal form, and specific models, i.e. built on the basis of and intended to be applied to, companies having specific legal forms.

To contribute to filling this gap, this work aims to test the following null research hypothesis:

H_0: *The specific bankruptcy prediction models (built on the basis of, and intended to be applied to, companies having specific legal forms) do not have different predictive capacities from that of a general bankruptcy prediction model (built on the basis of, and intended to be applied to, companies having any legal form).*

3. Research methodology

The test of the research hypothesis was conducted as follows:

- a 'general' bankruptcy prediction model was built on the basis of an overall sample of companies (mod GEN);
- two 'specific' bankruptcy prediction models were built, one on the basis of the sub-sample of cooperative companies (mod COOP) and one on the basis of the sub-sample of joint-stock and limited-liability companies (mod NO COOP);
- the statistical and substantial significance of the differences between the predictive capacity levels of mod GEN and mod COOP, applied to the sub-sample of cooperative companies, and between the predictive capacity levels of mod GEN and mod NO COOP, applied to the sub-sample of joint-stock and limited-liability companies, was evaluated;

The statistical significance of the differences between the levels of the predictive capacity of the models was evaluated in two different ways.

The first method consisted of the use of the AUC ('Area Under Curve'). As is known, this method is independent of the level of the cut-off used and is insensitive both to the proportions of companies 'in crisis' and 'not in crisis' present in the sample and to the costs of the classification errors of the models. For these reasons, it has been frequently used in previous studies (Chava and Jarrow, 2004; Ravi and Pramodh, 2008; Horta and Camanho, 2013; Pal et al., 2016; Altman et al., 2017; Du Jardin et al., 2017).

The second method consisted of the use of McNemar's test in the version suggested by Trajman and Luiz (2008). As known, once a value has been set for the cut-off, this method makes it possible to evaluate the statistical significance of the differences in terms of 'sensitivity' (percentage of companies correctly predicted to be 'in crisis' out of the total number of companies actually 'in crisis') and 'specificity' (percentage of companies correctly predicted as 'not in crisis' out of the total number of companies actually 'not in crisis') of the models[3].

The construction of the bankruptcy prediction models required the identification of the event that signals the existence of the crisis, the definition of the sample of companies, the choice of the analysis technique and the selection of the variables.

The event signalling the existence of the crisis was identified at the beginning of one of the bankruptcy procedures applicable to the companies on which this work focuses, according to Italian law (Royal Decree n. 267 of March 16, 1942)[4]. The crisis, therefore, has been understood in its legal meaning, as frequently done in the extant studies (Altman, 1968; Altman et al., 1977; Altman and Sametz, 1977; Ohlson, 1980; Dirickx and Van Landeghem, 1994; Ward and Foster, 1997; Daubie and Meskens, 2002; Chari-tou et al., 2004; Ciampi, 2015; Giacosa and Mazzoleni, 2018; Poli, 2020; Branciari et al., 2022). Therefore, a company was considered 'in crisis' if it was affected by the beginning of one of the aforementioned bankruptcy procedures during the

[3] To compare the different levels of 'sensitivity' ('specificity') of the two models, they have been applied to companies 'in crisis' ('not in crisis') and then the different ways of classifying these companies are compared: (a) companies will be classified as 'in crisis' by both models, (b) companies will be classified as 'in crisis' by the general model and 'not in crisis' by the specific model, (c) companies will be classified as 'not in crisis' by the general model and 'in crisis' by the specific model, and companies will be classified as 'not in crisis' by both models (d). The data 'a', 'b', 'c' and 'd' will correspond to the numbers of companies for which the specific classification will be observed. McNemar's test is based on the non-concordant classification numbers ('b' and 'c') and is configured differently according to their total. Further details will be provided later.

[4] The reference is to bankruptcy or forced administrative liquidation for cooperative companies and to bankruptcy or pre-bankruptcy composition for oint-stock and limited-liability companies.

[5] Subsequent years were not considered in order to prevent the analysis from being distorted by the effects of the pandemic.

years 2018 or 2019[5], while it was considered 'not in crisis' in the opposite case.

The sample of companies used was defined in two steps. In the first step, companies 'in crisis' and companies 'not in crisis' were identified based on the selection criteria shown in Tab. 1 and then extracted from the AIDA database (extraction date: June 2022).

Tab. 1 – Criteria for selecting the sample of companies

Companies "in crisis"	**Companies "not in crisis"**
cooperative companies, joint-stock companies and limited liability companies	=
companies for which the beginning of the bankruptcy procedures was recorded in the years 2018 or 2019	companies for which the beginning of the bankruptcy procedures was not recorded in the years 2018 or 2019
companies not affected by bankruptcy or liquidation or dissolution procedures in previous years	=
companies drafting the financial statements for the second year before the reference years of the "state of health", therefore the years 2016 or 2017	=
companies preparing financial statements in the short form	=
companies having been established for at least three years	=
companies not being innovative start-ups or SMEs according to the Italian law	=
	companies having the size data required by Italian law for the application of the reference bankruptcy procedures
	companies having prepared the financial statements relating to the reference year of the "state of health" and to the one preceding it

In the second step, moving from the extracted data, the companies 'in crisis' were acquired as a whole and combined with an equal number of companies 'not in crisis'. The companies 'not in crisis' were selected using the random selection criterion (Comuzzi, 1995; Ciampi, 2015; Arnis et al., 2018), ensuring that for each legal form, there was an equal number of companies 'in crisis' and companies 'not in crisis'. Therefore, a sample selection strategy aimed at constituting a 'balanced sample' was used (Sun et al., 2014; Veganzones and Severin, 2021). The relative numbers are shown in Tab. 2.

Tab. 2 – Composition of the sample of companies

Legal form	Companies "in crisis"	Companies "not in crisis"	Overall companies
COOP	218	218	436
2018	109	109	218
2019	109	109	218
NO COOP	218	218	436
2018	109	109	218
2019	109	109	218
Total	436	436	872
2018	218	218	436
2019	218	218	436

The sample of companies has been divided into two sub-samples – one (the 'train' sub-sample) consisting of 2/3 of the observations used to estimate the models, and one (the 'test' sub-sample) consisting of 1/3 of the observations used to evaluate the predictive capacity of the models. The division was made on a random basis, making sure that each sub-sample had the same proportion of (1) companies 'in crisis' and companies 'not in crisis', (2) cooperative companies and joint-stock and limited-liability companies and (3) companies by year of bankruptcy.

The analysis technique used was the logistic regression. This choice was made for several reasons. First, in terms of assumptions, logistic regression has fewer constraints than other techniques frequently used to build bankruptcy prediction models (Ohlson, 1980; Zavgren, 1985). Second, among the independent variables, it can include quantitative variables and suitably operationalised qualitative variables (Ohlson, 1980; Keasey and Watson, 1987). Third, it is the most transparent and intelligible technique in terms of results (Jones et al., 2015). Fourth, it makes it possible to directly define the levels of probability of bankruptcy (Giacosa & Mazzoleni, 2018). Finally, it guarantees acceptable performance levels, both in absolute and relative (comparative) terms (Jones et al., 2015). All these reasons have led logistic regression to be one of the most widely used analysis techniques for the construction of bankruptcy prediction models (Ohlson, 1980; Zavgren, 1985; Aziz et al., 1988; Keasey and McGuinness, 1990; Platt and Platt, 1990; Theodossiou, 1991; Salchenberger et al., 1992; Ward, 1994; Laitinen and Laitinen, 1998; McGurr and DeVaney, 1998; Kahya and Theodossiou, 1999; Beynon and Peel, 2001; Neophytou et al., 2001; Westgaard and Wijst, 2001; Foreman, 2002; Brockman and Turtle, 2003; Jackson and Wood, 2013).

Regarding the selection of the variables to be included in the models, in the absence of a universally recognised theory of the business crisis, it is difficult and arbitrary to identify *a priori* the financial data and ratios to be taken into consideration (Du Jardin, 2009)[6]. Consequently, the practice of starting with a large number of financial data and ratios and leaving the selection of those to be included in the models to the most appropriate statistical and econometric techniques has prevailed in the literature (Barontini, 2002). This practice was used in this study. After identifying a large number of financial data and ratios, the variables to be included in the models were selected using the 'stepwise selection method'[7], a technique widely used in previous studies (Veganzones and Severin, 2021).

The starting financial data and ratios were recently suggested by Poli (2020). The author began with the set of ratios traditionally proposed in the existing literature for the analysis of financial statements (Teodori, 2022) and verified which can be built directly or which adaptations they require if the financial statement for analysis is in the short form. Subsequently, the author verified which ratios could generally be built without suffering from a lack of necessary data (some may require the use of financial statement items that are null with a certain recurrence). Therefore, the author defined a set of ratios that can be used in a generalised way to analyse financial statements in a short form. Finally, the author found that this set of ratios was adequate for building effective bankruptcy prediction models. The main strength of the set of ratios suggested by Poli (2020) is represented by the fact that the resulting bankruptcy prediction model can be applied by all subjects interested in evaluating the financial health of a company and can be applied to all companies. Its main weakness is represented by the fact that – compared to the ratios suggested in previous studies when the financial statement in the ordinary form is available – some ratios were not considered, while other ratios were built in terms of proxies. The financial data and ratios are shown in Tab. 3.

Tab. 3 – Financial data and ratios

Financial data and ratios
Total equity-fixed assets margin on assets
Total equity and long-term liabilities-fixed assets margin on assets

[6] This study explores the effectiveness of bankruptcy prediction models based on data consisting either of single items or of ratios constructed on the basis of several items that can be directly drawn from the schedules of the financial statements intended for publication.

[7] The statistical significance of the variables was tested through the likelihood-ratio test, setting a statistical significance level at 1% for the entry of the variable and a statistical significance level at 5% for the exit of the variable.

Total liabilities to assets ratio
Current liabilities to total liabilities ratio
Cash ratio
Cash-current liabilities margin on assets
Acid-test ratio
Cash and receivables-current liabilities margin on assets
Current ratio
Current assets-current liabilities margin on assets
Added value on assets
EBITDA on assets
Operating income on assets
EBIT on assets
EBT on assets
Net income on assets
Total asset turnover ratio
Current asset turnover ratio
Total assets (natural logarithm)
Sales (natural logarithm)

Notes. All financial data and ratios are calculated concerning the financial statements in short form (art. 2345-bis of the Italian Civil Code).

Wishing to construct models with a prediction time horizon of two years, the financial statement data for year n-2 (which corresponds to 2016 or 2017) were used to predict the financial health of companies in year n (which corresponds to 2018 or 2019, respectively)[8].

[8] With reference to the observations included in the train sample, the financial ratios were 'purified' of the outliers. For the financial ratios that can assume values tending to 'less infinite' and/or to 'more infinite', the values lower than the fifth percentile and/or the values higher than the ninety-fifth percentile were considered outliers and were replaced, respectively, with the value corresponding to the fifth percentile and with the value corresponding to the ninety-fifth percentile.

4. Results and discussion

Tab. 4 shows the bankruptcy prediction models obtained by applying the methodology described above.

Tab. 4 – Bankruptcy prediction models

Financial data and ratios	**mod GEN**	**mod COOP**	**mod NO COOP**
Total liabilities to assets ratio	1.79	2.34	3.77
Cash ratio			-1.86
Cash-current liabilities margin on assets	-1.22		
Total assets (natural logarithm)	0.47	0.52	0.30
Constant	-8.84	-9.16	-7.08

Notes. 'mod GEN' was the general model built on the basis of the overall train sample of companies (both cooperative companies and joint-stock and limited-liability companies). 'mod COOP' was the specific model built on the basis of the train sample of cooperative companies. 'mod NO COOP' was the specific model built on the basis of the train sample of joint-stock and limited-liability companies. For each model, the regression coefficients of the variables are reported.

The three models (GEN, COOP and NO COOP) are different for the financial data and ratios included and for the regression coefficients of the variables when the same financial data or ratio is included in more than one model. This is in line with the generality of the studies that, although referring to other characteristics of the companies, have investigated the different predictive capacities of general and specific models (for a recent example referring to the Italian context, focused on the relevance of the economic sector to which companies belong, see Branciari et al., 2022).

Considering the limited number of financial data and ratios that the models include, all are characterised by a high level of 'parsimony'. This makes the models particularly simple to use and, therefore, particularly useful for potential users (Jones et al., 2015).

Considering the financial ratios that they include and the widely shared interpretation of the same (Teodori, 2022), mod GEN and mod NO COOP give importance to the financial structure and liquidity of companies, while mod COOP gives importance only to the financial structure of companies.

It is noteworthy that no model included a profitability ratio. This means that no profitability ratio has an impact on the probability of bankruptcy at the established level of statistical significance (0.01%). Considering that co-operative companies typically have a mutualistic purpose while the other companies typically have a for-profit purpose, the fact that mod COOP excludes a profitability ratio is not surprising (this is in line with Mateos-Ronco and López-Mas, 2011 and Dietrich et al., 2005), while the fact that

mod NO COOP also excludes it is surprising (this is in contrast to, for example, the recent study by Poli (2020)).

This result seems to suggest that the different purposes of companies have no relevance to the prediction of bankruptcy or bankruptcy – when it manifests itself in financial statements, in the sense that it can be perceived/predicted on the basis of financial statements – is a unitary phenomenon, mainly of a financial nature.

Tab. 5 shows the AUC values relating to the different models and sub-samples.

Tab. 5 – AUC values

	mod GEN	**mod COOP**	**mod NO COOP**	**chi-squared (p-value)**
test sample COOP	0.89	0.90		0.53 (0.47)
test sample NO COOP	0.86		0.86	0.00 (0.99)
chi-squared (p-value)	0.58 (0.45)			

Notes. 'mod GEN', 'mod COOP' and 'mod NO COOP' have the meaning illustrated in the notes of Tab. 4. The last column/row shows the results of the tests on the differences in the AUC values.

Recalling that the AUC values can vary between 0 (worst predictive capacity) and 1 (best predictive capacity) and using the AUC rating scale proposed by Hosmer Jr. et al. (2013), all models have at least an excellent level of discrimination. Focusing on mod COOP, the fact that this specific model had a high predictive capacity is in line with the research findings of previous studies focusing on other countries (Mateos-Ronco and López-Mas, 2011; Dietrich et al., 2005; Cruz and Sabado, 2022).

The evaluation of the differences between AUC values shows that in no case was there enough evidence to reject the null hypothesis of equality of AUC values. In other words, considering the test sample COOP, mod GEN and mod COOP had statistically equal predictive capacities; as for the test sample NO COOP, mod GEN and mod NO COOP had statistically equal predictive capacities; lastly, when it came to the test sample COOP and the test sample NO COOP, mod GEN had a statistically equal predictive capacity. These results support the research hypothesis that guided this study.

Tab. 6 shows the most important predictive capacity indicators, which are traditionally constructed on the basis of the 'confusion matrix'.

Tab. 6 – Confusion matrix and relative predictive capacity indicators

	mod GEN applied to COOP	mod GEN applied to NO COOP	mod COOP applied to COOP	mod NO COOP applied to NO COOP
Sensitivity	89.19	78.38	90.54	87.84
Specificity	72.97	79.73	72.97	72.97
False positives	23.26	20.55	22.99	23.53
False negatives	12.90	21.33	11.48	14.29
Accuracy	81.08	79.05	81.76	80.41

Notes. 'Sensitivity' is the percentage of companies correctly predicted to be 'in crisis' out of the total number of companies effectively 'in crisis'; it can range from 0 (worst) to 100 (best). 'Specificity' is the percentage of companies correctly predicted as 'not in crisis' out of the total number of companies effectively 'not in crisis'; it can range from 0 (worst) to 100 (best). 'False positives' is the percentage of companies incorrectly predicted to be 'in crisis' out of the total number of companies predicted to be 'in crisis'; it ranges from 0 (best) to 100 (worst). 'False negatives' is the percentage of companies incorrectly predicted to be 'not in crisis' out of the total number of companies predicted to be 'not in crisis'; it ranges from 0 (best) to 100 (worst). 'Accuracy' is the percentage of companies correctly predicted to be 'in crisis' or 'not in crisis' out of the total number of companies; it ranges from 0 (worst) to 100 (best). All indicators were determined assuming a conventional cut-off of 0.50 and were calculated concerning the reference test samples.

Regarding the test sample COOP, the levels of 'accuracy', 'sensitivity' and 'specificity' of mod GEN and mod COOP appeared to be substantially the same. For the test sample NO COOP, the levels of 'accuracy' of mod GEN and mod NO COOP appeared to be substantially the same, but the levels of 'sensitivity' and 'specificity' of mod GEN and mod NO COOP did not appear to be substantially the same (78.38 vs 87.84 and 79.73 vs 72.97, respectively). Concerning the test sample NO COOP, mod GEN was 'more balanced', reporting substantially similar levels of 'sensitivity' and 'specificity', while mod NO COOP appeared to have a more marked capacity to predict companies 'in crisis' ('sensitivity') than companies 'not in crisis' ('specificity').

Tab. 7 and Tab. 8 shows the data for calculating McNemar's test and the respective results of the same for joint-stock companies and limited-liability companies 'in crisis', the first, and 'not in crisis', the second.

Tab. 7 – Joint-stock and limited-liability companies 'in crisis' (evaluation of 'sensitivity')

		mod NO COOP	
		Classified "in crisis"	Classified "not in crisis"
mod GEN	Classified "in crisis"	56	2
	Classified "not in crisis"	9	7
McNemar's test		mid-p-value: 0.0386	

Notes. The two models classify 63 companies in the same way (56 'in crisis' and 7 'not in crisis') and classify 11 companies differently. mod GEN correctly classifies 58 companies, while mod NO COOP correctly classifies 65 companies. Thus, the second model appears to have a higher level of 'sensitivity'. Given the low number of cases classified differently, McNemar's test was conducted with the variant suggested by Fagerland et al. (2013). This reveals that there is enough evidence to reject the null hypothesis of equality of the 'sensitivity' levels.

Tab. 8 – Joint-stock and limited-liability companies 'not in crisis' (evaluation of 'specificity')

		mod NO COOP	
		Classified "in crisis"	Classified "not in crisis"
mod GEN	Classified "in crisis"	13	2
	Classified "not in crisis"	7	52
McNemar's test		mid-p-value: 0.1094	

Notes. The two models classify 65 companies in the same way (13 'in crisis' and 52 'not in crisis') and classify 9 companies differently. The mod GEN correctly classifies 59 companies, while the mod NO COOP correctly classifies 54 companies. Therefore, the first model appears to have a higher level of 'specificity'. Given the low number of cases classified differently, McNemar's test was conducted with the variant suggested by Fagerland et al. (2013). This reveals that there is not enough evidence to reject the null hypothesis of equality of the 'specificity' levels.

McNemar's tests revealed that there was enough evidence to reject the null hypothesis of the equality of 'sensitivity' levels and there was not enough evidence to reject the null hypothesis of the equality of 'specificity' levels.

The in-depth analysis led to the observation that although the two models were substantially similar in terms of overall 'accuracy', the two models were not equally similar in terms of 'sensitivity'.

Considering that the costs of the two types of error ('false negatives' and 'false positives') are generally recognised as not being the same (the former are much higher than the latter) (Veganzones and Severin, 2021: 215), regarding the test sample NO COOP, mod NO COOP could be considered as more 'performing' than mod GEN.

Unlike the previous one, this result does not support – at least partially – the research hypothesis that guides this study. This result is not directly comparable with those of previous studies since, as highlighted in the pre-

vious section dedicated to the literature review, no previous study has conducted an investigation similar to the one conducted in this study.

Although the higher predictive capacity of the specific model was limited to mod NO COOP and, with reference to this, to 'sensitivity', it supports the idea that a specific model, built on the basis of a homogeneous sample (in this case, the legal form of the company), is (in some perspective) more performing than a general model, as suggested in the literature (Varetto, 1999).

Focusing the attention on the variables included both in mod GEN and in mod NO COOP (i.e. 'Total liabilities to assets ratio' and 'Total assets (natural logarithm)'), Tab. 9 (Tab. 10) shows that cooperative companies – both those 'in crisis' and those 'not in crisis' – are more indebted (smaller) than the other corresponding companies.

Tab. 9 – Medians of 'Total liabilities to assets ratio' referred to the train sub-samples

Legal forms	Companies "in crisis"	Companies "not in crisis"	Total
COOP	1.14	0.89	0.98
NO COOP	0.96	0.75	0.88
Wilcoxon's test	-5.38***	-3.93***	-5.74***

*Notes. *** means that the level of statistical significance is 0.01%.*

Tab. 10 – Medians of 'Total assets (natural logarithm)' referred to the train sub-samples

Legal forms	Companies "in crisis"	Companies "not in crisis"	Total
COOP	12.96	12.19	12.56
NO COOP	14.25	13.56	13.87
Wilcoxon's test	6.78***	5.68***	8.62***

*Notes. *** means that the level of statistical significance is 0.01%.*

The specific models were able to reflect these heterogeneities more properly and, consequently, were more performing.

The fact that cooperative companies – both those 'in crisis' and those 'not in crisis' – were more indebted than the other corresponding companies suggests that the Italian economic system is inclined to tolerate the higher level of indebtedness of cooperative companies. This could depend on the fact that cooperative companies have a mutualistic purpose or on the peculiar configuration that their financial structures assume. With reference to the latter, it should be remembered that, for Italian cooperatives, shareholder financing (*prestito sociale*) is often a relevant form of financing. A future study could explore if and how this form of financing could im-

pact the probability of bankruptcy in cooperative companies.

From a methodological point of view, the last result suggests the importance of evaluating the predictive capacity of bankruptcy prediction models using different approaches/methods. In fact, if the evaluation had been made only through the AUC values, the important difference that has emerged regarding the 'sensitivity' – that represents one of the dimensions of the predictive capacity of a prediction model – would not have emerged.

5. Conclusions

Focusing on cooperative companies, on the one hand, and joint-stock companies and limited-liability companies, on the other hand, this study aimed to understand whether a general bankruptcy prediction model has a different predictive capacity compared to specific bankruptcy prediction models for companies with specific legal forms.

The research findings have shown that the overall accuracy of specific bankruptcy prediction models (built on the basis of and intended to be applied to companies having specific legal forms) does not appear to be different from that of a general bankruptcy prediction model (built on the basis of and intended to be applied to companies having any legal form). However, the research findings also show that the 'sensitivity', i.e. the predictive capacity of companies 'in crisis', of the former (in particular, that of the bankruptcy prediction model for joint-stock and limited-liability companies) appears to be higher than that of the latter. Therefore, considering that the prediction errors of companies 'in crisis' are associated with high costs and higher than those associated with the prediction errors of companies 'not in crisis', the specific bankruptcy prediction models appear to be preferable. With regard to the aforementioned different predictive capacities, it has emerged that they can be mainly justified by the level of heterogeneity of the two different sub-samples of companies. However, no elements emerged that could directly link the different performance of the models to the different purposes of the studied companies.

From a theoretical perspective, this study contributes to filling the gap in the relevance of the legal form of companies for bankruptcy prediction. The research findings suggest to those wishing to research bankruptcy prediction models to pay adequate attention to the legal form of companies. To improve their predictive capacity, they should build models using samples of companies that are homogeneous in terms of legal form. The research findings also suggest that they evaluate the predictive capacity of bankruptcy prediction models using different approaches/methods.

From a practical perspective, this study offers to those who may be interested in evaluating the financial health of a company (stakeholders such

as, for example, banks, suppliers, customers, etc., as well as the management and control bodies of the company) bankruptcy prediction models having a high predictive capacity differentiated according to its legal form. In particular, concerning the model relating to cooperative companies, it should be noted that it is the first model proposed in the literature for such companies in the Italian context.

Focusing attention on the managerial implications of the research findings, the bankruptcy prediction models suggest to the management and control bodies of the company that economic-financial dimensions (represented by the respective financial ratios) should mainly be monitored in order to predict the occurrence of a state of crisis. Specifically, they are the 'Total liabilities to assets ratio' in the case of the cooperative companies and the 'Total liabilities to assets ratio' and the 'Cash ratio' in the case of the joint-stock companies and the limited-liability companies.

In the Italian context, the research findings are particularly relevant considering the recent reform of legislation on business crises (Legislative Decree n. 14/2019), which has given particular importance to the timely prediction of the same (Baldissera, 2019). They provided suggestions regarding the relevance that should be attributed to bankruptcy prediction models within the organizational, administrative and accounting structures that they must establish to facilitate the prompt detection of crises and to promptly undertake appropriate initiatives to comply with the requirements of the new legislation on business crises. From this perspective, if bankruptcy prediction models are adequately used and their results are adequately interpreted as a form of advanced financial statement analysis, they could become part of a suite of management control tools that are useful in promptly detecting states of crisis.

The research findings achieved, however, are not without limitations (Du Jardin, 2010). Barontini (2000: 25) observed that 'the effectiveness of a model [...] depends on the characteristics of the analysis carried out: every methodological choice of the author of the model can significantly influence the performance obtained'. Consequently, the verification of the research hypothesis that guided this study will have to be repeated using different methodological choices. This may represent the first possible future development of the research. At the same time, Veganzones and Severin (2021: 210) noted that 'large samples are needed to obtain more reliable results and robustness, though the size tends to be conditional on the number of failed firms available'. Consequently, the verification of the research hypothesis that guided this study will have to be repeated by expanding the number of companies included in the sample (for example, by expanding the number of years taken into consideration). This may represent a second possible future development of the research.

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BOARD GENDER DIVERSITY AND PERFORMANCE IN GAZELLES: EVIDENCE FROM A SAMPLE OF ITALIAN PRIVATE HOSPITALS

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Abstract

Purpose: *This paper examines the influence of board composition in terms of gender diversity on the performance of high-growth firms, offering evidence from the health sector.*
Methodology: *The sample is composed of 27 startups operating in the health sector. Enterprises are born in Italy in 2014 and became gazelles in 2018 or 2019, respectively, in the fourth or fifth year of life.*
To analyse the effect of board gender diversity, multiple regression models were utilised, using return on assets (ROA) as a measure of financial performance.
Findings: *Results show that there is a statistically significant and positive relationship between board gender diversity and financial performance. In other words, as the percentage of women on board of directors increases, financial performance grows by approximately 6.41%.*
Originality of the study: *The impact of board gender diversity on firms' performances is widely investigated in the literature. However, this study is original both for the type of firms (gazelles) and for the sector investigated (private hospitals).*
Practical implications: *Managers of high-growth startups may find advantages in including women in executive and board positions. This is particularly relevant for the private healthcare sector, where governance structure plays a key role in achieving performance objectives.*

1. Introduction

Corporate research recognizes the importance of diversity on the board of directors (BoDs). It has a key role in improving firms' performance (Mahadeo *et al*., 2012; Hillman *et al*., 2000, 2002).

The term "diversity" refers to any kind of difference among members and is assumed to add value to the firm (Arfken *et al*., 2004).

The research on board diversity focused on different dimensions, such as educational and functional background (Goodstein *et al*., 1994; Golden and Zajac, 2001; Westphal and Zajac, 1995), race, ethnicity, and nationality (Arfken *et al*., 2004; Burke, 1997; Carter *et al*., 2003; Daily *et al*., 1999; Erhardt *et al*., 2003; Shrader *et al*., 1997; Oxelheim and Randøy, 2003; Ruigrok *et al*., 1999, 2005).

Given the growing number of women on corporate boards, scholarly attention has recently shifted to board "gender" diversity (Rose, 2007; Smith *et al*., 2006; Nielsen and Huse, 2010). The academic debate is still open, and the results of the empirical literature are still mixed: some studies showed a positive impact on financial performance with women on the BoD (Erhardt *et al*., 2003; Adler, 2001; Mahadeo *et al*., 2012), while others found no correlation (Shrader *et al*., 1997; Adams and Ferreira 2009; Marinova *et al*., 2016).

Little is known about how the board gender diversity affects firm performance in startups, especially those with exceptional growth potential, so-called "Gazelles" (Sterk *et al*., 2021).

The term "gazelle" was coined by Birch and Medoff (1994) to denote a small group of high-growth firms which - starting from a base-year turnover of at least $ 100,000 - achieved a minimum of 20% turnover growth each year over a three-year interval. These companies play an important role in the economic system of all countries for their contribution to the creation of new net jobs (Birch, 1979; Henrekson and Johansson, 2010).

Interest in gazelle enterprises is growing, but no standard definition exists. In this study, we assume the definition provided by the Organization for Economic Cooperation and Development (OECD). OECD defined gazelles as *"enterprises up to five years old with average annualized growth greater than twenty percent per annum over a three-year period, and with ten or more employees at the beginning of the observation period"* (Eurostat-OECD, 2007).

This paper aims to investigate the influence of board gender diversity on the financial performance in a sample of young, high-growth firms. We focused on gazelles operating in the healthcare sector because of the importance of the private hospital sector in the Italian context.

Italy is a country based on the National Health System (NHS) (Fattore, 2019). A large portion of hospitals in Italy are accredited and backed by the NHS. They provide for 30.4% of the beds nationally, although there are wide discrepancies between the different regions (Belfiore *et al*., 2022).

In the last decades, healthcare systems are facing conflicting trends (Mauro and Giancotti, 2021; Tartaglia Polcini *et al.*, 2021): short- and long-term effects of financial and economic restrictions; increasing demands of an ever-expanding and aging population, which leads to more chronic patients; increasing request and availability of technological innovations; new roles, new skills, and additional responsibilities for the health workforce.

To face the situation, governments have partnered with private hospitals to improve care, increase efficiency, and boost productivity (Mauro and Giancotti, 2021; Vecchi *et al.*, 2022). However, Public-Private Partnerships (PPP) are now under discussion because of the mixed results achieved, and the deteriorated trust between public and private actors (Vecchi *et al.*, 2022).

To date, few studies have dealt with the economic performance, financial profile, and structural growth of private hospitals (Belfiore *et al.*, 2022): "gazelles hospitals" support care processes in the health system, yet factors affecting their economic and financial performance are unclear. In particular, the search for the relevant characteristics to define effective governance has not received proper attention (Tartaglia Polcini *et al.*, 2021).

Under this framework, the primary aim of this article was to explore whether and to what extent the board gender diversity affects financial performance of the "gazelles hospitals" that collaborate with the Italian NHS. The topic of gender diversity is investigated in terms of proportion of women on company board (Hillman, 2015; Post and Byron, 2015). Specifically, we seek to answer, from an empirical standpoint, the following research question: *what is the impact of increased female representation on healthcare gazelles' financial results?*

To answer this research question, an empirical approach based on a panel regression analysis was employed. Our data comprises 27 startups operating in the health sector born in Italy in 2014, which became gazelles in 2018 or 2019. These enterprises were observed for six years following their birth (from 2014 to 2019). Therefore, the last sample comprised a panel of 126 observations.

Financial performance was measured as the return on assets (net income divided by total assets - ROA). ROA is the most frequently financial ratio used in studies on gender diversity on company boards (Erhardt *et al.*, 2003; Marinova *et al.*, 2016; Adler, 2001).

Our study provides the following theoretical and practical contributions.

First, board gender diversity research has been inconclusive because of contradictory findings in prior literature, requiring additional research and testing.

Second, this study addresses the gap in the literature on studies focused on the role of the BoD in high-growth firms (Garg, 2013; Rasmussen *et al.*, 2018), and how the composition of the BoD, in terms of gender diversity, affects the financial performance of gazelles. In fact, to the best of our

knowledge, no empirical studies exist testing the relationship between gender diversity and performance in healthcare gazelles.

From a practical point of view, this topic is relevant for the private healthcare sector: the governance and organizational structure of private hospitals shall be such as to ensure the measurement and achievement of the performance objectives (Taylor, 2000). Indeed, while public hospitals are not required to make profits and therefore their boards are not under any pressure to maximize shareholder value (Tartaglia Polcini *et al.*, 2021), this situation is very different in private hospitals, especially profit-making hospitals (Belfiore *et al.*, 2022). Their boards are required to return profit to their shareholders, whiles ensuring effective and efficient health delivery (Belfiore *et al.*, 2022).

The paper is organized as follows. The next section provides a review of the literature preceding the development of the hypotheses. In section 3, we present the research methods and the econometrics analysis; in section 4, we discuss the results of the empirical analysis. Finally, in section 5, last remarks and future research directions are presented.

2. Review of literature and hypotheses development

In the last years, the issue of board diversity has received an increasing attention from both academics and practitioners, becoming one of the key issues on corporate governance.

Of whatever kind it may be - of gender, nationality, age, professional background - diversity is deemed to broaden the debate within the boards and help to avoid the danger of homogenization of thinking, increase creativity and innovation, improve problem solving, and promote the exchange of ideas, providing new insights and perspectives to the board (Watson *et al.*,1993; Siciliano, 1996; Coffey and Wang, 1998; Carter *et al.*, 2003; Schippers *et al.*, 2003).

In this framework, the relationship between board diversity and firms' performance has become one of the major topics explored in the literature.

The empirical literature has produced mixed results: while some authors find a positive relationship between diversity and performance (Campbell and Minguez-Vera, 2008; Carter *et al.*, 2010; Cook and Glass, 2015), some others find a negative or no significant relationship (Shrader *et al.*, 1997; Zahra and Stanton, 1988; Rose, 2007; Adams and Ferreira, 2009).

Overall, the literature on the relationship between board diversity and corporate performance had not reach conclusive evidence on this topic.

As pointed out by Adams and Ferreira (2009), the impact of board diversity on performance is probably a heterogeneous phenomenon.

This could be due to contextual factors: diverse boards may be more use-

ful in large firms operating with complex asset structures and need more intensive monitoring from directors and complex advice (Coles *et al*., 2008).

This paper is focused on gender diversity, measured by the presence of women on the BoDs (Hillman, 2015; Post and Byron, 2015).

The topic of gender diversity has its roots in the transition from a "think-manager-think-male" culture (Schein, 1973) to a leadership style known as "transformational leadership" (Burns, 1978; Bass and Avolio, 1990).

The first has prevailed for a long time, attributing the characteristic of a leader - such as competition, ambition, analytical skills, emotional stability, aggressiveness, and so on - exclusively to the male gender (Schein *et al*., 1996).

Later, the value of alternative leadership styles to more directive ones was recognized: transformational leadership is characterized by the ability to inspire, combine different approaches (Athanasopoulou *et al*., 2018), foster empathetic involvement of employees (Post and Byron, 2015), and motivate by leveraging values, ideals, and a sense of mission (Burns, 1978; Bass and Avolio, 1990).

In this context, previous studies observe that this leadership style is found more frequently in women than in men (Eagly and Carli, 2003), raising the debate on gender diversity and its impact on the economic and financial firm's performance.

The academic literature on this topic provided mixed results.

Some studies hypothesized a number of organizational level benefits associated with gender diversity on the BoD. These include improved board decision-making quality (Milliken and Martins, 1996), more effective board strategic control (Nielsen and Huse, 2010), more stringent board monitoring (Adams and Ferreira, 2009).

Intangible and complex resources derive from board gender diversity. These include: market insight, creativity and innovation (McMahan *et al*., 1998; Ismail and Manaf, 2016; Wu *et al*., 2022), better quality decisions (Milliken and Martins, 1996), corporate reputation (Fombrun, 2006; Bear *et al*., 2010), effective organizational control (Westphal and Zajac, 1995; Bear *et al*., 2010), improved problem-solving (McMahan *et al*., 1998) and created a positive impact on cognitive conflict (Matolcsy and Wyatt, 2006).

These advantages seem to be based on cognitive differences between men and women, in terms of core values, risk attitudes, backgrounds, and perspectives (Adams and Funk, 2012; Perryman, *et al*., 2016; Simpson *et al*., 2010).

In particular, several studies suggest that women directors tend to hold more college degrees and more marketing and sales experiences compared to their male counterparts (Carter *et al*., 2010). Additionally, women directors are more prudent to risks, pay more attention to corporate social responsibility and philanthropy (Burgess and Tharenou, 2002; Post and Byron, 2015), have different socialization experiences compared to their male counterparts (Simpson *et al*., 2010).

Finally, women directors are prone to value different opinions, elicit information from all board members, and adopt a cooperative decision-making approach to stimulate collaboration within the group (Post and Byron, 2015).

As a result, a gender diverse board may benefit firms through these unique knowledge, information, experiences, and skills of women directors (Hillman *et al*., 2007; Miller and Triana, 2009). Many authors have documented that a higher proportion of women directors on boards is associated with positive accounting, financial, or market performance (Terjesen *et al*., 2009; Campbell and Mnguez-Vera, 2008; Carter *et al*., 2003; Conyon and He, 2017; Dani *et al*., 2019; Aguinis and Glavas, 2012; Bocquet *et al*., 2019; Salloum *et al*., 2019; Shehata *et al*., 2017; Galletta *et al*., 2021; Naciti *et al*., 2021; Moreno-Gómez *et al*., 2018).

Other studies have found the opposite by showing a negative association between female board representation and firm performance (Ahern and Dittmar, 2012; Matsa and Miller, 2013), while other studies have concluded that there is no clear relationship between female board representation and firm performance (Adams and Ferreira, 2009; Carter *et al*., 2010; Jurkus *et al*., 2011; Bianchi *et al*., 2020).

Although the literature has widely investigated the relationship between board gender diversity and firm performance, there is a surprising lack of empirical works on the effect of gender diversity on startups performance.

In effect, the topic is particularly relevant for these firms: board gender diversity effects on the decision-making process at the top level (Adams *et al*., 2010); this aspect is especially crucial for startups in which early-stage entrepreneurial decisions may have an important effect on survival and performance (Colombo and Grilli, 2010; Shrader and Siegel, 2007).

Despite this, the role of board composition in startups' functioning and survival has been studied mostly in terms of outside status, while the role of gender board composition is rarely investigated (Li *et al*., 2020), most probably because women are underrepresented in young startups (Dai *et al*., 2019; Bacchin *et al*., 2022).

This paper contributes to this stream of literature, investigating on the role of gender diversity in terms of female representation in BoDs of high-growth startups, and offering evidence from the private healthcare sector. The choice to focus on the healthcare sector is justified by the lack of studies in this area: despite the research on the effects of gender diversity has grown substantially, little is focused on the healthcare industry, leaving organizations to make decisions based on conflicting findings regarding the association of diversity with quality and financial outcomes (Gomez *et al*., 2019). Studies are mainly focus on other determinants of financial performance in healthcare sector (Nurettin Oner, 2016). Only recently, a review

of studies focused on the impact of diversity in general (Gomez *et al.*, 2019) (differences in race, age, ethnicity, educational background and gender of workers, managers, customers or teams, including nurses, technicians and physicians) on the performance and outcomes of healthcare organizations, offers some useful considerations: a) workforce diversity in healthcare sector is associated with better financial performance and a higher quality of patient care; b) gains from diversity are maximized when reflected in top management and board positions (Gomez *et al.*, 2019; Muller-Kahle *et al.*, 2011; Miller and Triana, 2009; Carter *et al.*, 2010). Despite the contribution, the study concludes by emphasizing the need to clarify which type of diversity contributes to the improvement of overall performance. In this sense, our aim is to investigate about the role of gender diversity in improving financial performance of healthcare companies.

Based on the above arguments, we propose the following first hypothesis (H1):

H1: *there is a positive relationship between board gender diversity (in terms of proportion of women on company board) and financial performance in gazelles operating in the private healthcare sector.*

However, in recent years, a stream of research on gender diversity based on the critical mass perspective (Kanter, 1977a; 1977b), has highlighted that female representation on the board can have a relevant influence on the decision-making and strategic processes of companies only when their subgroup (i.e., the number of women directors) on the board reaches a certain size (Lesch *et al.*, 2022). This theory suggests that only when the number of women directors reaches a large enough number to become the majority group (compared to the subgroup of male directors) and therefore, a critical mass, is it able to significantly influence board discussions (García-Meca *et al.*, 2022) and therefore corporate performance (Brahma *et al.*, 2021). Consequently, it is reasonable to assume that the impact of gender diversity on financial performance depends on the number of women directors on BoDs. Below a certain critical threshold of the female representation, on the contrary, we believe that the influence of women on the board and therefore on company performance is less. Following the main body of literature (Joecks *et al.*, 2013; Torchia *et al.*, 2010; Brahma *et al.*, 2021; Erkut *et al.*, 2008), we assume that the number of women directors needed to form a "critical voice" capable of exerting a significant influence on company performance is equal to 3. This is especially the case for companies whose BoDs are multi-gender (i.e., composed of men and women). Accordingly, we propose the following second hypothesis (H2):

H2: *Gazelles with three or more women on the BoDs perform better financially than others.*

3. Method

3.1 Sample and data

The empirical analysis is based on a longitudinal dataset of 27 high-growth startups operating in the healthcare sector.

The study covers the five-year period from 2015 to 2019.

Data were collected from AIDA-Bureau van Dijk (AIDA-BvD), a digital database contains comprehensive information and financial statements of the Italian companies.

The process of data collection comprises two phases.

First, we collected from AIDA-BvD the list of the entire population of startups born in Italy in 2014. Among these companies, we then isolated the startups that achieved the status of gazelles in 2018 or 2019, respectively, in their fourth or fifth year of life.

We defined gazelles as companies of up to 5 years, growing 20% over 3 years and employing 10+ employees - according to the OECD-Eurostat (2007) definition.

As a measure of growth, we used the annualized average growth rate in terms of the number of employees [1] and turnover [2].

$$Employment\ growth\ rate = \sqrt[3]{\frac{Employees_{(t)}}{Employees_{(t-3)}}} - 1 > 0.2 \quad [1]$$

$$Turnover\ growth\ rate = \sqrt[3]{\frac{Turnover_{(t)}}{Turnover_{(t-3)}}} - 1 > 0.2 \quad [2]$$

Where (t) and (t-3) represent, respectively, the beginning and the end of the three-year growth period.

Companies in our sample were established in 2014 and analysed from 2014 to 2019. We identified two periods of growth: 1) from 2015 (t-3) to 2018 (t) for companies that had 10 employees in 2015; 2) from 2016 (t-3) to 2019 (t) for companies that reached this threshold at the third year of age (2016).

At the end of this first phase of the selection process, 2,183 Italian gazelles have been identified.

The second phase of the selection process was aimed at identifying the gazelle companies operating in the health sector (hospital gazelles). We used the four-digits ATECO-ISTAT 2007 classification code.

We considered as hospital gazelles only the companies carrying out one

of the following economic activities: 1) Hospitals and general care homes (86.10.10); 2) Specialized hospitals and nursing homes (86.10.20); 3) Institutes, clinics, and university polyclinics (86.10.30); 4) Hospitals and long-term care homes (86.10.40); 5) Residential social work services (87). In table 1 we reported the distribution of gazelles by sector of economic activity.

Tab. 1: Distribution of the hospital gazelles by economic sector of activities (at the four-digit level of ATECO-ISTAT 2007)

4 digit code	**Description**	**Number of gazelles**	*%*
873000	Residential care activities for the elderly and disabled	12	44.44%
879000	Other residential welfare facilities	8	29.64%
871000	Residential nursing facilities for the elderly	5	18.52%
861010	Hospitals and general care homes	1	3.70%
861020	Specialized hospitals and nursing homes	1	3.70%
N		27	100.00%

In table 2, we report the distribution by regions of the hospital gazelles included in our sample.

Following the ISTAT-Eurostat classification, we found that about half of the hospital gazelles (48,14%) are in the regions of Southern Italy (i.e., Campania, Sardinia, Sicily, Puglia); 33,35% in the regions of Northern Italy (i.e., Emilia-Romagna, Lombardy, Piedmont, Friuli Venezia-Giulia) and the remaining 18.51% in the Central Italy (i.e., Lazio, Umbria, Marche, Tuscany).

Tab. 2: Distribution of hospital gazelles by regions

Regions	**Number of gazelles**	**Perc. (%)**
Campania	4	14.81%
Emilia-Romagna	4	14.81%
Sardinia	4	14.81%
Sicily	3	11.11%
Lombardy	3	11.11%
Puglia 2		7.41%
Lazio	2	7.41%
Umbria	1	3.70%
Piedmont	1	3.70%
Friuli Venezia-Giulia	1	3.70%
Marche	1	3.70%
Tuscany	1	3.70%
N	**27**	**100.00%**

3.2 Variables and measurements

To measure the dependent variable as a proxy of financial performance of the hospital gazelles, we used the ROA. This indicator is a powerful accounting-based indicator that summarizes the firm's performance; it represents the most used indicator in similar studies (e.g., Inostroza and Espinosa-Méndez, 2022; Simionescu *et al.*, 2021; Satriyo and Harymawan, 2018). As suggested by Kennedy *et al.* (1992), to mitigate the impact of outliers on the regression results, we winsorized the values of our dependent variable at the 5th and 95th percentile of its distribution (command *winsor2* in STATA 14.0). In this way, the outliers were replaced with values from the fifth and ninety-fifth percentiles of the sample population (see Cox *et al.*, 2003).

The explanatory variables include the independent variable and a set of variables related to the characteristics of companies and the composition of the BoDs. The independent variable is the gender diversity, in terms of proportion of women directors on corporate boards. Following previous studies (e.g., Singh *et al.*, 2023; Dwaikat *et al.*, 2021; Ahmadi *et al.*, 2018; Conyon and He, 2017; Byoun *et al.*, 2016; Low *et al.*, 2015), we measure this variable as the ratio of the total number of women directors and the total number of directors on board.

The regression analysis also included additional firm-specific and governance-related variables to control other variables potentially affecting a firm's financial performance. To control for corporate governance characteristics, we used the total number of directors on the company board (Kathuria and Dash, 1999), the age of the youngest and the oldest director (Eulerich *et al.*, 2014). Second, to control firm-level effects, we applied the logarithmic transformation of the total number of employees (Ali *et al.*, 2014) and of a total asset (Singh *et al.*, 2023) as proxies of business size. We also controlled for liquidity by using the current ratio, calculated as the current assets divided by the current liabilities (Delen *et al.*, 2013).

Table 3 summarizes the variables used in the regression models, their description, and measurements.

Tab. 3: List of variables used in the regression model and measures

	Variables	Abbrev.	Definition and measures	Authors
Dependent variable				
Financial performance				
	Return on Asset	ROA	ROA is computed as the ratio of the annual Earning Before Interests and Taxes (EBIT) to Total Asset in a financial year *t*	Singh *et al.*, 2023; Dwaikat *et al.*, 2021; Ahmadi *et al.*, 2018; Conyon and He, 2017; Byoun *et al.*, 2016; Low *et al.*, 2015.
Independent variables				
	Gender diversity ratio (GDR)			
	Proportion of Women Directors (%)	P-WD	Percentage of women directors on the board of a company measured as the ratio of the total number of women directors to the total number of directors	Ahmadi *et al.*, 2018; Conyon and He, 2017; Dwaikat *et al.*, 2021.
	Level of female representation in the BoDs (F-REPR)			
	1 Woman Director	1-WD	Dummy variable that assumes the value of 1 if 1 if there is one woman director, 0 otherwise	Brahma *et al.*, 2021; Joecks *et al.*, 2013.
	2 Women Directors	2-WD	Dummy variable that takes the value of 1 if there are two women directors and zero otherwise	Brahma *et al.*, 2021; Joecks *et al.*, 2013.
	3 Women Directors	3-WD	Dummy variable that takes the value of 1 if there are three or more women directors and zero otherwise	Brahma *et al.*, 2021; Joecks *et al.*, 2013.
Control variables				
	Corporate governance variables			
	Board size	B-SIZE	Number of directors present in the board of the firm	Kathuria and Dash, 1999.
	Youngest Director	Y-DIR	Age of the youngest director in the board of the firm	Eulerich *et al.*, 2014; Simionescu *et al.*, 2021;
	Older Director	O-DIR	Age of the older director in the board of the firm	Eulerich *et al.*, 2014; Simionescu *et al.*, 2021.
	Firms-level control variables			
	Operational firm size	EMPL	Natural logarithm of the number of employees for the firm *I* at time (year) *t*	Ali *et al.*, 2014; Simionescu *et al.*, 2021.
	Structural firm size	ASSET	Natural logarithm of a total asset for company *i* at time (year) *t*	Singh *et al.*, 2023.
	Current ratio	LIQ	Current assets/Current liabilities	Delen *et al.*, 2013.
	Year dummies	YEARS	Time trending dummy variables reflecting years 2014-2019	Barron and Waddell, 2003; Grinstein and Hribar, 2004.

3.3 Descriptive statistics and correlation matrix

Table 4 summarizes the descriptive statistics of the variables used in the regression analysis. It also summarizes the gender composition of the BoDs of the sampled gazelles.

The mean ROA of the full sample was 1.17%. The proportion of women on company boards was about 0.46. This value ranges from a minimum of 0 (in the hospital gazelle where there is no woman on the BoD) and a maximum of 1.00. We also found that the BoDs of the companies examined had an average of 4 directors during the observation period, with a minimum of 1 (in companies with sole director) and a maximum of 10. The average age of the directors was 53 years. The average age of the youngest directors was approximately 44 years, compared to the average of 62 of the older directors.

Almost all the hospital gazelles observed had an average of 32 employees and total assets of 1,225.88 thousand euros in the observation period. Therefore, according to the size parameters established by Directive 2013/34/EU, most of the gazelle companies in our sample are small and medium-sized enterprises (SMEs).

Tab. 4: Descriptive statistics of the variables used in the regression analyses

Variables	Obs.	Mean	St.Dev.	Min	Max
Return on Asset (ROA)	145	1.17	19.87	-49.44	32.13
Proportion of women Directors (%)	162	0.46	0.41	0	1.00
Board size	162	3.63	2.38	1	10
Youngest director	162	44.56	8.90	23	64
Older director	162	62.37	11.09	42	79
Total asset	145	1225.88	3551.06	1.577	20258.11
Number of employees	145	32.32	75.55	0	569
Current ratio	143	1.20	0.86	0.02	5.14

Table 5 reports the correlation matrix of the variables used in the regression analyses. Most correlation coefficients are low, thus suggesting that the multicollinearity was not a concern in our study. This is further confirmed by the mean value of the Variance Inflation Factor (VIF) that was below the critical threshold of 2.50 indicated by Gujarati (2022) (see Tab. 5).

Tab. 5: Pairwise correlation matrix of the variables used in the regression models

	1	2	3	4	5	6	7	8	VIF
1. Return on Asset (ROA)	1.00								
2. Proportion of women Directors (%)	0.09	1.00							1.20
3. Board size	0.03	0.13	1.00						2.29
4. Youngest director	0.05	-0.13	-0.62*	1.00					1.94
5. Older director	-0.03	0.29*	0.32*	0.02	1.00				1.50
6. Total asset	-0.10	-0.20*	0.01	-0.03	-0.28*	1.00			2.11
7. Number of employees	0.00	-0.05	0.01	-0.07	-0.20*	0.52*	1.00		2.19
8. Current ratio	0.42*	0.15	0.26*	-0.10	0.03	-0.13	-0.06	1.00	1.15
Mean VIF									1.77
Asterisks indicate the level of significance at 0.05 (*p-value* < 0.05)									

3.4 Statistical procedure and econometric modelling

As stated in the previous sections, we are interested in examining the influence of the board gender diversity on the hospital gazelles' financial performance. This relationship can be represented by the following basic general equation [1]:

$$\text{ROA} = f(\text{Gender diversity in the BoD, control variables}) \qquad [1]$$

This model represented the starting point of our hypothesis and the empirical analysis. For this purpose, in line with previous study (e.g., Simionescu *et al.*, 2021; Arioglu, 2020; Satriyo and Harymawan, 2018; Julizaerma and Sori, 2012), we first estimated the following Pooled Ordinary Least Squares (OLS) linear model [2] to test our H1:

$$ROA_{it} = a + Gender\ diversity_{it} + Corporate\ governance_{it} + Firm\ controls_{it} + _{it} \quad [2]$$

where is the regression coefficient of the variable used as a proxy of gender diversity in the BoD of the hospital gazelles. represents the vector of the other variables related to the characteristics of the BoD (i.e., age of the youngest director, age of the oldest director and total number of directors on company boards). is the vector of the control variables as reported in the table 3 above and denotes the error term for gazelle *i* at the time (year) *t*.

Considering the longitudinal structure of our data set, we estimated a panel multivariate regression model where the financial performance is

assumed to be a function of the gender diversity. The use of a panel regression model provides a more reliable and powerful analysis than cross-sectional analysis because it allows better control for unobservable heterogeneity and omitted variables biases (see Campbell and Minguez-Vera, 2008; Low *et al.*, 2015). However, as stated by Low *et al.* (2015) and Hermalin and Weisbach (2001), issues of reverse causality and endogeneity are common in the analysis of the relationship between gender diversity and financial performance. In these cases, OLS may no longer be the Best Linear Unbiased Estimator (BLUE) and the results of the regression analysis could be biased (Bhagat and Black, 2001). To evaluate the robustness of Pooled OLS estimates, we performed a series of regression models using different estimators and a different proxy of gender diversity. First, we have replaced the independent variable "Gender diversity ratio" with a categorical variable that expresses the number of female directors on the company board (see table 3). According to Brahma *et al.* (2021) and Joecks *et al.* (2013), we coded this variable by taking the following three dummy variables: (1) dummy variable "1 woman director" that take a value of 1 if there is one woman director on the company board, 0 otherwise; (2) "2 women directors" that assume a value of 1 if on the company board there are 2 women, 0 otherwise; (3) "3 women directors" that take a value of 1 if there are at least 3 women directors on the company board, 0 otherwise.

Second, in line with previous empirical studies on the relationship between gender diversity and financial performance (e.g., Fernández-Temprano and Tejerina-Gaite, 2020; Kimanzi *et al.*, 2020; Inostroza and Espinosa-Méndez, 2022), we employed Generalized Least Square (GLS) with Random-Effects specification and a hierarchical regression analysis as alternative models to further explain the effect of gender diversity on corporate performance by controlling for reverse-causality and unobservable effects.

4. Results

The results of Pooled OLS and GLS Random-Effects regression analyses summarised in table 6 highlights a positive relationship between the female representation in the BoDs and the financial performance of hospital gazelles. In addition, the results suggest that all the four models are overall statistically significant at the level of 99%, as showed by the *p-value* (<0.01) associated to the *F*-test for the Pooled OLS estimations (Models 1 and 3) and to the Wald Chi-square for GLS Random-Effects estimates (Models 2 and 4). Looking at the value of the R^2, we also find that Model 1 explains 27.35%, Model 2 explains 25.88%, Model 3 explains 31.81% and Model 4 explains 30.76% variation in financial performance, respectively.

Regarding the independent variable (i.e., proportion of women directors), we noted that the estimated regression coefficient is positive and statistically significant at the level of 5% in both Models 1-2, thus confirming our H1 that gender diversity on company board matters. These results are consistent with those of previous studies that found a positive relationship between the female representation in the BoDs and financial performance (e.g., Abdelzaher and Abdelzaher, 2019; Low *et al.*, 2015; Lückerath-Rovers, 2013).

Regarding the control variables, only the business size and the liquidity levels were significant, although at different *p-values*. The coefficient of the variables used as a proxy of the operational firm size (natural log of the number of employees) is negative and statistically significant at the level of 10% both in Models 1-2, suggesting a negative relationship between firm size and financial performance. This result is also consistent with the findings of similar previous studies (Inostroza and Espinosa-Menéndez, 2022; Singh *et al.*, 2023). As expected, the regression coefficient of the liquidity control variable is positive and statistically significant at the level of 1% ($p\text{-}value < 0.01$).

To further confirm our results, we also performed some robustness checks. First, in our regression analyses (Model 3-4 in table 6) we introduced an alternative measure as a proxy of gender diversity in the BoDs, namely the level of female representation on company board. This information was captured by a categorical variable of 4 categories, ranging in a scale of values between 0 (if in a company board there are 0 women directors) and 3 (if in a company board there are 3 or more women directors). In the regression analyses, this variable was proxied by the following 4 dummy variables: (1) No women directors (No-WD), (2) One woman director (1-WD), (3) Two women directors (2-WD) and (4) Three or more women directors (3-WD).

However, we included in the regression model only three of the four dummy variables to prevent the dummy variable trap due to the perfect multicollinearity (Hirschberg and Lye, 2001).

Consistent with the objectives of our study, we excluded from the model the variable "No women directors", which represents the term of comparison with the variables included in the regression.

The results of the estimates (Model 3-4) reported in table 6 overall show a positive relationship between the female representation in the BoDs and financial performance (ROA), thus confirming the H2.

Regarding the variable "One woman director" (1-WD), we found a positive and statistically significant regression coefficient in both Models 3-4. These same conclusions are also valid for the variable "3 or more women directors" (3-WD), whose coefficient is positive and statistically significant in both regression models (i.e., Models 3-4). It can conclude that the presence of three or more women directors on company boards can lead to a

significant increase in financial performance compared to the companies where there is a low representation of women on BoD. These results appear coherent with our expectation and previous studies that, assuming the critical mass perspective, have pointed out that 3 or more women in the BoDs represent a voice and their positive impact on financial performance (Brahma *et al.*, 2021; Joecks *et al.*, 2013).

Tab. 6: Results of the Pooled OLS regression analysis

Independent variables	Proportion of Women Directors (%)		Number of Women Directors	
	Model 1 (Pooled OLS)	Model 2 (Random-Effects)	Model 3 (Pooled OLS)	Model 4 (Random-Effects)
Proportion of Women Directors (%)	6.20** (2.642)	6.994** (3.345)		
1-WD			13.093** (5.084)	14.031*** (5.323)
2-WD			-1.332 (4.344)	-0.508 (5.204)
3-WD			12.593*** (4.682)	13.762** (5.427)
Board size	0.265 (1.014)	0.241 (1.232)	-1.394 (1.35)	-1.481 (1.237)
Youngest director	0.215 (0.234)	0.182 (0.299)	0.274 (0.256)	0.254 (0.276)
Older director	-0.212 (0.166)	-0.194 (0.229)	0.032 (0.163)	0.035 (0.202)
Natural log of Total Asset	0.551 (1.418)	2.954 (1.906)	0.991 (1.384)	3.015* (1.748)
Natural log of the Number of employees	-3.699* (1.996)	-6.002* (3.069)	-1.793 (2.128)	-4.163 (3.107)
Current ratio	8.343*** (2.078)	8.463*** (2.192)	8.829*** (1.962)	8.772*** (2.098)
Temporal dummies				
2015	14.768 (9.357)	13.255 (9.715)	11.975 (9.332)	11.565 (9.737)
2016	20.637** (8.685)	18.030* (9.707)	16.949* (8.776)	15.684 (9.712)
2017	16.493* (9.353)	13.124 (9.939)	12.635 (9.257)	10.650 (9.757)
2018	16.146* (9.478)	12.073 (10.657)	11.916 (9.443)	9.454 (10.557)
2019	19.332** (9.17)	14.999* (9.047)	15.093 (9.331)	12.33 (8.918)
_Intercept	-16.102** (15.796)	-19.928 (19.169)	-34.504* (18.78)	-36.867* (22.088)
N. obs.	134	134	134	134

N. groups		26		26
R-square	0.2735	0.2588	0.3181	0.3076
F-stat	2.88***		3.46***	
Wald Chi-square		55.34***		97.37***

Note: The Robust Standard Errors of the regression analyses are reported in parentheses. Asterisks show the level of significance at 0.01 (***), 0.05 (**) and 0.10 (*), respectively.

Table 7 reports the results of the hierarchical regression (Models 5, 5a., 5b.). In the first step (Model 5) we estimated a model that includes the dependent variable (ROA) and the firm-level control variables.

In the second step (Model 5a.), we added the variables related to the characteristics of the company boards.

In a third step (Model 5b.), we included in the regression model the gender diversity (in terms of proportion of women in the BoD) (Hillman, 2015; Post and Byron, 2015).

Consistent with the results of the OLS and GLS Random-Effects estimates, we found a positive and statistical relationship between the proportion of women on the company board and ROA. This result is also in line with the findings of previous studies (Isidro and Sobral, 2015; Erhardt *et al.*, 2003; Campbell and Minguez-Vera, 2008; Shrader *et al.*, 1997; Moreno-Gómez *et al.*, 2018).

The regression coefficient of the independent variable of our interest in the Model 5b is positive (5.38) and significant at a level of 5% (*p-value* <0.05). We also found that the value of R^2 increased significantly in the third step when the proportion of women on the BoDs was added in the model (Model 5b.). The R^2 changed from a value of 0.2090 in the second step (Model 5a.) to a value of 0.2212 (Model 5b.) in the complete regression model.

This change in R^2 values suggests that a not insignificant part of the variance in financial performance is explained by gender diversity and the female representation on the BoDs.

Tab. 7: Results of the hierarchical regression analysis

	Model 5	Model 5a.	Model 5b.
Step 1			
_Intercept	-9.683 (7.446)	-10.851 (14.721)	-10.656 (14.679)
Natural log of Total Asset	1.520 (1.370)	1.300 (1.292)	1.599 (1.316)
Natural log of the Number of employees	-2.536 (1.971)	-2.360 (1.900)	-2.888 (1.953)

Current ratio	9.324*** (1.932)	9.615*** (2.124)	9.115*** (2.071)
Step 2			
Board size		-0.144 (0.997)	0.014 (1.001)
Youngest director		0.119 (0.250)	0.164 (0.255)
Older director		-0.051 (0.159)	-0.128 (0.159)
Step 3			
Proportion of women Directors (%)			5.38** (2.616)
R^2	0.2029	0.2090	0.2215
R^2 diff.		0.06	0.013
F-test	8.53***	4.06***	3.79***
F-change		0.327	2.035

Note: The Robust Standard Errors of the regression analyses are reported in parentheses. Asterisks show the level of significance at 0.01 (***), 0.05 (**) and 0.10 (*), respectively.

5. Conclusions

Despite the increased challenges that healthcare organizations have faced in recent years, corporate governance in this field has not received sufficient attention by scholars (Tartaglia Polcini *et al.*, 2021). The continuous increase in healthcare costs, the emergence of new diseases and treatments, technological advances, and the growing weight of the needs of the community are all factors that make it necessary to identify how the different aspects of board composition contribute to define a governance effective.

One of these aspects is gender diversity: literature in this field is still lacking.

In this paper, we showed the results of a first-step research project aimed at analyzing the impact of gender diversity on financial performance of high-growth startups, offering evidence from the private Italian healthcare sector.

Findings show that the presence of women in the BoDs positively affects the financial performance of the observed hospital gazelles. Accordingly, we can confirm our research hypotheses.

Being an exploratory analysis, this study is not without limitations. First, the small size of the sample poses some problems regarding the generalizability of the data. The future steps include the expansion of the sample to

overcome the limit of the reduced sample size.

Second, we studied the relationship between board gender diversity and financial performance by focusing on the national context (Italy). We recognize that the institutional and cultural context might be of importance when analyzing board gender diversity and its effects. Hence, further studies should incorporate cross-country analyses.

Finally, by considering gender as the only diversity dimension, this study neglects the complex and multidimensional nature of the diversity construct. To overcome this limitation, future directions look to the concept of 'intersectionality' to determine the effect on financial performance of various dimensions of diversity (Styhre *et al*., 2008). Indeed, previous studies suggest that firms need to contemplate the multiple configurations of board diversity simultaneously (Asad and Georgakakis, 2023).

Despite these limitations, the article has important theoretical and practical implications.

From a theoretical point of view, we confirm that financial performance is a significant factor in the study of board gender diversity. We provide additional empirical evidence on the influence of female representation on the BoDs on financial performance and organizational outcomes.

From a practical point of view, we offer additional insight for corporate boards and policymakers into one central issue in most countries' corporate governance codes: the gender diversity. Our study suggests the importance of increasing the number of women in BoDs to benefit from the diversity in value, perspectives, backgrounds and skills they bring to boardrooms, as suggested in previous studies (Hillman *et al*., 2007; Miller and Triana, 2009; Simpson *et al*., 2010).

Our results can help managers comprehend the significance of gender diversity in increasing financial performance of startups and high-growth startups: they may discover benefits in women being involved in the BoDs and executive positions. These results are particularly relevant for the private healthcare sector, where governance and organizational structure play a key role in achieving performance objectives (Taylor, 2000). In this sense, we are contributing to the limited literature on the healthcare sector by concluding that gender diversity in board positions may lead to better performance in private hospitals.

Finally, although focused on the private healthcare sector, this study offers useful evidence also in the field of public healthcare sector: governance models found to be effective in the private sector can provide useful comparisons in the field of good governance in public healthcare organizations (Eeckloo et al 2004; Tartaglia Polcini *et al*., 2021).

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Authors' contributions

All authors were involved in the research design and contributed to writing the manuscript. Marianna Mauro conceived the study and wrote Sections 1. Monica Giancotti wrote Section 5. Giulia Cattafi conducted the analysis and wrote Sections 3 and 4. Elisa Rita Ferrari wrote Section 2. Monica Giancotti and Giulia Cattafi revised the manuscript according to the comments of the reviewers. All authors approved the final version of the manuscript.

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DIVERSIFICATION OVER DIGITALIZATION: A CASE STUDY ON THE BUSINESS SURVIVABILITY STRATEGY OF A FAMILY BUSINESS DURING COVID-19 CRISIS

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Abstract

Purpose. *The COVID-19 pandemic has led to a situation of generalised economic uncertainty. Many SMEs faced an unexpected crisis, which forced them to review their strategy. These enterprises implemented the best approach to recover and overcome the crisis. Among the different strategies that the companies realized, digitalization and diversification were among the most practised. Although both are risky and expensive, this paper wants to prove that diversifying can be more challenging and carry long-term results. This is due to nowadays attention on digitalization, which is taken for granted and considered an integral part of the business. Despite this, the diversification strategy can play a winning role, evolving the company's portfolio and creating new opportunities.*
Design/methodology/approach. *This is a qualitative case study focused on a small enterprise, which is a family business located in Southern Italy, and its reaction to the crisis through a diversification strategy.*
Findings. *The analysed enterprise initially created a different product, which gave the chance to reduce the loss of revenue and maintain the workforce. Then, the management decided to expand the product network and start a new company. As regards digitalization, it brought unexpected results.*
Practical and Social implications. *The study aims to increase the awareness of SME managers on the possible strategies available for SMEs in critical situations. To do so, company management should evaluate the sector, its competitors, and the availability of resources. Moreover, the case study contributes to the literature on corporate strategies applied during the pandemic period.*
Originality of the study. *Although digitalization has been the most used approach during the pandemic, this paper shows that sometimes even smart intuitions can make a difference in starting a new trade. The correct allocation of budget and resources and a high level of resilience are crucial for success.*

1. Introduction

The COVID-19 pandemic outset in 2020 and its repercussions in the following years stressed businesses in Italy and the whole world, undermining their survivability (Fairlie & Fossen, 2021). The health emergency with its high contagion rate, the impressive number of deaths, and the different containment measures carried out by the governments contributed to making the Italian economy very fragile. In early March 2020, obstacles such as loss of sales and revenue, shortage of supply, and difficulties in securing the workplaces directly affected 72% of the Italian small and medium enterprises (SMEs), which were forced to react in order to face this economic situation (OECD, 2020).

It is worthwhile to consider the 2020-2021 crisis as the result of both internal and external adverse events that have affected companies in a not easily predictable and controllable way, because of the great variety of factors and problems that managers faced. To overcome the critical issues caused by the pandemic, it has been necessary not only to have a clear picture of the moment and the complexities experienced to daily overcome them but also to understand how to behave in the near future.

The size of businesses is one of the aspects that may affect the companies' vulnerability: the smaller the firm, the more vulnerable it is to internal and external events (Lukason & Hoffman, 2015, Klein & Todesco, 2021). In accordance with this, the companies responded in both structural and strategic terms. In a nutshell, the majority of businesses decided to digitally transform their sales and services (Baig, Hall, Jenkins, Lamarre, & McCarthy, 2020; Blackburn, LaBerge, O'Toole, & Schneider, 2020), while a small part of companies focused the efforts in diversification and vertical integration (Robertson, 2020; Oberoi, Gupta, & Ladure, 2020).

Conspicuous studies support the role of the digitalization of SMEs to cope with the difficulties of the period. Indeed, the researches conducted so far show that the most used approach has been digitalization in all its stages, from the creation of e-commerce to the development of specific online services for each target audience, digital planning, and teleworking (Alatovic, Chhaya, Juneja, Smaje, & Sukharevsky, 2020; Lanshina, Barinova, Kondratyev, & Romantsov, 2020; Guo, Yang, Huang, & Guo, 2020; Schilirò, 2020; Sostero, Milasi, Hurley, Fernandez-Macías & Bisello, 2020; Hassankhani, Alidadi, Sharifi, & Azhdari, 2021; Datta & Nwankpa, 2021; Klein & Todesco, 2021). However, the research gap is given by the fact that digitalization is mainly treated as a temporary solution to the difficulties presented by COVID-19 and diversification has been understudied as a strategic response. This is due to the facility and immediateness of the digital transformation, as well as the cost control and the limited risks. The purpose and the reasoning of this study is to highlight that digitalization is

not the only way to react to this crisis and other strategies should be taken into account, such as diversification, which can be successful too, although it is more risky and challenging for the SME. Indeed, SMEs may decide to undertake a strategic path of adjustment, adapting their business model and investing in open innovation, collaboration, dynamic capabilities, and multi-business strategies to survive the critical situation and create new opportunities (Jacobides & Reeves, 2020; Ortega-Argiles, 2020; Peñarroya-Farell & Miralles, 2022). According to Oberoi, Gupta, and Ladure (2020), although it can be tricky in an uncertain period, diversifying across factors, sectors, and geography has historically played a winning role.

Nevertheless, the importance of this strategy, at the current stage, due to the short time since the beginning of the crisis, literature or published papers with regards to companies that undertook diversification strategies are not widespread and still in limited number. However, a deep and comprehensive analysis of the scenario in which the enterprise is set, its sector and its competitors, and the availability of its resources is pivotal in understanding whether a company is capable of rising again or not. This evaluation helps to find the best strategy to relaunch the business, as well as discover new alternative paths in which to grow and develop.

The aim of this study is to investigate, through a qualitative case study of a small family business, the achievement of a diversification strategy rather than digitalization as a reaction to counter the pandemic crisis effects. This paper wants to answer this research question: how and why an SME should consider implementing a diversification strategy over digitalization, and through which resources in times of crisis? The contribution of this research is twofold. At the entrepreneurial level, it provides some useful insights to managers about crisis management. Furthermore, it gives important guidelines to understand whether diversification is the best strategy over digitalization and how to implement it.

To this aim, the paper is structured as follows. Section two, after an introduction about the COVID-19 crisis and its impacts on Italian SMEs, addresses the analysis of the literature related to business strategies, with specific attention to both digitalization and diversification. The third section is focused on the methodology adopted in the study. Section four draws the case analysis. Section five discusses the case and its results. The last section summarizes the main points of the study and put under the spotlight the possible strategies that SMEs can apply or implement in a context of crisis.

2. Background & Literature

The following paragraph is divided into two sub-sections. The first one deals with the Italian national context in which companies have found

themselves in the COVID-19 period; the second one is dedicated to the SMEs' reactions, hence the difference between diversification, meant as a corporate strategy, and digitalization, intended as the digital transformation process of businesses.

2.1 The impact of the COVID-19 pandemic on SMEs

In 2020, the freezing of social and productive assets, caused by the pandemic and public measures, brought plenty of adverse consequences. It led to a reduction in the Italian GDP of 8.8%, making an increase in the national debt by 160%, and a reduction of the employment rate from 68.3% in 2019 to 62.9% in 2020 (ISTAT, 2020; Stirati, 2020; Euler Hermes, 2021). According to Confindustria and Cerved (2020), SMEs in 2020 had a decrease in turnover of 12.8%. If on the one hand, the most affected sectors were those interested by gathering bans and mobility restrictions, such as travel agencies or hotels, on the other hand, sectors such as e-commerce and cleaning products benefited, favoured by the acceleration of the digitalization process and new cleaning habits (Cerved, 2021). In particular, the catering sector had a decrease of 40% (about 3 billion less in turnover), transport registered -74% of revenues, and tourism had 16 million fewer travellers (ISTAT, 2020; Fonditalia, 2020). Even though 85,000 new businesses were opened during the same year, the effect of COVID-19 and the collapse in consumption led to the closure of over 390,000 businesses of non-food trade and services. Of these, 240,000 were exclusively due to the pandemic (Confcommercio, 2020).

In 2021, an improvement in the economic situation has been registered (AGI, 2022). The Italian SMEs system has shown a high degree of resilience: European and government interventions informally known as "ristori", moratoria and guaranteed loans have given liquidity to SMEs, which also benefited from the progressive reopening and the recovery phase that the Italian economy is experiencing (Cerved, 2021). Giving a glance at the numbers, 332,596 new businesses were opened (+14% compared to the previous year) and 246,000 were closed between January and December, representing the lowest value in the last fifteen years, even more contained than the 2020 record. Even though we have not yet returned to the values before the pandemic (Unioncamere, 2022), this data bode well for the economic trend of 2022.

As reported by the World Bank (2020), COVID-19 originated the worst recession after World War II. Despite many crises that have occurred throughout history, such as the 1929 Great Depression (Wheelock, 2020) or the 2008 financial crisis (Strauss-Kahn, 2020) this one caused by the pandemic is different and "singular in many respects", as the World Bank

Prospects Group Director Ayhan Kose reported (Felsenthal, 2020).

First, the pandemic was unpredictable: the enterprises were unprepared and they had insufficient or no plans at all about short time reactions, protection, or mitigation. Second, the sudden shutdown of companies, the difficulty in supplying, and the unemployment have caused unusual changes in the supply and demand system, significantly modifying the world economic trends. Its global impact required the commitment of governments and international institutions, which have set up large-scale rescue packages (even more conspicuous than the ones allocated during the 2008 financial crisis), to ensure the survival of their economies (Roland Berger, 2020). It is also important to notice that the recession is the consequence of the healthcare system collapse, enterprises' internal factors as well as external ones. Among the others, social distancing measures, the ban on gathering, and other restrictions on movements, travel, and activities forced people to deeply modify their shopping and behavioral habits (Moreira & dos Santos Souza, 2020; Swiss Economic Institute, 2021). As a consequence of what has been said, the effects of the pandemic persisted over time and manifested in various fields.

2.2 SMEs' reactions to the COVID-19 crisis

The COVID-19 pandemic has changed the life cycle of businesses of all sizes, bringing out difficult situations and at the same time potential opportunities (Gubitosi, 2021). As pointed out by a Deloitte report (2020), in May 2020, only 25% of businesses managed to seize new opportunities. These arose from the reconversion of production plants for new "essential" products (e.g. devices for individual protection), the adoption of new business initiatives concerning digitalization and sustainability, in addition to the operations in sectors on which COVID-19 has not produced significant impacts. These have been the winning strategies during the COVID-19 crisis.

One year later, in May 2021, it has been easy to classify Italian SMEs for their innovation paths (Bettiol, Capestro, Di Maria, & Micelli, 2021). Analysing this classification, it has been possible to identify 4 clusters of enterprises depending on their actions: the first cluster (10.5% of the sample) is given by the firms that have lowered their prices but have done nothing different from their usual business. The second (27.3% of the sample) and the third cluster (25.3% of the sample) refer to the companies that have reacted in a proactive way, carrying out functional R&D activities for the development of new products/services. Both clusters focused their efforts on the implementation of digitalization to reach respectively the clients and the suppliers. The remaining 37% is represented by the most innovative

and top-performer enterprises that realized a high-level diversification in products and/or services, reviewing their business model and using digitalization as a support to keep in touch with the clients and strengthen the post-pandemic businesses (Bettiol, Capestro, Di Maria, & Micelli, 2021).

Creativity, innovation, and entrepreneurship are some of the drivers used to face the difficult situation that Italian SMEs experienced and, in some cases, are still experiencing (Thukral, 2021). However, as Bettiol et al. (2021) showed, among the other interventions, digitalization and diversification were successful too. In particular, diversification is one of the corporate strategies that a firm can pursue to improve its business activities and reduce its risks. Based on the company's resources and skills, this strategy has to be carefully chosen, because, if done improperly, it can undermine the company's cohesion and focus (Ansoff & McDonnell, 1988; Markides 1997). According to Ansoff (1957), there are four different types of product-market strategies for business growth alternatives. The first one is market penetration, which is aimed at increasing sales without departing from the original business, addressing its present customers, or finding new customers for present products. The second one is the market development strategy in which the firm adapts its present product line to new missions. The third one is the product development strategy, which has the purpose of developing products with new and different characteristics. Lastly, the enterprise can decide to apply a diversification strategy, which means increasing the variety of products offered as well as the markets served. The company decides to expand into markets or with products that maintain ties and affinities with existing businesses (horizontal integration), or rather to diversify by offering products and services that have no relation to existing businesses (vertical integration); moreover, vertical integration can be upstream or downstream. The Ansoff Matrix, also known as the Product/Market Expansion Grid, is the reference model for the interpretation of corporate strategies (Ansoff & McDonnell, 1988). The motivations behind diversification processes can be innumerable. Among the main ones, we mention the exploitation of the economies of scope, for instance, the underutilized resources that it is better to use than dismiss, the skills of the corporate management, the exploitation of internal processes, and finally the increase in market power over competitors, with a greater range of products and profits (Johnson, et al., 2017). Considering the role of diversification in the COVID-19 crisis means that the enterprise lives in a particular situation where it has to decide how to react and evaluate the owned resources, potential opportunities, and threats. In general, in a crisis, the organization can and must consider reviewing its corporate strategy in order to create new market opportunities that improve the production and the positioning in the sector, without forgetting to take into account the cost/income ratio and the financial balance (Tunisini, Pencarelli,

Ferrucci, 2017; Pencarelli, 2013).

On the opposite side, digitalization is defined by the Oxford Dictionary (2023) as "the process of changing data into a digital form". If we relate this definition to the business world, we can agree with Bloomberg's (2018) point of view, which sees it as "the use of digital technologies to change a business model and provide new revenue and value-producing opportunities". A business can be digital in different ways, for instance in terms of value proposition and value demonstration, which means what and how it sells (Ritter & Pedersen, 2020). The application of digital tools and technologies strengthens the competitiveness, efficiency, and performance of the business (Bezrukova et al., 2020), giving the chance to reach consumers all over the world and widening the business environment (Neamţu, Hapenciuc, Bejinaru, 2019). Digitalization and digital transformation during COVID-19 have played a crucial role for enterprises helping them to adapt and overcome market difficulties with a mind-bobbling acceleration. Digital platforms were used to connect the stakeholders, while digital marketing was employed to make stronger brand identity and communicate with clients, along with selling products and services (Soto-Acosta, 2020; Schilirò, 2020; Kudyba, 2020; Amankwah-Amoah, Khan, Wood, Knight, 2021). Moreover, workplaces were reinvented and redesigned to allow employees to work remotely and guarantee business continuity (Ancillo, del Val Núñez, Gavrila, 2021; Olokundun, Ibidunni, Ogbari, Falola, Salau, 2021; Mićić, Mastilo, 2022). The rule to stay home, restrictions, and social distancing required the implementation of new ways of business and interaction that could make purchases easier (Winarsih, Indriastuti, & Fuad, 2021). This digital application was translated into a sharp and fast increase in e-commerce creation and online shopping, along with the boost of remote working modalities (Priyono, Moin, & Putri, 2020; Tighe, 2021; Klein & Todesco, 2021). Notwithstanding, in 2022, SMEs cannot consider digital transformation as the only approach to employ to survive in a moment of crisis such as the COVID-19 pandemic (Papadopoulos, Baltas, & Balta, 2020; Winarsih, Indriastuti, & Fuad, 2021). It is pivotal to bear in mind that, in this study, digitalization regards the application of digital tools (today's indispensable condition) to strengthen and improve the performances due to the pandemic circumstances, rather than a business strategy in the narrow sense. Following this perspective, diversification represents an alternative approach to cope with the crisis. The reason for this lies in the chance to evaluate the firm's markets and products and in the opportunity to open up new opportunities, improving the company's strategic positioning too (Pencarelli, 2013). Through diversification, the company decides to offer new products and/or services, which sometimes may not have links or a direct connection with the existing business of the company's portfolio: this gives birth to backward or forward vertical integrations, hence to new

opportunities. Both diversification and digitalization present strengths and weaknesses. On the one side, diversification can lead to risk reduction and growth opportunities, and it helps minimise the volatility of the portfolio's return. On the other side, it can require high costs for new assets and products, it can be complex to manage and it is risky because the enterprise can compromise the core business to focus on other sectors or activities. Moreover, diversification implies long-term objectives and tangible changes in the investment structure (Ansoff, 1957). Taking into account digitalization, it has its advantages and disadvantages too (Almeida, Santos, Monteiro, 2020). The process is based on innovation, it gives the chance to reach the customers in different locations and provide products and services in a business continuity perspective. During the pandemic, it gave also the opportunity of not losing the job. On the other side, it created technology dependence, increased data security problems, and highlighted the inequalities between people who are keen on using the internet and tech devices and who are not (Almeida, Santos, Monteiro, 2020; Nguyen, Hargittai, Marler, 2021; Klein, Todesco, 2021).

Having a glance at the research and the theoretical basis previously cited in this paper, the majority of the SMEs started a diversification or a digitalization process to survive during the pandemic crisis. Although many studies support one approach or the other (Guo, Yang, Huang, Guo, 2020; Gkeredakis, Lifshitz-Assaf, Barrett, 2021; Lanshina, Barinova, Kondratyev, Romantsov, 2020; Klein, Todesco, 2021; Yaya, et al. 2022; Fruehling, Beyer, Goeddeke, 2023; Moore, Rowe, Stokes, Lichy, Rodgers, Smith, 2022; Pham, Nguyen, Do, Vo, 2023), in this paper we want to focus the attention on diversification as an understudied strategic response, worthy of greater attention. This does not mean that digitalization was poorly beneficial - quite the opposite - because it made services and products accessible to everyone. Notwithstanding this, digital transformation was not enough for already digitalized companies or those that needed a different strategy to cope with the crisis. Since much has been written about digitalization and, on the contrary, little has been researched about diversification during the pandemic period, the aim of this study is to restore attention to those companies that have made strategic changes to revive their business and limit the consequences of the crisis.

3. Methodology

This paper is methodologically based on a qualitative case study focused on a small enterprise in Sicily, Southern Italy, Distilleria F.lli Russo, specialized in spirits and liquors manufacturing.

The Distilleria opened its doors in 1870 and it kept being operational

without interruption until today. At the current time, it is the only business in the alcohol refining and processing field to distil its own original grappa, brandy, and other alcoholic products in the entire Eastern Sicily. During its long period of growth through the years, this small firm remained a family-run company. The pandemic crisis, which hit both the market and the consumption, forced the distillery to find a solution to raise the business again. The key was found in the diversification and the opening of a new company, the Russosan. This launch was made possible thanks to Distilleria Russo's sales manager and her intuition.

This descriptive exploratory case study was made to investigate the real-time situation of the firm, along with the pandemic context and the company's circumstances. The case is impactful as it provides an in-depth understanding of the effects of COVID-19 on a small enterprise and its reactions. The reason for choosing this firm for the study is found in the fact that in March 2020 many Italian distilleries helped the population and hospitals offering their alcohol to produce sanitizer or temporarily produced their hand sanitizer. Between these companies, in Southern Italy, only two distilleries made their hand sanitizer, one in Calabria and one in Sicily. Unlike the one in Calabria, which made and commercialized its hand sanitizer just for a few months, only Distilleria Russo decided to make a new business from its brand-new product. The Sicilian distillery was the only one in the whole nation that created a long-time product and then its new business. It put into practise both digitalization, which was unsuccessful, and diversification, which favoured the survival of the company: this makes this study relevant and worthy of attention.

The data of the study was collected through one-to-one interviews with the company's management, set in different periods to observe performances and evolutions. As regards the participants, these were chosen based on their relevance and decision-making role in the company. The two participants are the distillery's owner and CEO and the sales manager, who is the person that had the idea of starting the diversification (and later became CEO of the new Russosan company). This method of data collection allowed among other things to have a clear and direct interaction with the company. Two interviews were carried out in August 2021 and two in March 2022. The consultations lasted approximately 3 hours. Their answers were recorded upon their permission, transcribed, and then analysed. The first round of interviews consisted of five questions about the business organization before the pandemic, the problems that arose because of the pandemic, and the strategic moves to sort the crisis out. The second round of interviews kept the same amount of questions, this time it was focused on the evaluation of the ongoing strategy and their consideration of diversification and digitalization processes. The methodology of the case study allows for seeing first-hand and understanding how the company made

its strategic choices. Moreover, this approach gave the chance to highlight the criticalities caused by and lived during the COVID-19 period and the company's reactions.

Open-source materials and web pages represented additional data collected for the research. Furthermore, press releases published throughout the years 2020 and 2021 provided extra information about the company's development and the Russosan products. In addition to this, the firm gave access to its own internal reports. All these sources made data triangulation possible.

Data have been analysed following an event-based procedure, emphasizing the issues, the goals, the figures of profits and loss, and the main decisions taken by the management in order to make new market opportunities.

4. Case analysis

Since its opening, Distilleria Russo is a family-owned company, which makes its own alcoholic products, such as liquors, grappa, and spirits. Between December 2019 and January 2020, the firm carried out an original rebranding project, which interested the brand name, turned into "Russo Siciliano", the communication strategy and the target, widening the gaze to the Ho.Re.Ca sector, in addition to the large-scale distribution and private consumers. This would have been a winning move if the COVID-19 pandemic had not broken out a few months later.

March 2020 marked the starting point of Distilleria Russo's transformations and development. Both the CEO and the sales manager affirm that the lockdown, the national measures on social distancing, and the ban on gathering were the greater issues to face. All orders and the sales network, in general, were completely blocked, due to the closure of the restaurants, and the stop of conviviality moments; the crisis in the world of catering translated into unsold alcohol and stockpiling, as well as a fall in productivity, consumption, and revenues. Looking at the figures, in May 2020 the company's turnover registered a decrease of 50%, compared to the Y-1 values in the same month.

In that difficult moment, the management felt the need to find a solution before it was too late. The main strategy was to focus the efforts on the points of sales and grocery shops, stopping the catering and restaurant distribution project. In the meanwhile, the sales manager had a smart intuition in figuring out the solution to use the unsold alcohol and get involved again in the business. She states: *"I thought I had to give a useful answer to the company and also to consumers, avoiding the unemployment benefits for the employees. The idea was to continue producing pure alcohol and create a line of*

sanitizing products absolutely natural, without chemicals, harmless even for children, in short, a real revolution."

Both interviewees agree on the fact that transforming alcohol from the basic material of liqueurs to the basic material of hand sanitizers was a successful move to give a chance to the Distilleria to overcome the crisis. In April 2020 the "Prontigen" hand sanitizer, made by Russo Siciliano, was on the market. The sales manager refers that the use of unsold alcohol and the employment of internal resources gave the chance to amortize costs by 30%. Its sales generated an income of 20%, despite other costs, such as production and packaging.

Prontigen was an innovative product, different from the competitors' ones because it was free of chemicals, suitable for children, and made only of 75% alcohol, water, and menthol crystals. Therefore, thanks to the innovative characteristics of the product and its performance on the market, it gave the possibility for the company to reduce and mitigate the decreasing sales. Indeed, the company had a drop of 50% in the overall revenue; this figure has been reduced by the 20% income gained by the Prontigen sales.

Following the same intuition, after the hand sanitizer release, a multisurface disinfectant was distributed too. The first items were marketed under the brand "Russo Siciliano", causing strong image damage. Indeed, among the mixology brand ambassadors, some of them raised criticism and disappointment for being linked to a company that produced degreasers. In addition to this, consumers (especially purists) found themselves disoriented, losing the company as a reference point for the production of liqueurs and spirits. Since the goal was to have its own corporate identity, rank in the branch of detergency, and reach schools and families, the management decided to differentiate the brand, creating on May 2020 the new company Russosan S.r.l. This diversification allowed the company and the product to increase its own credibility and reputation. It is worthwhile to notice that the new company organization led both firms to new business: Russosan enhanced its identity as a disinfectant solutions manufacturer and Russo Siciliano increased the sales of pure alcohol, gaining a new partner, which is also the biggest buyer of alcohol. Russo Siciliano's owner is proud of his choice: *"What I want to highlight is that we did not create products that would only respond to the COVID-19 emergency but we wanted to develop a branch of the company, destined to last, which created products for the sanitation of people and things with natural ingredients. So the company has not reconverted, nor distorted".*

Thanks to the internal collaboration with Russo Siciliano and the synergy with other Sicilian companies, Russosan succeeded in the marketplace, presenting a new product every 2-3 months. In August 2021, a wide range of products was available, among the others, the Prontigen sanitizer for fruit and vegetables, cleaning sanitizer for the air conditioning filters, hand

soap, and floor sanitizer, enriched with grape seed oil. From January to May 2022 the Russosan management broadened the horizons of cleaning by creating the universal degreaser, the brand new insect repellent, and the microfiber cloth. Russosan's CEO told that "the goal is to promote products that are suitable for all, in an inclusive and ethical way".

As regards digitalization, only Russo Siciliano doubled its online sales. Indeed, in the period from March 2020 to May 2021, the firm saw a growth of 2.4% in sales to individuals, facilitated by the fact that the liquor was delivered directly to the home. This growing trend stayed constant also between May 2021 and May 2022. On the contrary, in two years (2020-2022), Russosan online sales did not rise at all. Mr. Russo declared: *"The distillery's e-commerce doubled its sales, while unfortunately, Russosan sold very little, maybe because it was included in the distillery page. Our goal is to create two separate websites and make investments in digital communication, such as sponsored ads, to increase respectively online sales for both brands. Unfortunately, from 2020 to May 2022, no significant improvements on both web pages were carried out because of a shortage of available funding, but we already have plans in mind".*

It is interesting to point out that both companies did not consider social communication such a big deal for businesses. However, when the online purchases started to rise, the management realised that the website and the e-commerce were poorly performing but they were not able to make new investments, as they put all the efforts into the Prontigen project. In April 2022, both companies won a national call for financing aimed at the digitalization of businesses. The actions to be taken within 6 months included the implementation of Russo Siciliano's e-commerce, the creation of a new site and e-commerce for Russosan, and the improvement of online communication for both brands.

In June 2022, at the time the study was conducted, the CEO of Russo Siciliano indicates a new phase of growth for the distillery. The business still has a great attraction towards the world of hotels and restaurants and they hope to gain ground in it. Moreover, it can be said that 30% of losses were not recovered until January 2022, a period from which they saw an overall increase in sales thanks to the resumption of private events and catering.

With regard to Russosan, comparing the company between May 2020 and 2022, the balance is positive in terms of growth of the range of products but not as positive as the sales manager would have liked in terms of market penetration. This is due to the fact that the product distribution is still on a local basis and the production plant is not sufficient to satisfy the request for the national large-scale distribution. However, the management stated during the interviews that they are planning and working on these aspects in order to expand their production capabilities and sales, hoping to become an example to be followed. Indeed, Russosan's CEO concluded, *"despite the objective difficulties I encounter in physically reaching my final con-*

sumers, […], I always involve people with joy and enthusiasm, so that my work can be a positive example for other local businesses [...] I hope Prontigen becomes an example of resilience, intended as the ability to face difficult moments glimpsing different perspectives, including the development."

5. Discussions

Prontigen played a crucial role in the distillery's existence during the pandemic period. Criticising the diversification, it was a smart and winning strategy that faced many difficulties.

The hand sanitizer was initially produced by the brand Russo Siciliano, taking advantage of the existing target, partners, and distribution channels; moreover, Prontigen was created with the distillery alcohol and distributed by the employee, giving the chance to save 30% of the costs. Prontigen had the function of supporting the distillery business and employees, as well as financing it with the birth of Russosan. Indeed, after the above-mentioned reputational damage, the new firm bought alcohol and grape seeds to create sanitizers and cleansers. Russosan today is the most important commercial partner of Russo Siciliano firm, but nothing could have been done if the business had not started from the existing resources of the distillery.

The COVID-19 pandemic has certainly brought management greater attention to digital transformation and communication, therefore companies have woken up. E-commerce is essential in 2022; it allows companies to directly reach new markets and consumers, increasing sales. In the same way, online communication, intended as sponsored ads and social media interactions, helps firms to strengthen their identity, create engagement and make the customer experience more enjoyable. However, in a crisis period, digitalization can be done only if the companies have disposable capital and resources to invest in it. Therefore, how and why an SME should consider implementing a diversification strategy over digitalization, and through which resources in times of crisis? The reply to this question is to be found in the opportunities that a company has in the market and the availability of resources. In a crisis, an SME can implement its digitalization in different ways, for instance, by employing digital marketing tools. It can create engagement with the customers through social channels and sponsored advertising, open or improve the e-commerce, update the website and make a better user experience, expand the product catalogue so it can be seen before the purchase, provide digital payment methods, and so on. Moreover, the enterprise can also increase the digital transformation of internal data and adapt the workplace to provide agile working. It can digitalize the supply chain and distribution. In any case, digitalization is

carried out if the company wants to increase sales and visibility, aiming at improving efficiency, the work, and the consumer experience. It also works when the company wants to create engagement with customers, reaching and facilitating new customers who are always on target. As regards the supply chain and distribution, digitalization facilitates and speeds up contacts and practices with the stakeholders during the various phases. As far as the workplace is concerned, digital transformation allows the enterprise to provide business continuity and the workers not to lose their job. However, to achieve all this, it is necessary to have the financial, human, and logistic resources available.

On the contrary, the company that wants to expand its range of products, develop new ones, and address them to new or existing markets, therefore new or existing consumers, achieves diversification. Indeed, as mentioned before, the company can develop in sectors connected or not to its core business. Hence, diversification is a useful strategy for enterprises that have the purpose to expand, create new market possibilities, reduce dependence on a single product or market, and increase their resilience. However, this strategy also comes with risks, including rising operating costs and the need to acquire new skills and resources to enter new markets or industries. To successfully diversify, a company needs many resources, including financial, human, technology, marketing, R&D, and logistics resources.

Before starting a digital transformation or a new strategy of diversification, the management has to evaluate the availability of the resources, which can drive the choice about what to implement (the internal organization, the workplace, the market, the target, or both) and have a row idea about the costs. An environment and competitor analysis can give more information about the directions to take. Once the strategy is well defined, it is time to take into account other additional costs, such as R&D, machinery, human resources, marketing, and possible changes in the supply chain. Finding the best supplier and creating with them successful relationships can be very rewarding: especially for companies who want to propose a new product, the key point is to determine the value proposition and make it evident to the customers and the stakeholders.

Distilleria Russo proposed a new product to its existing target, a hand sanitizer done without the utilization of chemicals, strengthened by the fact that there are no other similar products on the market. The diversification strategy was successful: they made Prontigen and opened Russosan exploiting the internal resources, savings on alcohol, and employee costs. Later, Russosan highlighted the value of the products and based its business on their quality, giving life to a line of detergents made with natural ingredients, which were dermatologically and metal tested. The digitalization process did not go hand in hand due to the lack of liquidity to invest.

Russosan's digitalization was limited to Prontigen's e-commerce which was a showcase page of the company's products on the distillery website, it did not have any social channels or sponsored ads. However, thanks to the possibility given last April 2022 by the Italian government with the national call for financing aimed at the digitalization of businesses, the process will undergo faster in the next months to be ready in October 2022.

To sum up, the theoretical implications of this study help us understand the difference between diversification as a corporate strategy and digitalization as a digital transformation process. It suggests that, although risky and expensive, diversification plays a winning role in long-lasting results. The research has important practical implications for the management of companies that are considering adopting a growth strategy based on diversification. In particular, this study demonstrated that in a period of crisis, with the availability of resources, it is more rewarding to expand the range of products and the market rather than aiming only at online sales. Lastly, for what concerns academic implications, the study provides guidelines and insights about how diversification and digitalization can be adopted and implemented within enterprises. This could be an inspirational model for SME management to face crises, such as the pandemic one, and develop growth strategies, as well as new approaches in the business context.

6. Conclusions

The COVID-19 pandemic weighed on SMEs with different consequences, from the supply chain to the sales process. Markets and consumers will reflect the effects in the next future, with the hope that businesses can overcome the economic and financial loss of the last two years.

In the meanwhile, the companies tried to react in the best way to the crisis with various approaches and strategies. The majority of enterprises put into practise digitalization, especially as a business continuity measure. For instance, many enforced smart working, others used their social and online presence to improve consumers' online engagement and online sales. Differently, as this study underlined before, only a few companies put their efforts into other strategies, such as diversification. This approach gave the chance to the firms to expand their business, carrying out vertical and horizontal integrations.

The Sicilian Distilleria Russo is an example of successful diversification: it used unsold alcohol and the internal employee to create and distribute a new product, different from the existing portfolio. Starting from a hand sanitizer, the firm created a new business, Russosan, specialised in a wide range of cleansers and disinfectant products. This smart intuition initially represented a way to employ the stockpiles, but it shortly became a new

market partnership. Indeed, Russosan is today the best alcohol buyer of the Russo's distillery. It is significant that in the year 2020-2021, the distillery registered an increase in online sales, although the low-performing website, but nothing has been done to implement the online aspects due to a shortage of liquidity in that period.

Through the presentation of this study, this paper wants to increase awareness of the possible strategies that SMEs can apply or implement in the context of a crisis. Considering the business adaptation and development, as well as the available resources, can make a difference. In addition to this, the creation of a value proposition and the satisfaction of the evolving market's demands can be the starting point of a new trade.

The findings of this study have to be seen in light of some limitations. Being based on a single case study, a limit of this research is found in its generalization. Another limit was given by the data saturation problem, which is in part solved using different sources and data triangulation. However, it would be interesting to follow the path of these companies to analyse their development. Furthermore, being related to the COVID-19 crisis, which is a quite recent event, relevant studies on this topic are limited. Future research may be developed to validate the strategy of this company. In the same way, a similar analysis can be applied to other companies that boosted digitalization and diversification in order to compare their results. Moreover, it would be inspiring to compare the Russosan path to the one of other family firms, which lived COVID-19 crisis and employed a diversification strategy.

To conclude, it is ambitious and challenging to modify the company strategy to get the business back up in a period of crisis. However, it may not be enough to carry out a single strategy between diversification and digitalization, forasmuch as often both are functional to the success of the enterprise. This is reinforced by the fact that we live in a time where companies are looking to technology to facilitate the sales processes, marketing, and management of businesses in general.

The key point for a successful SME facing a period of crisis is to have a business model that takes into account the budget and the resources for the product, the needs of the market and consumers, and a strong value proposition. Finally, a good level of organizational resilience can help the company to react proactively to market changes and unexpected events.

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Abstract

The book offers an overview of innovative sources, dimensions of expertise for supporting creative and cultural organisations and initiatives. Authors highlighted the importance of cultural heritage, participatory approaches, and entrepreneurship in the cultural sector with a further analysis on sustainable development. In accordance with cultural entrepreneurship, the book provides an outlook of cultural enterprises, offering some evidence from an entrepreneurial ecosystem perspective. Hence, the authors offer a map to analyse the debate on the sustainable development linked to cultural heritage: the levels of analysis (micro, meso, macro); the four domains in which the sustainability concept unfolds (cultural, social, economic, and environmental); and the regenerative processes of cultural initiatives that are consistent with the sustainability perspective (management, participation, entrepreneurship). Conclusively, the Editors propose themes that should be explored in the debate about cultural initiatives and sustainability.

Review

One of the key concepts unfolded in this book, whose editors are Paola Demartini, Lucia Marchegiani, Michela Marchiori and Giovanni Schiuma, is the entrepreneurship, its processes and socio-economic patterns linked to managerial practices of cultural organizations. This book is part of a collection of studies developed by scholars, who share interests in arts, culture, business, management, and innovation. The previous book *(Management, Participation and Entrepreneurship in the Cultural and Creative Sector, edited by Martin Piber, 2020)* is about the importance of the culture and arts as memories, experience, and collective heritage. Additionally, all these latter concepts should be understood and discussed under the guidelines of sustainable development, employing an integrated perspective and an interdisciplinary approach. In recent times, through the debate on the sustainable management of cultural initiatives it has been adopted a new perspective on how cultural organizations and initiatives employ management practices embracing a multi-stakeholder perspective, considering all the needs of the latter.

Moreover, another topic that has become worthy of importance in the economic literature is participation and participatory approach in culture. With the complete fulfilment of participatory approach, socio-economic development, urban regeneration and capabilities development across art and culture are promoted. Furthermore, supporting this assumption, participation enables us to engage various actors and stakeholders, who could provide their knowledge, experience, and commitment in the cultural and creative areas. Starting from this concept, cultural entrepreneurship has a strong potential: the meaning of tangible and intangible cultural heritage can be renewed in the present and then projected in the future for next generations. Thus, cultural entrepreneurship fosters sustainable development through innovation and growth in the sector of creative industries. The debate on sustainable development of cultural heritage has produced varied conceptual models that spread out the theory of sustainability; in fact, with the Hangzhou Declaration *"Placing Culture at the Heart of Sustainable Development Policies"* written in 2013, the key role of culture in sustainable development has been confirmed. Afterwards, a step forward has been done with the *"Cultural Heritage Counts for Europe"* manifesto *(ChCFE)* in which different but connected domains (cultural, social, economic, and environmental) had been debated. In 2020, *SoPHIA* (Social Platform for Holistic Heritage Impact Assessment) a new European project was founded. *SoPHIA* pursues different but complementary aims: to set up a network of stakeholders (researchers and practitioners active in the branch of heritage); to stimulate participation among the stakeholders involved; to yield sustainable and useful tools to raise knowledge on the implementation of

relevant policies and practices; and to encourage the project and its outputs at the European and international levels. The domains explicated in *SoPHIA* are cultural, social, economic and environmental. The cultural domain is the most connected to the population well-being and in which the linkage between heritage and people is revealed. The interaction between people and culture, but also organizations and individuals are studies of the social domains. Cultural policies and practices come together with the variety of combined values that play a crucial role in conservation and valorization of *CH*. The economic domain is related with the valorisation of the *CH*, combining the sustainable managerial practices with the economic results of cultural interventions. At last, the environmental domain refers to all the critical outcomes such as climate change, overtourism and growing urbanization that need to be taken care of.

Likewise, the book is written following the investigation of three different level of analysis that has been accepted succeeding the *ChCFE* report: Macro, Meso and Micro. The first refers to the bigger picture perspective such as European or larger communities; the Meso level includes smaller levels as local, regional, and national. The latest comprises case studies. At this point, the book presents a deeper analysis of the three previous mentioned levels and the regenerative process (management, participation, entrepreneurship) with a detailed study of the four domains that hold the sustainability concept.

The authors in the Micro Level of Analysis (Section 1) examine cultural organisations (museums, performing art organisations) or actors (cultural entrepreneurs and workers. The first two chapters *"Aligning Market Strategies, Digital Technologies, and Skills: Evidence from Italian Museums"* and *"Exploring the Financial Strategies of Private Museums"* explore the processes of digitisation, fundraising and citizen participation. Moreover, on the actors' side, in chapter *"Through the Public's Lens: Are Museums Active Members of Society? An Investigation During the COVID-19 Pandemic"* we find a study about the museum reaction to the Covid-19 and how they have supported the communities and society, a rarely discussed theme in literature. This analysis has led to a debate on the public image of the museums, in terms of social involvement and activism. In the next two chapters *"The Leadership Dance in a Performing Arts Organization"* and *"Interpretive Innovation in the Performing Arts: The Role of Organizations"* performing art organisations and actors are the main subjects; the first point out the role of the leader that, seen from a different perspective, represents the image of cultural organisations. In the case study of "*Fondazione Nazionale della Danza Aterballetto"* the several factors that can alter or modify the leadership structure at different levels (individual, organisational and environmental) are introduced. As stated in the chapter *"Interpretive Innovation in the Performing Arts: The Role of Organizations"* we understand how our cultural heritage

is renewed through the comprehension of cultural and art institutions innovation. Hence, performing arts organization bind them to a mission in which matching tradition with novelty is a central part. Moreover, they commit to regenerating cultural heritage and sustain its transmission. The chapters *"Start Me Up: The Challenge of Sustainable Cultural Entrepreneurship of Young Cultural Workers"* and *"Organizing Academic Entrepreneurship Drawing on Cultural Knowledge: The puntOrg Experience"* deal with cultural entrepreneurship as a regenerative process in which cultural workers are able to produce artistic or cultural, economic and social value. *"Start Me Up: The Challenge of Sustainable Cultural Entrepreneurship of Young Cultural Workers"* introduces the multifaceted concept of sustainability: cultural, economic, and social. The cultural aspect refers to the capability of developing new ideas; the second one, instead, refers to the economic sustainability of cultural activities. At last, cultural workers need to face with the social impact of their work. Young entrepreneurs are trying to find new ways to develop their business considering sustainability. While, in the chapter *"Organizing Academic Entrepreneurship Drawing on Cultural Knowledge: The puntOrg Experience"* it is presented the issue of cultural entrepreneurship and academic entrepreneurship, especially in the light of University reforms that reframed the role of professors and researchers working in Academia.

The Section 2 entails the articles related to the cultural initiatives that affect on a regional scale: the previous mentioned Meso level. Culture is here addressed as connected with its environment, territory, and stakeholders. The first two contributions "*Promoting Collaboration Through Creative Network: The Puglia Music Industry"* and *"Change in Perspectives in Cultural Tourism: A Sustainable Managerial Model for Cultural Thematic Routes Creating Territorial Value"* aim to investigate on two managerial issues: networking and digitalization, both located in southern Italy, Puglia. Creating a network means to solve complex problems in our society and to promote strategies for regional attractiveness. However, digitalization is exploited in the creation of a new sustainable managerial model that, through the diversification of the cultural heritage offer and the use of new technologies, it avoids overturism in some artistic centres.

Likewise, the following chapters *"A Struggle of Capitals Over the Identity and the Cultural Offering of Festivaletteratura: the Organizational Impact of Audience Development"*, *"Participatory Event Platforms in the Urban Context: The Importance of Stakeholders' Meaning of "Participation""*, and *"Cultural Heritage Through The "Youth Eyes": Towards Participatory Governance And Management Of UNESCO Sites"* highlight the process of engagement of citizens and stakeholders in planning/implementing cultural initiatives and the consumption of cultural goods and services. From the assumption that the process of involvement is an approach that can lead to a sense of identity of community in the branch of cultural heritage, but there are many consider-

ations that arise around the specificity and the intrinsic fragility of such initiatives, *"where participation becomes a resource over time, if successfully managed, or liability in itself"*. However, according to a sustainable development perspective, it is confirmed that the participatory model has great potential to create values for citizens and different stakeholders. More specifically, in *Urbino per Bene-Urbino for Good* project, launched in 2017 by the municipality of Urbino (Italy), it has been discussed how World Heritage Site is felt by residents and student and managed by Public Administration. Through the research it emerges a difficulty of institutions in achieving their goals, as interventions on culture and the regeneration of the city of Urbino itself depend on a real understanding of the values of local communities.

In the final chapter of Section 2 we talk about cultural entrepreneurship linked to sustainable development. The purpose of this contribution *"Entrepreneurial Cultural Ecosystems in Rural Context: Some Insights from Rural Cultural Centers in France"* is to focus on a specific type of rural cultural entrepreneurship: the creation of cultural centers in rural territories. A qualitative empirical investigation based on two significant case studies of rural cultural centers located in the region of Auvergne-Rhône-Alpes in France is carried out. This contribution introduces the complex system of ecosystems, which seem to be much debated in the cultural and creative sector. A cultural ecosystem evolves with the aim to focus on producing collective cultural and social values.

To conclude, we find the last level of analysis (section 3: The Macro Level) that address issues concerning a broader global scale. The chapter *"Culture Indicators for Sustainable Development"* scrutinizes The Culture 2030 Indicators report, released by UNESCO in 2019. In a few words, the latter is a framework of thematic measures, divided in four domains (environment and resilience, prosperity and livelihoods, knowledge and skills and inclusion and participation) and 22 indicators. The author critiques both the design of the framework, with an exhaustive analysis of its domains and indicators, and its practical application to the institutions, organisations and enterprises of the cultural sector.

The chapter *"The Digitalisation of Cultural Heritage for Sustainable Development: The Impact of Europeana"* analyzes the digitization process of cultural heritage as a tool to preserve it and prevent its loss. The case study is Europeana, a digital portal that can be considered as a sample of enhanced value for cultural policies of the UE. Lastly, the main theme in the chapter "*The Contribution of Crowdfunding Regulation to Cultural Entrepreneurship in a Supportive Ecosystem"* is how an effective crowdfunding regulation can support cultural entrepreneurship. Over the past decade, crowdfunding has emerged to play an important role in financing for the cultural and creative sector. Two relevant aspects that policy operators need to deal with which are Benefits and Barriers. To regulate crowdfunding is neces-

sary to improve taxation and matching subsidies, consumer and investor protection and information provision. In this contribution EU and USA are identified as main markets for crowdfunding, nonetheless their respective policies might influence efficiency and equity.

In light of these considerations, the book offers us a debate about cultural initiatives and sustainability since they both are at their earlier stage. Hence, the Editors propose main themes that should be further explored: impact on economic variables, shifting from a view on competitiveness to a view on prosperity; culture and welfare that require citizens inclusion; quality of cultural interventions: namely the fostering of a sustainable approach. This volume is interesting to read both for academics and practitioners.

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