THE IMPACT OF BLOCKCHAIN ON SMES' SUSTAINABILITY. THE CASE OF AN APULIAN WINE COMPANY

Grazia Dicuonzo
University of Bari
grazia.dicuonzo@uniba.it

Francesca Donofrio
University of Bari
francesca.donofrio@uniba.it

Simona Ranaldo
University of Bari
simona.ranaldo@uniba.it

Mario Turco
University of Salento
mario.turco@unisalento.it

Abstract

The Italian business system, characterized mostly by the presence of SMEs, makes interesting the analysis of the tools that promote their growth, including through investments in new digital technologies. Among these, the blockchain has the potential to ensure greater transparency of business processes, supporting their competitiveness and sustainability. SMEs show an attitude of closure towards the digitization process, very often neglecting the benefits both in terms of economic-financial performance and improving competitiveness and corporate sustainability. In light of the limited theoretical contributions on the subject, this study aims to analyze the relationship between sustainability and digital technologies in SMEs, analyzing a case study operating in the wine sector. The results show an increasing attention of SMEs to digital innovation, recognizing their potential advantages in terms of improving corporate sustainability policies.

1. Introduction

Blockchain is an emerging technology potentially capable of revolutionizing the way companies operate by modifying traditional business models (Überbacher et al., 2020; Zalan, 2017). This technology benefits from the unchangeable nature of annotated records and facilitates disintermediation (Crosby et al., 2016) by allowing suppliers to negotiate directly with customers, avoid reconciliations, track resources efficiently and ensure data integrity (Lacity, 2018). Therefore, it is considered a valid support tool for the pursuit not only of economic and financial objectives (Hughes et al., 2019; Lemieux, 2016; Morkunas et al., 2019) but also of corporate sustainability objectives (Adams et al., 2018; Nayak & Dhaigude, 2019). In terms of sustainable performance, blockchain can guarantee respect for human rights and fair and safe working practices by tracing possible social and ecological conditions that could interfere with safety, health or the environment (Adams et al., 2018).

In light of consumers' growing concerns about environmental issues, companies have become increasingly interested in digital technologies, recognizing their instrumentality for obtaining economic and sustainable advantages to the entire business. However, these advantages seem only to apply to large companies: small and medium-sized enterprises (SMEs) find it more difficult to implement new digital technologies (Crosby et al., 2016; Lemieux, 2016; Überbacher et al., 2020; Yli-Huumo et al., 2016).

Although SMEs are characterized by a structural flexibility that allows rapid adaptation to changes (Ritchie & Brindley, 2005), the number of SMEs that have decided to start a digital transformation process is very small (Dawn et al., 2002; Houghton & Winklhofer, 2004; Smallbone et al., 2003). Some main causes of the low interest in the adoption of new technologies are an absence of individuals with the necessary professional background (Oyelaran-Oyeyinka & Lal, 2006), a high level of risk aversion and insufficient financial resources to support investments in innovation (Lal, 2007).

For these reasons, as well as a lack of knowledge about potentials advantages, SMEs are reluctant to commit to digital transformations (Bi & Cochran, 2014), very often missing out on advantages in economic-financial performance, competitiveness, and corporate sustainability.

However, the importance of SMEs to the economic and social development of several countries—particularly Italy, where more than 90% of enterprises are SMEs (Prometeia, 2019)—makes it interesting to analyse the impact of new technologies, blockchain in particular, on sustainability. In this study, we investigate sustainability through its three criteria: environmental, social and governance (ESG) (Buallay, 2019; Drempetic et al., 2019).

Nowadays, most studies focus on the potential advantages of blockchain, and only a few examine how this technology can support companies in

pursuing sustainability objectives (Massaro et al., 2020). The present study intends to fill this gap, and it focuses on understanding the degree of technological knowledge by analysing a case study from the wine sector, which is particularly interested in the development of blockchain applications. By bringing real-life evidence to light through case analysis, we are able to make a contribution both to the theory and practice of sustainable business model development. These practical contributions lie in being able to offer market operators elements for appraising effects on the traceability of products and in posing some preliminary ideas about how the adoption of blockchain can support sustainable development strategies.

This work is structured as follows: section 2 presents the literature review; section 3 describes the development of the research questions; section 4 outlines the the research methodology; section 5 discusses the results, deepening in the perception of users of the technology and the impact of blockchain on corporate sustainability; and section 6 presents the conclusions drawn from our investigation.

2. Technological innovation and sustainability in SMEs: a literature review

2.1. Technological innovation and SMEs

A recent Prometeia study (Prometeia, 2019) reports that SMEs are the engine of Italian economic growth: SMEs make up 92% of active businesses and 82% of employment, a percentage that is well above the EU average. Despite being the driving force behind the economy of Italy, small and medium-sized Italian companies, especially those in the south, continue to occupy marginal positions in the world of international business, an absence that is mainly due to SMEs' lack of investment in innovation (De Felice et al., 2007). Artificial intelligence, big data, blockchain and the Internet of things have all contributed to the advent of a Fourth Industrial Revolution (or Industry 4.0), which currently represents a significant challenge for companies operating in all sectors (Schwab, 2016). The spread of new digital technologies has radically transformed every aspect of corporate life and, more generally, the way of doing business (Jovanović et al., 2018). In particular, changes have been observed in operating processes (Maresova et al., 2018), in the way activities are conducted within industrial value chains (Parida et al., 2019) and in the promotion and marketing of products. Although the prior literature portrays SMEs as having greater flexibility from a structural and process point of view (Ritchie & Brindley, 2005) - a flexibility that facilitates their ability to respond and adapt to changes - the number of sSMEs that has benefited from digital transformation is

very small (Dawn et al., 2002; Houghton & Winklhofer, 2004; Smallbone et al., 2003). By digital transformation, we mean the application of digital capabilities to processes, products and resources (Schmarzo, 2017) in order to make business processes more efficient, increase customer value and minimize the risks associated with business. SMEs, unlike large companies, tend to show a low propensity towards the adoption of new digital technologies, mainly due to inadequate organizational skills (Markus & Robey, 1988; Whyte et al., 2002) causing a not fully efficient use of innovation, even at the implementation level (Anderson & Schaan, 2001; O'Farrell & Miller, 2002). The absence of figures with the professional backgrounds necessary for the achievement of digital transformation could compromise companies' competitiveness and durability (Oyelaran-Oyeyinka & Lal, 2006). Investment in the employee training process increases companies' ability to implement digital transformation (Lundvall et al., 2002; Malerba, 1992) since inadequate knowledge of digital tools frequently contributes to these low adoption rates (Houghton & Winklhofer, 2004). However, the lack of experience and Information and Communication Technologies (ICT) skills on the part of those responsible for business management (OECD, 2019), the high level of risk aversion and the limited availability of financial resources are the factors that limit investment in research and development and, consequently, the growth of SMEs (Lal, 2007). In order to benefit from digital transformation, companies must invest in technology and put into effect any organizational or managerial changes that may be required by these technologies. Smaller companies often have a capital endowment that cannot guarantee the financing of investment projects in corporate growth. In addition, the excessive traditionalism and conservatism that characterizes the culture of small businesses, especially family businesses (Sharma et al., 1997), negatively affects their ability to innovate. Other limits to the digital transformation of SMEs include risk aversion, which severely restricts growth and innovation, and the closure of capital, which has negative implications for a company's investment capacity (Peake & Marshall, 2017; Raymond, 2005; Songini & Gnan, 2013).

As mentioned above, there are countless barriers to the adoption of new technologies by small enterprises, but the process of adoption of new technologies is very fast. This acceleration is linked to a high level of flexibility and adaptability to change (Chrisman et al., 2015; Classen et al., 2014). Indeed, despite being more rooted in tradition and less capable of innovation than larger companies, many small businesses have begun to move towards digitalisation (Beugelsdijk et al., 2018; Duran et al., 2016). At the same time, some highly innovative small firms are attached to tradition.

They are particularly able among business in general to internalise and reinterpret their historical knowledge and re-contextualise it within the current and digital scenario. In other words, these companies do not dis-

sipate their past knowledge but rather diffuse it within the company (Miroshnychenko et al., 2020; Suddaby & Jaskiewicz, 2020). The real challenge to supporting small business innovation is identifying the mechanisms behind their decisions and behaviours, which are different from those of other types of companies (Erdogan et al., 2020).

Digital technologies, in addition to promoting greater production flexibility, contribute significantly to the reduction of costs and the creation of high-quality products, allowing SMEs to achieve ever greater competitive strength (Oyelaran-Oyeyinka & Lal, 2006). In addition, there are advantages for automation and process optimization, with regards to time savings, error reduction, risk resources and corporate sustainability (Grubic & Jennions, 2018). However, according to some studies, SMEs do not always recognize the added value deriving from the application of new technologies (Bi & Cochran, 2014), and the tendency to formulate short-term strategies severely limits the medium-to-long-term investments required for the adoption of new technologies (Mintzberg & Waters, 1982). To fully reap the benefits of Industry 4.0, management should interpret these investments not as a cost but as an opportunity to improve their business models, productivity and corporate competitiveness (Moeuf et al., 2017).

2.2. *The role of blockchain technology in SMEs' sustainable development*

Blockchain is traditionally dated to the publication of a 'white paper' by Satoshi Nakamoto (Nakamoto, 2008), in which he introduced a peer-to-peer version of bitcoin. Technically, 'block chain' indicates a series of transactions recorded on a public virtual database, decentralized and shared among all users without the intervention of third parties to validate the operations (Drescher, 2017; Hughes et al., 2019; Lacity, 2018). Transactions are grouped into blocks, and the set of all blocks forms a chain. Therefore, blockchain describes a logical sequence of transactions with the addition of new blocks being validated by a combination of peer-to-peer networks, consensus and encryption mechanisms to ensure the integrity of the data entered (Feng et al., 2018; Guo & Liang, 2016). The smart contract, one of the key features of blockchain, allows agents to conduct an authenticated transaction without the involvement of third parties by automatically checking whether the contractual terms are respected (Delmolino et al., 2016).

In Distributed Ledger Technology (DLT), users can be anonymous ('permissionless blockchain') or visible ('permissioned blockchain'). Public and private networks fundamentally differ in their access to the ledger.

In a public network, all peers have access to the ledger and participate in transactions independently, while in a private network, participants need permissions to keep the copy of the ledger and participate in confirmation transactions. In the latter case, consent, or permission to write the

blocks in the chain, is entrusted to one ('private') or more subjects ('consortium') who perform the function of validator (Dicuonzo et al., 2020).

Blockchain technology has the potential to gradually, but significantly, revolutionize the way companies operate (Überbacher et al., 2020; Zalan, 2017). The decentralization of the database allows for high transaction volumes and the disintermediation of processes (Crosby et al., 2016). In line with these considerations, blockchain has all the characteristics to enable companies to not only reach economic-financial goals but also sustainability goals (Adams et al., 2018; Nayak & Dhaigude, 2019). Indeed, the ability of blockchain to create new sustainable business models is recognized (Nowiński & Kozma, 2017), although studies in this area are still limited (Massaro et al., 2020).

The three main components of sustainability represented by economic, social and environmental dimensions make up the well-known triple bottom line (Bebbington & Unerman, 2018). In order to contribute to the creation of sustainable industrial value, new technologies, including blockchain, must intervene in the three dimensions of sustainability, which would lead to a transformation of business models and management of business processes(Di Vaio & Varriale, 2020).

Economic benefits are easy to observe, as there are several cases that show that blockchain is useful for increases the wealth of companies (Hughes et al., 2019; Lemieux, 2016; Morkunas et al., 2019). Tracking likely environmental and social situations that could create an environmental, social, safety or health risk is a crucial blockchain characteristic (Adams et al., 2018). For example, a clear chronology of the history of products could allow consumers to evaluate the origin and ethics of the product, and efficient energy systems like Echchain and ElectricChain could help reduce greenhouse gas emissions (Futurethinkers, 2017). By implementing blockchain technology, product authentication that is respectful of the environment can be carried out at any level and in real time, promoting customer loyalty and trust in the company. Environmentally conscious consumers can monitor goods along the entire supply chain, thereby verifying whether the company pursues sustainable practices. Through the implementation of blockchain, all products can be tracked, allowing interested consumers to access not only information relating to the current state of the product but also to the product's history (Provenance, 2015). Each product will be assigned a digital identification (Abeyratne & Monfared, 2016), and the use of smart contracts will allow only network participants to modify information, such as product ownership, value-added services, certifications, quantities, quality, locations, etc. (Abeyratne & Monfared, 2016). Blockchain will uphold the upstream and downstream flows of material and information in a reliable and transparent way, the positive results of which are higher levels of customization, reduced surveillance costs and

holistic management practices to serve the customers (Tian, 2016; Wong et al., 2020).

Despite the advantages of the implementation of distributed technology, major obstacles remain to its adoption, especially in SMEs—obstacles having to do with technology, behaviour and organization (Crosby et al., 2016; Lemieux, 2016; Überbacher et al., 2020; Yli-Huumo et al., 2016).

Instrumental to the application of blockchain technology is solid collaboration along the entire supply chain, achievable with leadership capable of motivating all the partners involved. Organizations must also have a adequate knowledge of technology and its potential and a propensity for investing in innovation (Hastig & Sodhi, 2020).

3. Research questions

The importance of SMEs for the economic and social development of our country makes it interesting to analyse the tools that could help enhance their growth. Digital technologies are currently an important means of consolidating a company's competitive advantage, requiring profound changes to business models (Jovanović et al., 2018; Moeuf et al., 2017) for the obtainment of benefits in costs, quality of products and improved economic, financial and capital performance as a whole (Morkunas et al., 2019; Peake & Marshall, 2017; Raymond, 2005; Songini & Gnan, 2013).

Despite the many advantages, the percentage of SMEs that have embarked on a path of digital transformation is very small (Dawn et al., 2002; Houghton & Winklhofer, 2004; Smallbone et al., 2003). In addition, not implementing courses to increase knowledge of digital innovations (OECD, 2019) strongly limits the adoption rates of such tools (Houghton & Winklhofer, 2004). SMEs are therefore not always able to recognise the benefits of a digital transformation process (Bi & Cochran, 2014; Hastig & Sodhi, 2020).

In line with these theoretical premises, we formulate the following research question:

Rq (1): Do SMEs recognise the benefits of new digital technologies?

Even with the potential difficulties faced by SMEs in the digitalization process, new digital technologies has the ability to transform traditional business models, change business strategies and revolutionize managers' mental paradigms (Hughes et al., 2019; Morkunas et al., 2019). Distributed ledger technology (DLT), which includes blockchain, has all the characteristics that would enable companies to achieve profitability and sustainability goals (Bebbington & Unerman, 2018; Di Vaio & Varriale, 2020), both of which are linked to the balance between economic objectives and the use

of internal, environmental and social resources (Nayak & Dhaigude, 2019). More specifically, sustainability is understood in terms of performance on environmental, social and governance levels.

The environmental sphere includes a company's ability to efficiently use resources in its processes, leading to a reduction in environmental impacts. The social dimension expresses a company's ability to promote ethical values and relationships of trust and collaboration among employees, while also respecting human rights. The last factor, governance, refers to a company's ability to act in the interest of its shareholders through corporate management systems and processes (Buallay, 2019; Drempetic et al., 2019).

Blockchain promotes the integration of the environmental and ethical-social dimensions with the needs of competitive and entrepreneurial development.

Tracking likely environmental and social situations that could create an environmental, social, safety or health risk is a crucial application of blockchain (Adams et al., 2018).

Considering how limited investigations into this topic have been, this study aims to expand upon the literature dealing with blockchain to create a tool for facilitating the creation of sustainable business models in the agri-food sector. We seek to fill the gap highlighted by Massaro et al. (2020) by answering the following research question:

Rq (2): How can blockchain technology support SMEs in achieving sustainable goals?

4. Methodology

To answer our research questions, we used the methodology of the case study (Yin, 2014), a methodology that is recommended for studying phenomena that are still unexplored (Eisenhardt, 1989), such as the impact of new digital technologies on the sustainability of SMEs. This methodology also ensures a high level of understanding of the complex reality examined (Berg, 2004).

We chose a single case study, which we considered one of the most representative cases of the application of blockchain in the wine industry.

Blockchain technology is not yet fully mature, and this case analysis is exploratory, providing preliminary explanations to our research question, and warrants further investigation in subsequent empirical studies.

4.1 Research context

Torrevento, a company based in the Apulia region, was founded in 1400 and meets the requirements of SMEs established by the EU Recommendation 2003/361/EC, which restricts SMEs to those companies employing 50 to 250 employees with a revenues of 10 to 50 million euros and a total assets of 10 to 43 million euros. Torrevento is one of the largest companies in the regional wine scene: it has an annual production of several million bottles, owns 250 hectares of vineyards and manages an additional 200 hectares in different parts of Apulia. The agri-food sector has always been the engine of economic development in Apulia due to excellent and diversified local production , which respects tradition and offers high quality, safe and sustainable products (Assessorato alle Risorse Agroalimentari, 2013). Dairy products, extra virgin olive oil, wine, baked goods and food pastes are among the products typically attributable to the region. Recently, Apulia has promoted the recognition of new districts - among them, the South East Barese food district -, which helps preserve the territory through sustainable local development. As shown by a survey of the Italian wine sector conducted by Mediobanca (April 2020), Apulian wineries recorded an increase in revenues of 7.5% from 2017 to 2018. The simultaneous expansion of investments (ISTAT, 2019) in artificial intelligence, blockchain and the Internet of things (IoT) has also fostered the competitive strengthening of many SMEs in Apulia that, thanks to the traceability of the food supply chain, guarantee the purchase of products fully adherent to the requirements for the 'Made in Italy' label.

Torrevento's vision has always been native vine recovery, expression of the territory and enhanced heritage in order to produce inimitable and competitive products. In keeping with the winemaking tradition, the company has always adopted production policies focused on organic viticulture, which are environmentally friendly. Torrevento is one of the first companies in Apulia to have implemented blockchain for the traceability of its products, so it represents an opportunity to capture the effects of technology on the social, environmental and economic dimensions of sustainability. As early adopters of blockchain, Torrevento management is aware of the challenges to implementing the technology and has already assessed the advantages and disadvantages associated with its adoption.

At the end of 2019 the company has a revenue of 864.638 euros, total assets of about 14.4 million euros and 39 employees.

4.2 Data collection

Semi-structured interviews were conducted with the quality manager of the company Torrevento, who has been engaged for several years in the field of sustainable management of resources in environmental, social and economic terms. These interviews sought to uncover the relationship between blockchain and corporate sustainability. They allowed open answers, lasted about 60 minutes and were conducted through an online platform.

Initially, we developed 9 interview questions based on the theoretical frameworks outlined by Morkunas et al. (2019) and Kamble et al. (2020). We then sorted the interview questions into two macro-areas relating to SMEs' recognition of the benefits associated with new digital technologies and the support provided by blockchain to SMEs in their pursuit of sustainable goals. For data coding, we assigned three researchers to independently and separately code the information obtained from the interviews. The results obtained were subsequently compared to each other to verify their validity using the open-coding method (Strauss & Corbin, 2014). We grouped the raw data that emerged from the interviews into well-defined conceptual subcategories that referred to the main topics explored. In addition, further documents were analysed, including: (i) the last approved annual report, in which strategic lines are outlined; and (ii) some articles published in national newspapers on the trials of blockchain infrastructure conducted by Torrevento. The use of multiple data sources made it possible to triangulate the information and increase the reliability of the results that emerged during the interviews.

4.3 Data analysis

Starting from the theoretical contributions of Morkunas et al. (2019) - which examines business models in light of the development of new technologies -, and the contribution of Kamble (Kamble et al., 2020) - which examines the supply chain objectives of sustainable agriculture-, this study analyses the impact of blockchain on business sustainability. Morkunas' contribution specifically examines business models according to the logic proposed by Osterwalder and Pigneur (2010), i.e. as the logic of value creation, transfer and acquisition (Osterwalder & Pigneur, 2010). This model consists of seven building blocks: target, value proposition, communication, customer relationship, resources, key activities and partnerships.

Kamble et al. (2020) proposed an application framework called agri-food supply chain (AFSC) framework, which is based on four main dimensions: supply chain visibility, supply chain resource integration, sustainable performance and data analysis capabilities or "the ability to use resources to perform analysis tasks, based on the interaction between IT resources and other business resources" (Cosic et al., 2015).

This study focuses on four important aspects of the sustainable business model: i) sustainable performance, in terms of the organization's ability to protect the natural resources available during product production, delivery and consumption; ii) value proposition and business strategy, which must be aligned with the opportunities offered by the blockchain and the challenges to be faced in its implementation; iii) key resources and activities of the new business, as well as the organizational change necessary for the adoption of the technology; and iv) sustainable disclosure.

Specifically, the interviews were divided into four parts that reflected the dimensions identified by the study's framework, and they were designed to answer, in different ways, the research questions outlined.

The following table outlines the interview questions, each of which is sorted under the research question they answer.

The interview questions and analysis of the results presented in the next section follow the aspects described above.

Do SMEs recognise the benefits of new digital technologies?
1. What has been your company's path towards sustainability? Did the company start with sustainability goals or have these developed over time?
2. Before blockchain, what were corporate sustainability policies?
3. What adjective or noun would you use to define blockchain? And why?
4. How do you use the blockchain and what is the blockchain model you use?
5. Does blockchain enable your company to compete more effectively? In what way?
6. What are the advantages, disadvantages and difficulties encountered in implementing blockchain?
7. Does your company have the right people, partnerships and resources to encourage blockchain adoption? Was it necessary to set up training courses?
8. What organizational changes were required for the implementation of the blockchain and how were they managed?
9. Who promoted the adoption of blockchain technology in your company?
How blockchain technology support SMEs in pursuing sustainable goals?
1. How could blockchain affect the national and international wine sector and its sustainability?
2. Does the company pursue sustainable development objectives?
3. How has blockchain contributed or does it contribute to the pursuit of sustainable development goals?
4. How does blockchain technology contribute to making business processes more sustainable?
5. Has the sustainability of your business model improved with the adoption of blockchain?
6. Will blockchain enable you to improve your customer services and generate more value for them?
7. Will the blockchain allow you to monitor the ethicality of your products?
8. Through which channels does your company communicate your sustainability policies and practices to customers?
9. Does your company draw up a sustainability report?

5. Results

5.1. Blockchain technology and sustainable performance

Torrevento use blockchain technology, specifically Mystory developed by Det Norske Veritas (DNV). DNV's initiative to undertake this digitization process stems from the need to test blockchain in the agri-food sector, viticulture in particular. Torrevento used Mystory blockchain to trace an extremely niche product: Veritas wine made with an indigenous grape and labelled DOCG Castel del Monte Bombino Nero. The process involves attaching a QR code on the wine bottle after a series of checks by DNV inspectors. Mystory's blockchain protocol provides for control by the DNV inspector not only in the final stage of bottling but also in the initial phase of grape ripening, harvesting and transport—even verifying the traceability of the bins used for transport from the field to the cellars where the drilling and fermentation takes place. At each stage, the inspector acquires the documentation necessary to certify the provenance, history and ethics of the wine present within each bottle. This process reflects one of the main features of blockchain technology, which is to ensure the integrity and veracity of the data embedded in the chain (Adams et al., 2018; Feng et al., 2018; Guo & Liang, 2016). To sum up, DNV applies its own brand (accessible with the QR code attached to each bottle) to test and to ensure the veracity of what the company communicates. In particular, the company recognizes the ability of blockchain technology to improve the three dimensions of sustainability: social, environmental and economic (Bebbington & Unerman, 2018; Di Vaio & Varriale, 2020). In the social dimension, following Adams et al. (2018), Torrevento recognizes the accuracy and punctuality of the distributed technology, thanks to which it is possible to reduce the risk of error and manipulation of information, since products follow an absolutely controlled and tracked path. According to an interviewee: "Only a blockchain technology, with its verified and certified digital database, shareable and above all immutable (not editable) can guarantee the perfect traceability of the supply chain, the absolute clarity and the immediacy of information directly to the consumer. This contributes to a greater guarantee to an increasingly attentive consumer who is deserving of protection. Bringing the results of verification activities directly to the consumer is unprecedented and we believe it is a bold and ethically correct choice to bring to market." Following this description, and in line with prior literature (Abeyratne & Monfared, 2016), blockchain is described by the respondent as a photograph that captures every step of the supply chain with no possibility of modification. In other words, thanks to blockchain technology, the consumer can learn about the history of wine, from the ripening phase of the grapes to bottling.

Within the environmental dimension, sustainability goals are followed

by using exclusively local grapes (production at 0 km), thereby reducing emissions of transport-related pollutants. In addition, Torrevento uses devices that can monitor the use of pesticides and water consumption, thereby reducing waste and dispersal of harmful substances into the air.

As for the economic dimension, Torrevento is aware that investments in innovation have improved the company's competitiveness. Indeed, as stated by Moeuf et al. (2017), management should interpret these investments not as a cost but as an opportunity to improve their business models, corporate productivity and competitiveness.

First, the implementation of blockchain technology for product traceability, which ensures the transparency of the entire tracking and tracing phase, has promoted the loyalty of pre-existing customers and the acquisition of new customers (Morkunas et al., 2019; Peake & Marshall, 2017; Songini & Gnan, 2013). The attention of more and more consumers to the quality of products, especially food, is what pushed Torrevento to implement blockchain technology, and, thanks to blockchain, the company has seen an increase in demand for its wine.

Second, the company shares the idea that blockchain applications are a valuable tool to enhance and make immediately visible the potential of Italy, Apulia in particular.

The results of this section show that blockchain technology is a tool that can improve corporate sustainability in all its dimensions (social, environmental and economic) (Bebbington & Unerman, 2018; Di Vaio & Varriale, 2020). In particular, by using blockchain, Torrevento has increased its customer loyalty by offering an ethical and environmentally friendly product with a sustainable production path that can be monitored at any time by the consumer. In addition, identification of suppliers closes to production sites who are equally concerned with environmental issues (which reduces transport-related environmental pollution), as well as attention given to the waste of resources, has led to an improvement in the environmental sustainability of the company and of the Apulian region as a whole. The benefits of attracting a greater number of consumers and the improvement of the company's image, which is also due to greater visibility, has also led to an increase in the company's value, consistently with previous studies on the topic (Hughes et al., 2019; Moeuf et al., 2017; Morkunas et al., 2019).
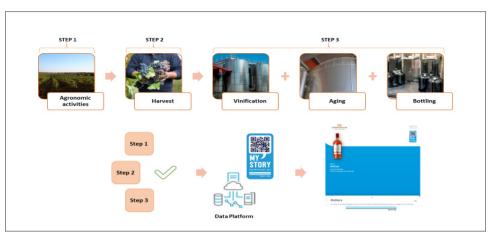
Figure 1 - My Story: the blockchain solution for tracking wine

Source 1 - Authors processing

5.2. Value proposition and business strategy

Ensuring the protection of the environment within which the large area of vineyards is developed has always been the focus of Torrevento's founders. This interest is demonstrated by the numerous certifications obtained (ISO 9001, ISO 14000 and ISO 22000). The path of corporate sustainability, initially oriented almost exclusively to the environmental sphere due to the geographical location in which Torrevento is located, has also inevitably turned to ethics, specifically dealing with the protection of its employees and obtaining the international certification SA8000. The company later decided to take on not only environmental and social issues but also economic ones by adopting the Equalitas standard. This standard, born in 2015, aims to promote the sustainability of agri-food and wine supply chains, sharing at national levels a unique approach to the sustainability of the wine sector. Cantina Torrevento has distinguished itself over the years by rooting its development plan in research, sustainability and quality. The founders have always believed in the potential of innovation to improve production efficiency, stating that "Italy and, in particular, the Apulia region, must invest in technology to continue to excel in an increasingly globalized context and to bring out and know the quality of the Made in Italy brand". Indeed, Torrevento is aware of the instrumentality of distributed technology in improving its visibility in the domestic and international market, further differentiating it from its main competitors (Moeuf et al., 2017; Oyelaran-Oyeyinka & Lal, 2006).

According to the interviewee, " blockchain increases visibility, and being more visible makes the company more attractive and cutting edge than others".

Torrevento also stated that investing in digital technologies requires adequate knowledge of them, as suggested by Hastig et al. (2020). The company's founders believe in this regard that, as with any other form of investment, it is appropriate to study the advantages and disadvantages that would result. Specifically, the interviewee said that before implementing blockchain technology, "the founders did extensive research on the costs and benefits associated with the technology, as well as the organizational changes that may be required."

5.3. Key resources and activities of the new business

Regarding the benefits of implementing blockchain technology, and consistent with Morkunas et al. (2019), the respondent believes that they will only be evident in the medium to long term.

As for the disadvantages and difficulties linked to the technology (Hughes et al., 2019), the company claims that it has not incurred high costs at the operational level, having already had the tools necessary for product traceability. In this regard, the company stated: "It was simply an integration and transfer of verifications on the blockchain platform. We have adopted the blockchain system and integrated it perfectly with what we already do". For this reason, the company did not feel the need to allocate a specific resource to the management of the project, as all employees were already involved in the daily registration of the steps linked to traceability. The company simply took time to train employees who were already tracking and tracing in the purpose and operation of blockchain. Although there have been no changes in the company's organizational or business model, blockchain has been "an additional testing ground for the company to verify and improve its traceability and traceability system."

According to the respondent, the real disadvantage of adopting DLT technology stems from the management of information about the activities of suppliers downstream from the production process, over which it is not always possible to exercise full control. However, for blockchain to work, "it is necessary for the winery to form, inform and convince the various suppliers to assume a greater sense of responsibility, given that they are part of a controlled and tracked supply chain."

The Apulian economy is characterized by the presence of small entrepreneurial businesses, strongly linked to traditions and not open to Innovation. In this context, it is difficult to persuade the entrepreneur about the opportunities provided by new digital technologies. However, as has been stated by earlier literature (Beugelsdijk et al., 2018; Duran et al., 2016), one must consider young entrepreneurs who are more inclined to change and technological innovation.

In summary, the analysis of results presented in this section, reveals an adequate knowledge of the technology and its benefits by the founders of the company, promoters of the implementation of blockchain in the Torrevento company.

Certainly, the founder's orientation towards new technology was one of the main drivers of the process, but a cost-benefit analysis is also important to consider. In fact, the company stated that it has not incurred high costs. The greatest difficulty concerned researching suppliers willing to follow the production standards imposed by blockchain. Torrevento recognises the benefits related to new digital technologies, and precisely this knowledge has favoured the implementation of blockchain.

5.4. Sustainability disclosure

The Equalitas-Sustainable Wine standard promotes the adoption of an internal sustainability management system and the publication of an annual sustainability report, both aimed at ensuring the continuous improvement of business sustainability standards. The Equalitas standard also calls for carbon and water footprint certifications, requiring companies to reveal the consumption and environmental impacts resulting from its production process. In fact, the need to offer guarantees of product quality to increasingly aware and demanding consumers and the willingness to adapt to international regulations for complete traceability of products are among the reasons that Torrevento has undertaken an innovative plan aimed at corporate quality since 2000. To this end, in addition to implementing the standards from a hygienic self-control manual according to the HACCP System, the company has obtained several certifications related to its quality systems. These include DLG TS Process-Wine, BRC Global Standard for Food Safety 2018, ISO 22000 - 2005 for Food Safety, ISO 14001:2015 for Environmental Quality, IFS (International Food Standard) 2018 and ISO 140001:2004 (2019), Equalitas Corporate Sustainability, Product Sustainability Equalitas. Torrevento, adhering to these standards, intends to draw up a summary sustainability budget that covers social, economic and environmental initiatives in order to provide its stakeholders with an exhaustive picture of the production policies that aim to safeguard the environment and protect the local environment and employees.

6. Conclusion and future research lines

The importance of SMEs to the economic and social development of Italy (Prometeia, 2019) encourages investigation of the relationship between blockchain technology and sustainable development, as well as the role played by innovation knowledge in the implementation of a digital transformation process. Our first research question asks whether SMEs recognise the potential benefits of new digital technologies, and the examined company recognises the advantages. The decision to invest in innovation is linked to the culture of the founders, who are aware of the importance of digital technologies for the growth of corporate value. Specifically, the choice to adopt blockchain technology came after a careful cost-benefit analysis.

Among the main obstacles to the implementation of blockchain is the entrepreneur's culture and his or her willingness to invest in new technology (Sharma et al., 1997). This was not an issue for Torrevento, which has always been open to the adoption of technology, establishing itself as one of the most cutting-edge companies in the Apulia wine industry.

Based on our case study, we can confirm that small and medium-sized businesses recognize the benefits of new digital technologies, which was the first research question we set out to answer.

The second research question asks how blockchain technology supports the sustainability goals of SMEs. Our interview revealed that there is perfect synergy between digitalization and sustainability (Buallay, 2019; Drempetic et al., 2019).

More specifically, blockchain technology has improved the company's social, environmental and economic sustainability. The technology has fostered an improvement in the image and reputation of the company and has led to greater visibility, which has increased customer loyalty. In addition, blockchain promotes transparency in corporate sustainability initiatives, serving as an advantage for companies that adopt ESG policies and revealing cases of inadequate implementation of these policies (Moeuf et al., 2017).

The present study contributes to the literature not only by highlighting blockchain as a tool capable of promoting corporate sustainability (Massaro et al., 2020) but also by partially filling other gaps (Queiroz et al., 2019)—identifying, among the barriers associated with the implementation of blockchain technology, the presence of suppliers that are not always conducive to change.

Indeed, the Apulian economic system is characterized by the presence of small businesses that are firmly tied to traditions and not open to innovation, which makes it difficult to manage information about the activities of suppliers downstream of the production process.

In conclusion, as there are cultural obstacles to the adoption of new digital technologies, sustainability-focused SMEs will not be able to consider

the benefits of digitalisation as a support tool for monitoring the company's sustainable goals.

However, many issues remain unexplored (Wang et al., 2019), as the topic of blockchain is recent and thus little known by scholars and practitioners (Queiroz et al., 2019).

In our current socio-economic context, possible future research developments look at new crisis management technology in the agri-food sector.

The massive decline in consumption caused by the Covid-19 pandemic has led to devastating consequences for the economy, especially in the wine sector, which has seen a complete disappearance of wine tourism. In addition to the loss of the in-person sale, costs have increased due to the health prevention measures adopted during harvest and the lower liquidity caused by unsold stocks (Mediobanca, 2020).

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