WAGENINGEN UNIVERSITY AND RESEARCH

Department of Social Science - MSc Thesis in Business Studies

Relationship of sustainability projects in the wine industry with supply chain vertical integration and risk exposure

Supervisors:
Prof. Miranda Meuwissen (WUR)
Prof. Claudio Soregaroli (Unicatt)

BEC-80436
Radici Luca
Student n°.
930507678100

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Executive summary

The interest in sustainability is becoming increasingly important in food supply chains. For the success of sustainability initiatives, the management of the relationship with the supply chain partners is fundamental. The aim of this research is to study the relationship between sustainability projects, supply chain vertical integration and risk exposure in the wine industry. The analysis has been done through semi-structured interviews to wine producers participating to VIVA (Italian Voluntary Sustainability Project) based on a theoretical framework that integrated findings of the existing literature with transaction cost economics (TCE). The findings show that the participation to the sustainability project has not affected the degree of supply chain vertical integration and wine producer were found to be already highly integrated in the supply chain. Moreover, the participation to the sustainability project was found to decrease risk exposure improving market position and the reputation of the company. This qualitative research has an exploratory nature and the findings can be considered valuable to the context and participants of the study. Further research is needed to study the conceptual framework and to extend the results to the whole sector considering other Italian and international sustainability projects.

Key words: Sustainability, Supply chain vertical integration, Risk exposure, Wine, Italy

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Table of contents

List of tables

List of figures

List of abbreviation

CSR	Corporate social responsibility
CT	Contingency theory
GMO	Genetically modified organism
IT	Institutional theory
NT	Network theory
NGO	Non-Governmental Organisation
OIV	International Organisation of Vine and Wine
PAT	Principal agent theory
RBV	Resource-based view
RDT	Resource dependence theory
RGT	Relational governance theories
SC	Supply chain
SCM	Supply chain Management
SME	Small and medium-sized enterprises
ST	System theory
TCE	Transaction cost economics
VIVA	Valutazione Impatto Viticoltura sull'Ambiente (Enviromental Impact Assessment of Viticulture)

1. Introduction

1.1. Background and problem statement

In the last decade, the interest for sustainable practices has been growing. Consumers and producers are increasing their attention toward sustainable issues (Loveless, et al., 2010). A supply chain is considered sustainable when, seeking to produce profit, it does not harm the environment and the society. A sustainable supply chain (SC) performs well in both financial and sustainability performance of social and natural dimensions (Pagell & Wu, 2009). The agri-food supply chains have a pivotal attention to the concept of sustainability because their activities affect the survival of plants and animals (Pullman et al., 2010).

Sustainability has an important role also in the wine industry. The OIV (International Organisation of Vine and Wine) defines sustainability in the wine sector as "Global strategy on the scale of the grape production and processing systems, incorporating at the same time the economic sustainability of structures and territories, producing quality products, considering requirements of precision in sustainable viticulture, risks to the environment, products safety and consumer health and valuing of heritage, historical, cultural, ecological and landscape aspects". In their processes vineyards and wineries use a lot of water that can be contaminated by their activities (i.e. use of chemicals). Therefore, it is necessary for the actors of the wine supply chain to preserve soil, surface and ground water (Gabzdylova et al., 2009).

In the Italian context there are various initiatives that have been launched in the last years that differ for requirements and purpose. One of them is VIVA. (Valutazione Impatto Viticoltura sull'Ambiente), promoted in 2011 by the ministry of Environment to improve the sustainability of the wine sector in Italy (Lamastra et al., 2014). The objective of VIVA. is to evaluate the sustainability performance of Italian wine companies with a standardized method considering water, vineyard, territory and air indicators. The sustainability performances are evaluated taking into consideration the full supply chain from vineyard to consumer (Corbo, et al., 2014).

For the success of sustainability initiatives, the management of the relationship with the supply chain partners is fundamental (Flint, & Golicic, 2009). Sustainable supply chain management takes into consideration information, material and capital flows and focuses also on the cooperation among supply chain actors for a sustainable development considering the three dimensions of sustainability (i.e. environmental, economic and social). The integration with the supply chain partners is often regarded as a barrier for the implementation of sustainable SC but it is pivotal for

their success (Seuring & Müller, 2008). Supply chain integration is defined by Flynn et al. (2010) as "the degree to which a producer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organizational processes, in order to achieve effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer". Supply chain vertical integration refers to the management of inter-organizational processes (i.e. relationship with suppliers and customers).

Additionally, sustainability strategies have also an impact on supply chain risks and their management (Seuring & Müller, 2008). Risks in SC are typically represented by delays and disruptions caused by procurement risks (i.e. inventories and stockouts), supply risks (i.e. quality issues and supplier dependency), supply chain relational risks (i.e. moral hazard and hold up risks), demand risks (i.e. demand volatility and information distortion), infrastructure risks (i.e. equipment malfunctions) and external risks (i.e. hurricanes, wars, outbreaks of disease) (Giannakis & Papadopoulos, 2016; Waters, 2015). Sustainable supply chains are based on solid partnerships. Good relationships and coordination with supply chain partners help to decrease the number of risks in sustainable SC (i.e. risks of delays and disruption) thanks to increased stakeholder engagement and better planning with supply chain partners. (Teuscher et al., 2006).

Most of the present researches on sustainability initiatives in the wine sector focus on the consumer side, centred on eco-labelling, eco-certification and consumers' preferences (Delmas, & Grant, 2014; Pomarici, & Vecchio, 2014). Others assess the search toward competitive advantage through sustainability (Flint, & Golicic, 2009). Moreover, various authors evaluated the effect of voluntary standards and projects on vertical integration of food supply chains applying transaction cost theory. Ghozzi et al. (2018) considered soybean supply chain to study the impact of the introduction of non-GMO voluntary standards on supply chain vertical integration. Ghozzi et al. (2016) focused on poultry supply chain applying resourced based view and transaction cost theory to analyse the impact of non-GMO standards on supply chain vertical relationship. Banterle & Stranieri (2008) studied the effect of voluntary traceability system on vertical relationship focusing on Italian food supply chains.

To my knowledge there are no researches applying transaction cost theory to assess the relationship between voluntary sustainability project and supply chain vertical integration. Furthermore, even if researches have started to consider sustainability in supply chain risk management, it is not clear how sustainability issues and the management of the relationship with supply chain partners, required in sustainability projects, affect supply chain risk exposure.

1.2. Objective

The objective of this thesis is to study the relationships between sustainability projects in the wine industry, supply chain vertical integration and risk exposure.

Sub-objectives

1. To review the relationship between sustainability projects in food supply chains, vertical integration and risk exposure.
2. To analyse the relationship between sustainability projects in the wine sector and supply chain vertical integration.
3. To analyse the relationship between sustainability projects and supply chain risk exposure.

This research will focus on the companies participating in VIVA. voluntary sustainability project in the wine industry.

1.3. Outline

The next chapter will describe the application of sustainability in the wine industry. First, it will consider the global context and then it will narrow down to the Italian situation and the VIVA case. The third chapter of the thesis will focus on the review of the relevant literature connecting the concepts of sustainability with supply chain vertical integration and sustainability with risk exposure. The last paragraph of the third chapter will describe the theoretical perspectives that have been applied in the context of supply chain relationship. The fourth chapter will describe the methodology of the research followed by the results. The thesis will end with discussion and conclusions.

2. Sustainability in the wine industry and VIVA case

2.1. The concept of sustainability in the wine sector

The OIV (International Organisation of Vine and Wine) defines sustainability in the wine sector as "Global strategy on the scale of the grape production and processing systems, incorporating at the same time the economic sustainability of structures and territories, producing quality products, considering requirements of precision in sustainable viticulture, risks to the environment, products safety and consumer health and valuing of heritage, historical, cultural, ecological and landscape aspects". The concept of sustainability in the wine industry is summarized in figure 1. Sustainability in the wine industry has not received a lot of attention by media because it is considered as a "dirty" sector (Gabzdylova et al., 2009). The wine industry faces various social and environmental challenges with effect on the nature and local communities. To produce wine there is an impact on water use, water contamination, green-house gas production, energy use, air quality, wildlife habitat and human resources. An additional issue that wine industry should consider is the destruction of the ecosystem using all the available land in wine areas. Growing grapes will always leave an environmental footprint. For wine producers it will always be possible to reduce the effect on the environment and to improve sustainability performance (Barber et al., 2009; Gabzdylova et al., 2009; Marshall et al., 2005; Ohmart, 2008).

In the wine industry, the region of production has an important role. There is a strict correlation between wine, region and tourism. As the activities of wine producers affect the territory and the landscape, they are more sensitive to sustainability initiatives. If wine producers are sensitive to environmental topics, on the other hand, they are not focused on social sustainability. (Pullman et al., 2010, Szolnoki, 2013).

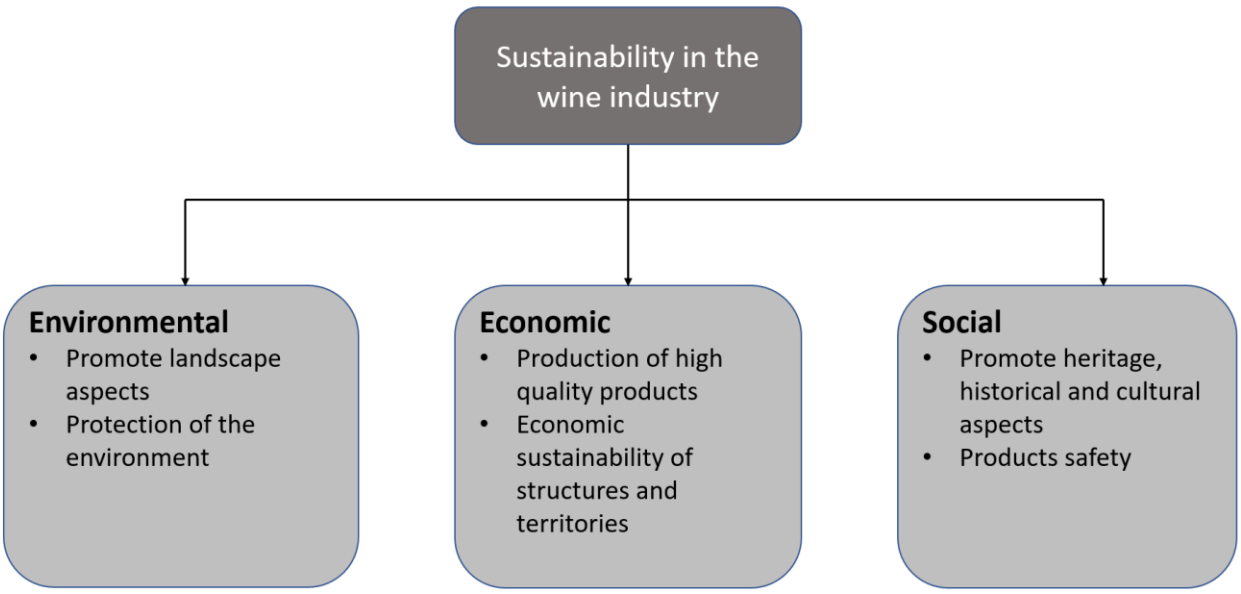

Figure 1: The concept of sustainability in the wine industry divided by the three dimensions

2.2. Drivers for the adoption of sustainability projects

Wineries are classified in four categories considering their behaviours in terms of sustainability: devoted, laggards, unexploiters, and opportunists. Devoted wineries are strongly oriented toward sustainability and invest in consumer communication, employees training and education. Laggards are wineries that would never invest in sustainability. Unexploiters usually adopt sustainability practices without informing other people and they limit the benefit that can be gained by sustainability. Opportunists are wineries that adopt few sustainability practices but highlight these activities (Casini et al., 2010).

Wine producers adopt sustainability practices reacting to internal and external stimuli. Internal drivers are stimuli coming from inside the firm, such as ethical motives moving the management or strategic intentions. External drivers, instead, are stimuli coming from outside the firm, such as institutions, consumers, regulations, competitors and external activists (Santini et al., 2013). Various authors considered the drivers to adopt sustainability initiatives in the wine industry. Gabzdylova et al. (2009) found that the most important drivers to adopt sustainability initiatives are personal values of managers (i.e. personal preferences and satisfaction with the profession), increasing product quality and satisfying consumers' demand. Pullman et al. (2010) instead, argued that wine producers decide to adopt environmental practices to avoid regulatory fines, escape from market pressure or to increase their profit. Wine companies invest in sustainable activities driven by the search toward competitive advantage (Flint et al., 2009). Other authors

consider the adoption of sustainability practices as a response to the changes in the market and to the increasing risks. Wine has recently become a global complex market due to grown competition with new entrants to the market able to offer lower prices, decreased number of retailers with increased power, increased consumers knowledge about wine and changes in consumer's demand. In this complex environment, wineries need to develop resilience in order to survive. Wine producers need to innovate and experiment in order to obtain new capabilities and resources to survive in a complex environment (Golicic et al., 2017).

There are also other factors that influence the decision to adopt sustainability initiatives such as the size of the company, the age of the management and the type of ownership (private vs. public) (Gabzdylova et al., 2009). For example, incumbent businesses in the market may not adopt sustainability projects for the sunk costs and for the risk of cannibalizing existing products. Young and small businesses are instead more open investing in sustainability projects (Gilinsky et al., 2016). Delmas & Gergaud (2014) argued that another factor influencing the decision to adopt sustainability projects is the willingness to pass down the business to the children. Drivers for the adoption of sustainability project in the wine industry are summarized in table 1.

Table 1: Drivers for the adoption of sustainability projects in the wine industry

	Country	**Internal**				**External**			
		Philosophy or ethical reasons of the management[1]	Strategic intentions[2]	Increase profit	Product improvements	Institutional stimuli	Competitors pressure	Market demand	External activists pressure
Delmas & Gergaud (2014)	USA	X[3]			X			X	
Flint et al. (2009)	New Zealand	X	X	X				X	
Gabzdylova et al. (2009)	New Zealand	X			X			X	
Gilinsky et al. (2016)	USA, Spain and New Zealand	X		X				X	X
Pullman et al. (2010)	USA	X		X		X	X		
Santini et al. (2013)	Italy	X	X			X	X		X

[1] Such as interest of the management in sustainability or organizational culture.
[2] Such as the search of competitive advantage
[3] X= considered in the article

2.3. Benefits and challenges of sustainability projects

Sustainability projects have both benefits and challenges. Gilinsky et al. (2015) studying wine producers in the USA, Italy and Spain found that sustainability is perceived as an important issue and a source of competitive advantage. The benefit for wine producers differs among countries. In Italy and USA, producers perceived a benefit considering cost reduction (i.e. energy consumption, reducing waste byproduct). Instead, in Spain, the benefit is perceived in differentiation strategies reinforcing their effort in sustainability, such as product branding and improvements of relationships in the supply chain.

Wine producers face also challenges in the application of sustainability practices because they need to change their products and processes. The main barriers are the lack of market interest in sustainability, the limited resources available for wine producers and the lack of sustainability orientation of the actors in the supply chain (Signori et al., 2017). Furthermore, companies need to select the right eco-certification and coordinate it with eco-labels in order to increase their prices for sustainability. Not all the certifications lead to benefits and producers need to identify sustainability certifications that allow to improve their reputation and quality (Delmas, & Grant, 2014; Pullman et al., 2010). Companies need also to identify consumers that are willing to pay a premium price for sustainable wine. Consumers do not always consider sustainability as an important characteristic for the selection of wines. Most of the consumers give the priority to quality and origin and sustainability is a secondary characteristic. Wine producers need to target this segment of consumers in order to increase their prices with the application of sustainability initiatives (Barber et al., 2009; Loveless et al., 2010).

In the wine industry, there is confusion around sustainability topic. Wine producers use terms of organic, biodynamic and sustainable as synonymous. Education around the sustainability topic on both consumers' and producers' side is needed. Companies that are already investing in sustainability practices argue that there is a need of uniformity and coordination of information among organizations, producers and consumers in order to make them successful (Szolnoki, 2013). Furthermore, most of wine producers focus only on environmental sustainability. Hoemmen et al. (2015) argue that sustainability projects that focus on both social and environmental sustainability lead to economic benefit. Benefit and challenges are summarized in the table below.

Table 2: Benefits and challenges of sustainability projects in the wine industry

	Country	Benefits				Challenges			
		Competitive advantage[1]	Improvements in profit[2]	Reputation	Increased product quality	Limited resources	Limited market interest	Certification selection	Confusion on the concept of sustainability[3]
Barber et al. (2009)	USA		X[4]				X		
Delmas, & Grant, (2014)	USA		X	X	X			X	
Gilinsky et al. (2015)	USA, Italy and Spain	X	X	X					
Hoemmen et al. (2015)	USA		X				X		
Loveless et al. (2010)	Australia						X		
Signori et al. (2017)	USA, Australia, New Zealand and Italy					X	X		
Szolnoki, (2013)	France, Germany, USA, Hungary, Italy, Greece and Spain.						X		X

[1]It includes differentiation strategies and improvements compared to competition
[2]It includes both cost reduction and price premium
[3]Such as confusion with the concept of green or organic
[4]X=Considered in the article

2.4. The global and Italian wine industry

Even if wine is a global business, wines are still strictly related to their region. The producers are divided into 'Old World' countries (e.g. Italy, Spain, Portugal, France and Germany) and 'New World' countries (e.g. Argentina, Australia, Chile, New Zealand, South Africa, and the United States). Around 60% of the export market is controlled by the "Old world" countries (Gilinsky et al., 2015; Orth et al., 2007). Italy is the greatest world producer of wine by volume and by number of producers. It is the third country for wine consumption and the second exporter of wine by volume (OIV, 2019). Italy is also the European country with the highest share of organic production (Gilinsky et al., 2015). Most of the wine businesses in Italy are family owned or own-operated businesses (Gallucci & D'Amato, 2013). Small size wineries represent 80% of the total wine producers contributing to 1.5% of the national production. Big industrial producers are 0.2%

of the total contributing to more than 40% of the national production. Cooperatives contribute to 50% of the national wine production (ICE, 2017). As shown in figure 2, Veneto is the region with the highest wine production with 9.679 thousand hl followed by Puglia, Emilia-Romagna and Sicilia.

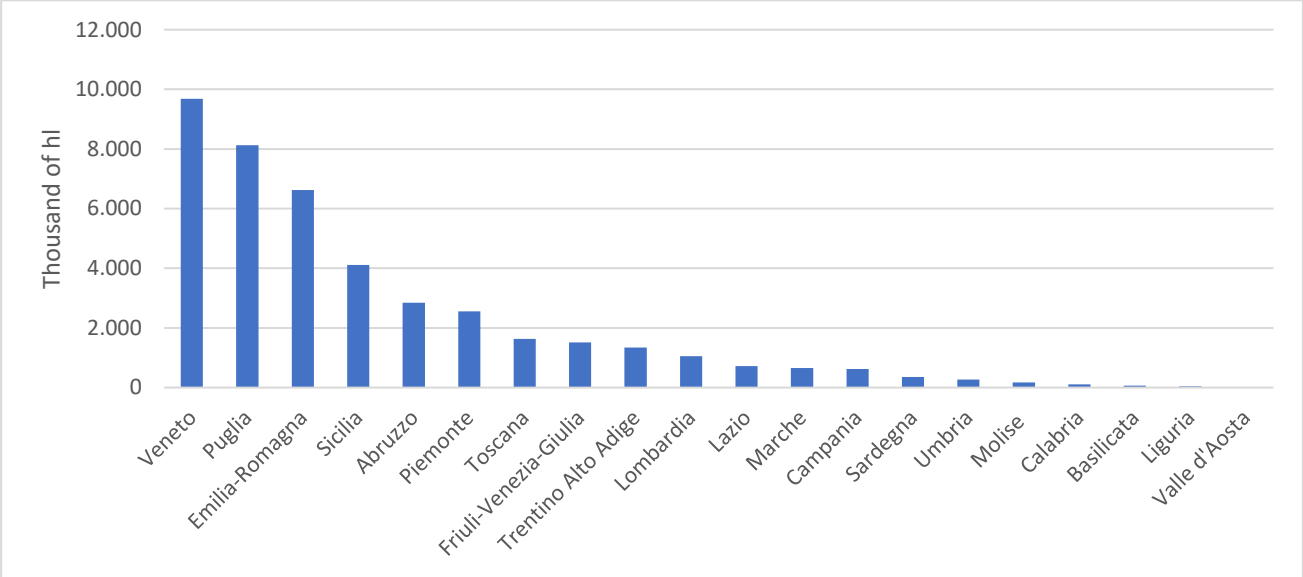

Figure 2: Overview of the Italian wine production of 2017 divided by region (Ismea, 2018)

2.5. The case of VIVA "Sustainability and culture"

The Italian wine sector is active in the topic of sustainability. Various sustainability programs have been launched in the last years. The programs differ in objectives, goals, methodology and requirements (Corbo et al., 2014). One of them is VIVA (Valutazione Impatto Viticoltura sull'Ambiente) that has been promoted since 2011 by the Ministry of Environment to improve the sustainability of the wine sector in Italy. The objective of VIVA is to improve the sustainability performances of the Italian wine supply chain. It measures sustainability performances of the participating companies using indicators based on scientific principles and international standard. The indicators are air, water, vineyard and territory. To allow consumers to access information regarding the producer's identity and the sustainability scores, a "smart label" is applied to the wine producers' bottles. VIVA takes into consideration the full supply chain from vineyard to consumer. All the operators in the supply chain are actively involved in the respect of sustainability requirements. Sustainability is evaluated in all the steps from harvest to consumption, considering vineyard, wine cellar (production), distribution, consumption and disposal. To improve sustainability performance, VIVA considers all the stakeholders in the supply chain. Collaboration

and communication with the stakeholders are considered fundamental for the promotion and development of sustainability.

One of the basic principles of VIVA is a continuous sustainable improvement. Sustainability is considered as a path and not as a destination. For this reason, VIVA provides guidelines and good production practices to the participating producers. Guidelines are written by a scientific committee and aim to improve the sustainability performances of the participating companies. Good production practices, instead, are used as instruments to reach agreed sustainability goals. Furthermore, VIVA considers sustainability in all its dimension (table 3): the protection of the environment, the economic growth and social development. VIVA holistically considers the sustainability pillars. Additionally, it adds also a fourth pillar that considers the cultural aspects. It is believed that cultural diversity, popular and agricultural traditions are part of the sustainability concept in the wine sector. To measure sustainability in the wine sectors, VIVA identifies some indicators for each sustainability pillar.

The companies participating in the project are evaluated by an external party. To ensure veracity the evaluation is done by an impartial entity. After the evaluation, all the information is available to the public ensuring transparency to stakeholders and final consumers. The certification is valid for two years. A company can choose to certify a product or the full organization. For the former, the data refers to the impact to produce a bottle of wine. For the latter, the full organization is analysed and the data refers to the impact arising from the firm's activities. At the moment according to the VIVA website, 37 producers certified at least one of their bottles with 52 certified bottles and 19 producers certified the organization.

Table 3: VIVA Sustainability pillars (from VIVA guidelines)

Environmental dimension	**Economic dimension**	**Social dimension**
• Efficiency and energy consumption analysis of emission gas (i.e. Greenhouse gas) • Water consumption analysis • Biodiversity evaluation for the agricultural ecosystem • Efficiency analysis for soil conservation • Management of the landscape heritage and adoption of protection measures • Give value to natural goods	• Investments in public utility • Investments to promote green and circular economy • Fair compensation to actors in the supply chain	• Worker protection (security and health) • Workers training • Activities that support young • Management of the relationship with the territory and neighbourhood • Focus on consumer safety and health • Clear, uniform and transparent communication • Protect popular tradition • Promote local agriculture culture and production

3. Review of the relationship between sustainability, vertical integration and risk exposure

3.1. Conceptualising sustainability, vertical integration and risk exposure

Sustainability

The World Commission on Environment and Development (1987) defined sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their needs". This definition is the most adopted but it is hard to apply for companies because it doesn't provide guidelines for the organization. Therefore, the concept of sustainability is usually split into the triple bottom line (Figure 1) that considers economic, environmental and social issues (Elkington, 1998).

Supply chain vertical integration (SCVI)

Researches on supply chain integration have offered different definitions and dimensions to identify the concept. Some authors considered both internal and external integration. Flynn et al. (2010) defined the concept of supply chain integration as "the degree to which a producer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organizational processes, in order to achieve effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer". Other authors instead considered just the external dimension of supply chain integration. Jayaram et al. (2010) and Schoenherr & Swink (2012) studied supply chain integration as the extent to which a company strategically collaborates, interconnects and aligns its supply chain with its downstream and upstream partners.

The concept of supply chain integration can be divided into three dimensions: suppliers, customers and internal integration (Schoenherr & Swink, 2012). This research will focus on vertical integration referring to supplier and customer integration and not considering the internal one (see figure 3). Consumers integration (downstream) refers to the activities of collaboration and information sharing with the key consumers that provide the firm the information about opportunities and market expectations in to react more efficiently to customer's needs (Wong et al., 2011). Supplier integration (upstream) considers collaboration and information sharing with suppliers, providing to the firm information about supplier's capabilities, processes and planning and forecasting (Ragatz et al., 2002).

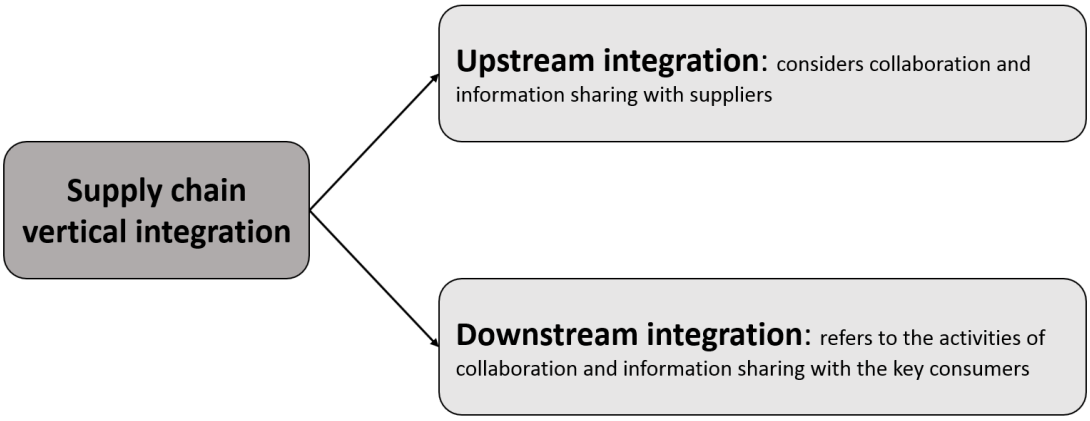

Figure 3: The dimensions of supply chain vertical integration

Supply chain risk

Risk is considered as a negative deviation from the expected performances, resulting in negative consequences for the focal company (Hofmann et al., 2014). Supply chain risk exposure is defined as the vulnerability of a supply chain to disruption and delays of materials, information or financial flows from the initial suppliers to the consumers, caused by unexpected events. Supply chain risks can be divided into three categories (see figure 4): internal, supply chain and external risks (Waters, 2015).

- *Internal risks* arise from the operations within the organization or the management decisions. For example, accidents, reliability of the equipment, human errors, financial problems and safety stock level.
- *Supply chain risks* are external to the firm but within the supply chain. They arise from the relationships with supply chain partners. They can be divided between suppliers' risks (reliability, availability of the materials, lead times, etc) and customers risks (variable demand, payments, problems with order processing, etc)
- *External risks* refer to risk coming from outside the SC beyond managers control. They arise from the interaction with the external environment. For example, weather risks, geopolitical risks, outbreaks of disease, market volatility, etc (Giannakis & Papadopoulos, 2016; Waters, 2015).

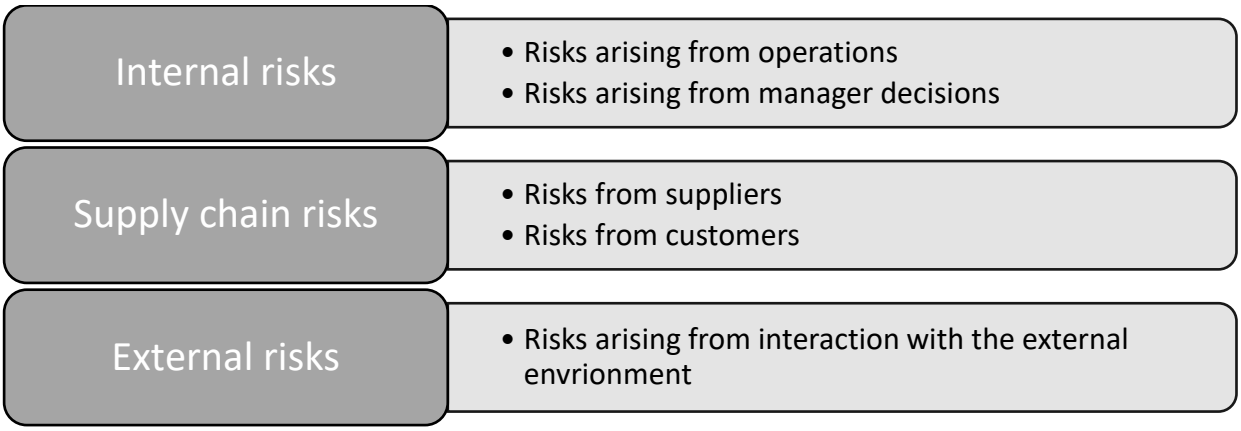

Figure 4: Types of supply chain risks

3.2. Relationship between sustainability and supply chain vertical integration

This section will focus on the review of the literature assessing the relationship between sustainability and supply chain vertical integration in the food supply chain. First, the research of Seuring & Müller (2008), summarizing literature until 2008, will be considered. Then, literature from 2008 will be analysed. Literature has been searched through various databases and search engines such as Google Scholar and Scopus. The keywords used are: "sustainability", "environmental", "social", "food supply chain", "vertical integration", "collaboration" and "supply chain relationship". Literature focusing on the food supply chain is scarce and do not consider supply chain vertical integration directly. The topics considered are supply chain collaboration, communication and information sharing.

The research of Seuring & Müller (2008) offers a literature review on sustainable supply chain management and collaboration in the supply chain related to sustainability. Until 2008 most of the literature focused on the environmental aspect of sustainability with rare integration of its three dimensions. In the first place, the authors identified the triggers for sustainable supply chain management. The most important pressures come from stakeholders, consumers and government. Moreover, when the focal company has external pressure, it passes it to its suppliers. To manage a sustainable supply chain, a company need to consider a longer portion of the supply chain than that needed for economic reasons. Furthermore, in sustainable supply chains, there are more issues and problems to take into consideration compared to the classic SC. The authors identified two strategies to implement sustainable supply chain management:

- *Supplier management for risk and performance.* Integration with the supply chain partners (considering communication, monitoring, evaluation, reporting and sanctions) are considered as supporting factors to sustainable supply chain management. This kind of factors decrease the risks related to sustainability and conventional supply chain risks. Furthermore, they improve the sustainability and financial supply chain performance.
- *Supply chain management for sustainable products*. To offer products with improved environmental and social quality, cooperation with the supply chain partners is required. The interactions with the supply chain partners from the raw materials to the final customers need to be integrated. Therefore, there is a need to consider a longer part of the supply chain than usual.

Now, literature from 2008 linking sustainability and supply chain relationship will be considered. The latest literature is in line with the findings of Seuring & Müller (2008). A higher degree of vertical integration is needed to improve sustainability in the supply chain. Various articles point out the importance of enhanced information sharing, communication and coordination with the supply chain partners.

Pagell & Wu (2009) found that the communication and the exchange of information with the supply chain partners are fundamental for sustainable supply chains because they increase transparency, product quality and the number information provided to the final customers. Collaboration with customers and suppliers and a good selection of suppliers creates also value for the company and improves both sustainability and financial performance. The management of the relationship with the supply chain partners is fundamental also for sustainability projects in the wine industry (Flint, & Golicic, 2009). Sustainability initiatives require a higher degree of integration with supply chain partners. The integration with the supply chain partners affects positively the implementation of sustainability practices. One member of the supply chain cannot claim to be sustainable without a solid relationship and network with supply chain partners. Therefore, the alignment of goals in the supply chain is needed to reduce the cost of sustainability and to gain competitive advantage (Annunziata et al., 2018).

Focusing on the Dutch food and beverage sector, Grekova et al. (2016) found that environmental collaboration with suppliers improves business performance. Collaboration with customers, instead, improves internal environmental performance, reduces costs and improves the position in the market. Environmental collaboration with customers pays off more in the food sector because the focal company is rewarded if they improve their internal processes (i.e. higher price, higher demand). Grekova et al., (2014) argued that companies pursuing environmental sustainability need

to cooperate with the supply chain partners and increase the number of information exchanged in the supply chain. Companies investing in sustainability usually improve first their internal processes. Only companies having environmentally sustainable internal processes consider also external ones (i.e. collaboration with the supply chain partners) to improve sustainability performances. Environmental collaboration with supply chain partners is increasingly considered necessary in the agri-food sector. Good selection and relationship with both customers and suppliers lead to benefits in the whole supply chain. For example, in the food supply chain producers instruct farmers to grow organic crops with specific characteristics. Farmers improving communication with the producers decrease uncertainty and get a higher price for their products (Pagell & Wu, 2009).

When investing in sustainability initiatives, companies are focusing mainly on changes inside their organization Therefore, collaboration is not considered as a part of the sustainability concept. Flint & Signori (2014) summarize sustainability for the wine companies as follows: "being sustainable is a leader driven and directed, project-based, environmentally-focused, economically constrained journey that begins and sometimes remains self-focused, being different from the industry, remaining sceptical, and only sometimes involves collaborating with supply chain partners". Large organizations usually consider collaboration with supply chain partners important in the development of sustainability initiatives. On the contrary, SMEs do not consider collaboration with supply chain partners as a goal for sustainability. They focus more on internal environmental sustainability because they don't have the power and the resources to influence supply chain partners (Flint & Signori, 2014). The findings of the literature review are summarized in table 4.

Table 4: Summary of the relationship between sustainability and supply chain vertical relationship

References	Business sector	Sustainability dimension[1]	Association between[3]	
			Sustainability on supply chain vertical integration[2]	**Supply chain vertical integration on sustainability**
Annunziata et al. (2018) (e)[4]	Food &beverage	EN, EC, S	+[2] (SCVI is needed to reduce the cost of sustainability and for competitive advantage)	+ (Higher degree of SCVI improve sustainability performance)
Flint, & Golicic (2009) (e)	Food &beverage	EN, EC, S	+ (SCVI is fundamental for the success of sustainability projects)	nc
Flint & Signori (2014) (e)	Food &beverage	EN, EC, S	SME /	Large companies + (SCVI important factor for sustainability)	+ (Higher degree of SCVI improve sustainability performance)
Grekova et al., (2014) (e)	Food &beverage	EN	+ (sustainability requires collaboration and higher level of information exchange)	nc
Grekova et al. (2016) (e)	Food &beverage	EN	+ (Environmental collaboration with SC partners reduces costs and position in the market)	+ (Higher degree of SCVI improve sustainability performance)
Pagell & Wu (2009) (e)	Various[3]	EN, EC, S	+ (SCVI is required for the implementation of sustainability projects)	nc

[1] Sustainability dimensions are: EN= Environmental sustainability, EC= Economic sustainability, SO= Social sustainability.
[2]The type of relationship present will be considered. The acronyms used are: += positive relationship, -= negative relationship, nc=relationship not considered, /=no relationship present.
[3]Forest and wood products, cleaning products, electronic scrap, pizza restaurants, IT equipment, snack food, paper products, lighting products, food and beverage products and building renovation.
[4]e=empirical research, n=normative research

3.3. Relationship between sustainability and risk exposure

There is lack of research assessing the relationship between sustainability and supply chain risks. Literature has been searched through various databases and search engines such as Google Scholar and Scopus, by using the following keywords: “sustainability”, “environmental”, “social”, “food supply chain”, “risk” and “risk exposure”. Considering the lack of literature linking sustainability and risk exposure in the agri-food sector, this section will consider also other sectors.

The report by United Nations Global Compact and BSR (2010) suggested that in many industries sustainability-related risks are greenhouse gas emissions, natural disasters, accidents, energy consumption, packaging waste, environmental damages during logistics and transportation. Companies are exposed to risks and they can experience losses from ecological, social and ethical problems in the supply chain (Hofmann et al., 2014). It is not clear what is the relationship between sustainability and risk exposure. According to some authors, sustainability initiatives create new risks in the supply chain. Giannakis & Papadopoulos (2016) divided sustainability-related risks in

endogenous and exogenous. Endogenous environmental risks inside the company are perceived as the most important. This kind of risks can be controlled by managers. Exogenous risks are harder to control. Anderson & Anderson (2009), instead, considered six categories of sustainability risks: global warming/climate change, boycotts, environmental liability, ecosystem, social responsibility and directors' and officers' liability. The most important are global warming and boycotts. Global warming is usually the most discussed and considered by researchers and managers. Boycotts are related to stakeholders' interest in sustainability: companies not investing money in sustainability can suffer loss in revenues and profit.

Current literature is not clear on what is the relationship between sustainability and supply chain risks. Giannakis & Papadopoulos (2016) argued that sustainability-related risks could be triggered by rigorous business decision without causing supply chain disruption. For example, they can create negative effects on companies' stakeholders (i.e. shareholders, community). Anderson & Anderson (2009) believe that environmental and social reputation is important for companies and that their performances are affected by sustainability decision. Companies undergo pressure from different stakeholders (such as government, NGO and consumers) concerning sustainability performances and they need to adapt to their pressure. Hoffman et al. (2014) instead, suggested that sustainably risks are equivalent to ordinary supply chain risks. The difference is in the way they are triggered. Ordinary supply chain risks are triggered by disruption of the in the material, information and financial flows. Sustainability-related supply chain risks, instead, are triggered by stakeholders' reactions. Both ordinary and sustainability-related risks can create damage to the company. Foerstl et al. (2010) focused on sustainability-related risks caused by the irresponsible behaviour of suppliers. The non-adherence of suppliers to sustainability standards established in the supply chain can cause reputational damage, adverse publicity and costly legal obligation to the focal company. They highlighted the importance of the assessment of suppliers' sustainability performances to reduce sustainability reputational risks.

Other authors believe that sustainability decreases the number of risks in the supply chain because of the improved relationships with partners required in sustainable supply chains. Teuscher et al. (2006) claim that with the increasing awareness of consumers for sustainability issues, it becomes important for the company to manage an increasing quantity of information in the supply chain. Solid partnerships are fundamental for sustainable supply chains and reduce supply chain risks. Gouda & Saranga (2018) focused on the importance of evaluating and analysing suppliers' sustainability performance and sustainability-related risks. With a good evaluation of suppliers, the focal company has more information about sustainability and can improve sustainability performance in the supply chain. These activities help to enhance sustainability performance,

increase awareness in the supply chain and increase the quality of the products. Through higher integration with the supplier companies, companies with higher supply chain effort can lower the level of supply chain risks (Gouda & Saranga, 2018). Instead, Cruz (2013) discussed the effect of corporate social responsibility (CSR) on supply chain risks. Investments in CSR increase profit and decrease supply chain risk. Investments in sustainability decrease possible future costs such as negative media coverage, future lawsuit, financial mismanagement, unreliable business relationships and operation disruptions.

Sustainability-related risks can be managed only with the involvement of stakeholders (Hoffman et al., 2014). Alternatively, Giannakis & Papadopoulos (2016) argued that the management of sustainability-related risks aims at reducing the effect on companies' stakeholders rather than minimizing the cost for possible supply chain disruptions. Sustainability-related risks need to be managed in an integrative way to improve sustainability performances in the supply chain. Teuscher et al. (2006) suggested that with the adoption of good risk management model companies can reduce risk exposure and improve sustainability performance. Good risk and supply chain management ensure stability, advanced risk perception and appropriate communication with supply chain partners. They considered sustainable supply chain management as total quality management able to handle external, internal and sustainable related risks in the supply chain.

Some research focused on sustainability initiatives in the wine industry. Sustainability is often considered as a response to changes in the market and to the increasing risks. The wine market has become global with new entrants to the market able to offer lower prices, decreased number of retailers with increased power, increased consumers knowledge about wine and changes in consumer's demand (Flint et al., 2011; Golicic et al., 2017). With increasing external risks, companies invest in new capabilities and resources innovating their products and process and developing resilience (Golicic et al., 2017). Flint et al. (2011), instead, suggested that wine producers, to survive in a complex market, need to develop capabilities to improve resilience. For example, investing in marketing to highlight what makes a certain wine unique (such as provenance and quality of the wine). Furthermore, companies need to change and innovate their product to improve quality and to increase the value delivered to customers. Sustainability innovate products and processes increasing product quality and the value delivered to consumers. The findings of the literature review are summarized in table 5.

Table 5: Summary of the relationship between sustainability and risk exposure

References	Sector	Sustainability dimension[1]	Type of risk [2]	Effect of sustainability on risk	Effect of risks on sustainability
Cruz (2013) (n)[3]	Ns[4]	EN, S, EC	I, E, SC	-[5] (Investments in CSR reduce future possible costs and risks)	Nc[6]
Flint et al. (2011) (e)	Food &beverage	EN, S, EC	E, SC	nc	External risk push company to invest in sustainability
Foerstl et al. (2010) (e)	Chemical	EN, S, EC	SC, E, I	+ (Sustainability can create reputational risks due to possible irresponsible behaviour of supplier)	nc
Giannakis & Papadopoulos (2016) (e)	Various*	EN, S, EC	I, E, SC	+ (Sustainability increase SC reputational risks. Companies' stakeholders reactions can create negative consequences for the firm)	nc
Golicic et al. (2017) (e)	Food &beverage	EN, S, EC	E, SC	nc	External risk push company to invest in sustainability
Gouda & Saranga (2018) (e)	Various[7]	EN, S, EC	I, E, SC	- (Sustainability decreases SC risks because there is higher degree of supply chain integration)	nc
Hofmann et al. (2014) (e)	Telecommunication, energy utility, logistics services, retailer, chemistry	EN, S, EC	I, E, SC	+ (Sustainability increase the number of risks in the supply chain. Stakeholders attention to sustainability issues can cause losses to the firm)	nc
Teuscher et al. (2006) (n)	Food &beverage	EN, S, EC	I, E, SC	- (Solid partnership required by sustainability reduce supply chain risks)	nc

[1] Sustainability dimension are: EN= Environmental, EC= Economic, SO= Social.

[2] Type of risks are I=internal risks, E=external risks SC=Supply chain risks

[3]e=empirical research, n=normative research

[4]ns=not specified

[5]+=sustainability increases supply chain risks, -=sustainability decreases supply chain risks

[6]nc=not considered

[7]Energy, professional services, construction and engineering, facilities, metals and mining, pharmaceutical, automotive, textile and fashion, aerospace and defence, utilities, food, chemical, electronics, machinery

3.4. Theoretical perspective to supply chain relationship and vertical integration

The aim of this paragraph is to summarize the theoretical perspective that has been used to analyse supply chain relationships. Various articles considering theories applied to supply chain relationship will be taken into consideration. First, these articles will be summarized (see table 6) and then the most important theories will be described.

Halldórsson et al. (2015) consider the complexity of supply chain management and the impossibility to describe it with only one theory. They emphasize the conceptual slack (the difference between analytical perspectives and methodological approaches) and the limits of the application of a single theory in supply chain management. They suggest that the theories are complementary and should be used together to describe SCM. The most important theories considered are principal-agent theory (PAT), network theory (NT), resource-based view (RBV) and transaction cost economics (TCE). Chicksand et al. (2012) focusing on theoretical perspective in purchasing and supply chain management argue that there is not the right theory to analyse the integration in supply chains. There is not a single dominant theory describing supply chain management and instead, researches make use of "homegrown" theories and theory coming from different fields. These theories are transaction cost economics (TCE), principal-agent theory (PAT), resource dependency theory (RDT), network theory (NT), resource-based view (RBV) and industrial organization.

Shook et al. (2009) analyse the strategic sourcing decision of making, buying or allying. It is important to select the right suppliers and to manage sourcing relationships. The main theories considered are institutional theory (IT), resource dependence theory (RDT), network theory (NT), systems theory (ST), resource-based view (RBV), transaction cost economics (TCE) and principal-agent theory (PAT). Kembro at al. (2014), instead, focus on the information flows in the supply chain. The predominant theories used to analyse information sharing are transaction cost economics, contingency theory (CT), resourced based view, resource dependency theory (RDT) and relational governance theories (RGT). Most of the researches on information sharing applying these theories focus on dyadic level.

In table 6 it is evident that the main theories applied to describe supply chain relationships are transaction cost economics, resource dependency theory, resourced based view, principal-agent theory and network theory. The main theories will be now shortly described.

- Transaction cost economics (TCE). It analyses the governance of economic transactions. Transaction costs differ on the diverse level of coordination in the supply chain. The basic

assumption is that actors act opportunistically because of bounded rationality and with information asymmetry. Actors control the risk of opportunism through different levels of asset specificity and integration with the supply chain partners. Through different levels of coordination, actors in the supply chain can reduce uncertainty and transaction costs.

- Resource dependency theory (RDT). The basic assumption is that organizations depend on external resources and search alternative sources to get access to the resources while trying to remain autonomous from other organizations. The theory predicts that the organization adapts its behaviour to the context where it is operating. It helps to explain why a company decides to share information or not and collaborates with certain supply chain partners holding some particular resources.
- Resource-based view (RBV). It focuses primarily on internal resources of firms as a unit of analysis. Organizations owning resources that are valuable, rare, inimitable and/or non-substitutable develop and sustain an edge over competitors. Information and relationship with the SC partners are considered as valuable resources that can lead to competitive advantage in the supply chain. The extended version of RBV suggests that resources are not only inside the firm borders. A collaborative relationship can be a source of competitive advantage.
- Principal-agent theory (PAT). It focuses on adverse selection and moral hazard problems to analyse efficiency. It analyses the transaction recognizing the conflict of interest within economic actors. The key problem is to design the most efficient contract considering bounded rationality and asymmetric information.
- Network theory (NT). It focuses on the relationships an organization has with other organizations and their effect on behaviours and outcomes. The management of the relationship with supply chain partners is a key for success. The unit of analysis is the network (that consists of nodes/actors linked with the interactions). The type of interaction influences the decision to purchase or vertically integrate into the supply chain. It also considers the centrality of a company in the network. The more a company is central the more is sought out as a partner.
- Relational governance theories (RGT). It considers six related theories (social exchange, social capital, social contract, relational exchange and relational view). It is used to address the limitations of TCE and to study strategic buyer-supplier relationships. Two or more partners become mutually reliant and employ an informal mechanism to govern the relationship. The partners will continue the relationship until they are getting benefit from

it. The theory is based on trust (not opportunistic behaviour) guiding the relationships and explains why partners should cooperate and share information.

Table 6: Theory considered in the context of supply chain relationship

References	Supply chain flows[1]	TCE	RDT	RBV	PAT	NT	RGT	CT	IO	IT
Chicksand et al. (2012)	I, M, F	X	X	X	X	X			X	
Halldórsson et al. (2015)	I, M, F	X		X	X	X				
Kembro at al. (2014)	I	X	X	X			X	X		
Shook et al. (2009)	I, M, F	X	X		X	X				X

[1] I= Information flows, M=material flows, F= financial flows

TCE=Transaction cost economics, NT=Network theory, RBV=Resource based view, RDT=Resource dependency theory, PAT=Principal agent theory, RGT=Relational governance theories, CT=Contingency theory, IO=Industrial organization, DCA=Dynamic capabilities and IT=Institutional theory

4. Methodology

4.1. Conceptual framework and hypotheses

Considering the theoretical perspective described in the previous paragraph, TCE will be used to analyse the changes in supply chain vertical integration and risk exposure after the introduction of the sustainability project. The transaction cost economics (Williamson, 1979, 1985) focuses on the transaction (a transfer of a good or a service) and considers the cost of contact, contract and control. The decisions of economic actors take place with bounded rationality and opportunism and they cannot predict all possible outcomes of a transaction. The main objective of the theory is the minimization of the transaction cost.

Williamson (1991) identifies three forms of transaction governance. The governance structures are:

- *Spot market* refers to not recurrent transactions between unknown actors. The exchange of goods is immediate and at current prices.
- *Hybrid* forms are used when a longer-term transaction is implied with a higher amount of information exchanged. It includes informal or formal obligations and the identity of the partners is more important compared to spot market. There is no shared ownership of the assets.
- *Hierarchy* forms are present when the transaction is organized and controlled internally. Two or more different stages are under the same ownership. This governance form is also called vertical integration (Williamson, 1979, 1985).

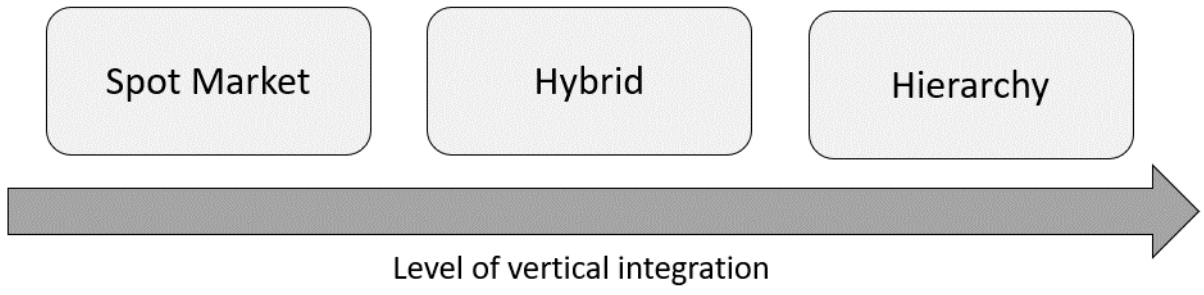

Figure 5: Governance structure of a transaction

Williamson (1991) identifies also the transaction attributes. The transaction attributes are asset specificity, uncertainty and transaction frequency.

- *Asset specificity* is the investment made to support a particular transaction. It considers the value that would be lost in any different use.
- *Uncertainty* can be behavioural or environmental. Behavioural uncertainty is due to the difficulty to predict the outcome of the transaction (i.e. incapacity of fulfilling the contract obligation), environmental refers to the unpredictability of the changes of the economic environment (i.e. fluctuation of demand, price or technology).
- *Frequency* refers to how often the transaction takes place. This attribute will not be considered in the research because it is assumed that the introduction of sustainability projects does not impact the frequency of the transaction.

The main implication of TCE is that firms, aligning their transaction governance with transaction attributes, will minimize transaction costs and improve performance (Williamson, 1985). This means that changes in transaction characteristics lead to changes to a governance structure that is minimizing the transaction costs. Moving from spot market to the right (figure 5) there is a higher level of vertical integration with higher control of the transaction. When there is a shift in governance form, there are also changes in the type of coordination form (from price to hierarchy) and governance instrument (control and incentive mechanism) (Raynaud et al., 2009). Companies move from spot market to other different forms of governance because they need higher vertical coordination and make interdependent investments. Increasing the interdependence in the transaction, they keep decision making and property rights separated (Ménard, 2004). The conceptual framework is summarized in figure 6.

Hypotheses

In paragraph 2.2, the drivers for the adoption of sustainability projects in the wine industry have been discussed. It has been found that wine companies adopt sustainability projects due to internal reasons (such as personality or ethical reasons of the management, strategic intentions, increase profit or product improvements) or external reasons (consumers demand, competitors' pressure, institutional stimuli or external activists' pressure). Paragraph 3.3, describing the relationship between sustainability projects and risk exposure, explains that companies invest in sustainability projects to survive in a complex and risky environment (Flint et al., 2011; Golicic et al., 2017). (Flint et al., 2011; Golicic et al., 2017). Following the common findings leads to the first hypothesis.

- *Hypothesis 1: Companies adopt sustainability projects reacting to external complex environment.*

As it has been shown in paragraph 3.2, sustainability projects require a higher degree of supply chain vertical integration. Investing in sustainability projects, companies increase collaboration and communication with the supply chain partners (Annunziata et al., 2018; Flint, & Golicic, 2009; Pagell & Wu, 2009; Seuring & Müller, 2008). A higher degree of vertical integration improves information, material and financial flows in the supply chain changing the transaction characteristics. Sustainability projects require interdependent investments (for example in new information systems or new dedicated personnel) increasing asset specificity. That calls for relationships based on trust and mutual dependence. It is expected to have a shift from market to hierarchies through hybrid forms. Moving in hierarchy direction increases vertical coordination and more interdependent investments. Consistently, the following hypothesis can be made:

- *Hypothesis 2: Sustainability projects increase asset specificity.*
- *Hypothesis 3: Increasing asset specificity for the adoption of sustainability projects calls for higher degree of vertical integration.*

In paragraph 3.3, the relationship between sustainability and risk exposure has been discussed. It is not clear what is the effect of sustainability projects on risk exposure. Some authors suggested that sustainability increases supply chain risks. Most researches focused on reputational risk created by sustainability issues (Foerstl et al., 2010; Giannakis & Papadopoulos, 2016; Hofmann et al., 2014). Foerstl et al. (2010) studied sustainability-related risks caused by the irresponsible behaviour of suppliers. The non-adherence of suppliers to sustainability standards established in the supply chain can cause reputational damage, adverse publicity and costly legal obligation to the focal company. Investing in sustainability projects, firms increase their dependence to supply chain partners and the sustainability-related risks caused by suppliers. With increasing asset specificity, there are increasing transaction costs with higher risks for opportunistic behaviour and less re-adaptability of assets. Continuity between parties and adaptive capabilities become important with a nontrivial level of asset specificity. Transaction cost economics predicts that with nontrivial degree of asset specificity, an increase in uncertainty changes the governance structure (Williamson, 1985). In this research, it is assumed that asset specificity is present to a nontrivial level. Therefore, with increasing supply chain risks, an increase in vertical integration is expected (from market to hierarchy). Various authors support the idea that a higher degree of vertical integration helps to reduce supply chain risks created by the adoption of sustainability projects (Cruz, 2013; Gouda & Saranga, 2018; Teuscher et al., 2006). This reasoning leads to the following hypothesis

- *Hypothesis 4: The adoption of sustainability projects increases supply chain risks.*

- *Hypothesis 5: Increasing supply chain risks for the adoption of sustainability projects calls for higher degree of vertical integration.*

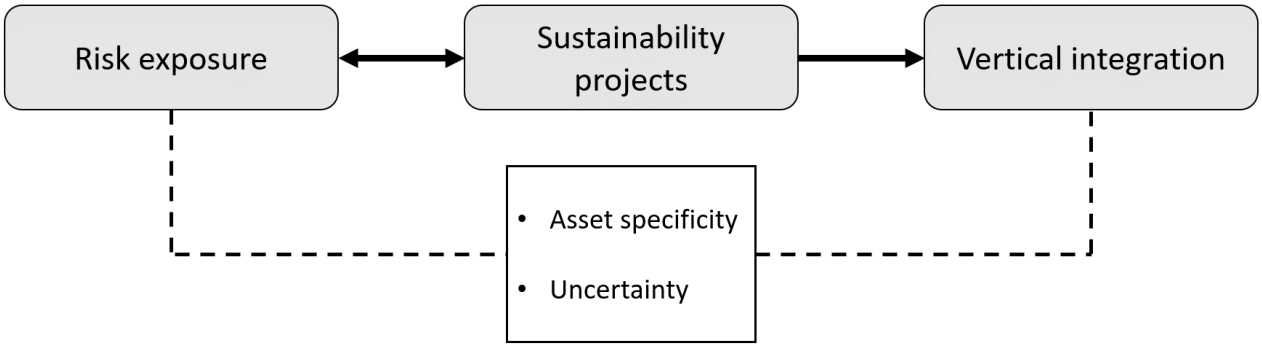

Figure 6: Conceptual framework

4.2. Case study and sample

Case study

The objective of the present research - to study the relationships between sustainability projects in the wine industry, supply chain vertical integration and risk exposure - is exploratory and requires a qualitative study appropriate to examine in depth how wine producers interact and cooperate with the supply chain partners and how to perceive risk after the adoption of sustainability projects. Qualitative researches do not aim to make a generalization to a larger population but to get an in-depth understanding of a phenomenon. (Dworkin, 2012). The selected case study for the research is VIVA, the Italian sustainability project for the wine industry described in paragraph 2.5. With 17% of world production, Italy is the first Wine producer in the world (OIV, 2019). VIVA was selected for its completeness, high level of detail, innovation and transparency. It is the only sustainability project promoted by the Italian Ministry of Environment. Differently, to the other Italian sustainability projects, the selected program aims to assess sustainability along all the chain integrating existing good practices and standard with the use of innovative indicators (vineyard and territory indicators). Additionally, VIVA publishes all the manuals and disciplinary on the website that is available to all the stakeholders. To conclude the certification has an innovative label with a QR code while the other sustainability projects have only a label with a sign (Corbo et al., 2014). See the table here below for the comparison between VIVA and the other Italian sustainability projects.

Table 7: Comparison of VIVA with other Italian sustainability programs in the wine industry (Corbo et al., 2014)

Aspects	Italian programs	VIVA
Integration of the sustainability dimensions	All the three dimensions of sustainability considered	Higher level of detail with creation of new social and economic indicators
Completeness in the boundaries definition	Assessment of vineyard and winery	Assessment of the whole supply chain
Practices, standard and indicators	Use of existing good practice and standard based on scientific point of view	Use of new indicators created ad-hoc for the certification (vineyard and territory) on a scientific base.
Transparency and communication	Majority of the programs do not publish their evaluation system to the public	Disciplinary, manuals and evaluation systems available on the website
Label	Sign on the label	QR code and sign

Sample

The sample has been randomly selected from the companies that are applying VIVA. The requirements for the selection are the participation to the sustainability project and the certification of a product, the organization or both. The identified companies satisfying these conditions were 37. The producers have been contacted by the researcher first during Vinitaly (the biggest wine fair in the world) from the 7th to 10th April 2019. This was an occasion to introduce the research project to the producers and to ask their availability to be interviewed. During the event, the researcher reached 23 producers. In the following days, the producers were contacted by email or by phone. The availability for the interviews with a decision maker or the responsible person for sustainability in the company was asked. 9 producers responded and gave their availability for the interview. Two interviews were held face to face, three by Skype and four by phone (see table 8). The interviews were done from April the 16th to May the 30th 2019. All the interviews have been recorded and every participant was aware that the researcher was recording the conversation.

Table 8: Overview of interviews with wine producers

Company	Interview Type	Role of the interviewed person	Time in the company for the interviewees	Duration
Producer 1	Phone	R&D responsible	8 years	35 min
Producer 2	Phone	Quality responsible	11 years	20 min
Producer 3	Phone	Operative director/ Quality responsible	17 years	20 min
Producer 4	Phone	Quality responsible	17 years	50 min
Producer 5	Skype	Owner	10 years	30 min
Producer 6	Skype	Agronomist/ Quality responsible	22 years	35 min
Producer 7	Face to face	Enologist/ brand responsible	10 years	1 hour
Producer 8	Skype	Owner/external relationships	30 years	45 min
Producer 9	Face to face	Sustainability and planning responsible	20 years	45 min

Table 9: Sample description with indication of the supply chain relationship that has been analysed in the research

Company	Region	# bottles per year	Application of VIVA	Transactions controlled	Transactions analysed
Producer 1	Umbria	1.000.000	2015	1, 2, 4[1]	3, 5
Producer 2	Umbria	130.000	2014	1, 2, 4	3, 6
Producer 3	Emilia Romagna	25.000.000	2017	2, 4	1, 5
Producer 4	Veneto	100.000.000	2017	4	2, 6
Producer 5	Piemonte	12.000	2013	1	4, 6
Producer 6	Umbria	2.7000.000	2017	1, 2, 4	3, 5
Producer 7	Veneto	350.000	2016	2, 4	1, 3, 5
Producer 8	Friuli Venezia Giulia	300.000	2013	1, 2, 4	3, 5
Producer 9	Emilia Romagna	3.200.000	2017	2, 4	1, 3, 6

[1]Refers to transactions in figure 7

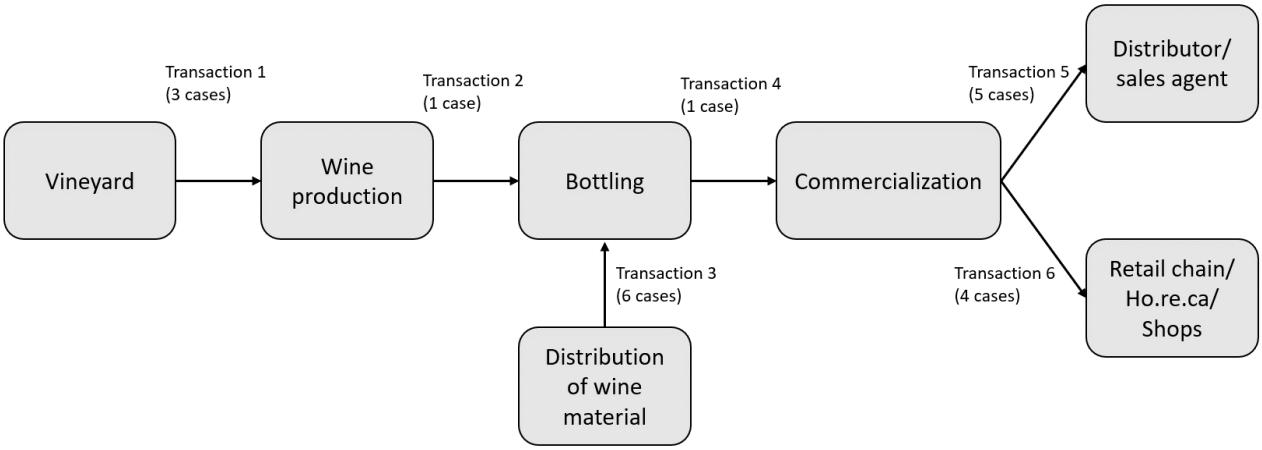

Figure 7: Overview of the transactions analysed with the interviews

All the respondents are owners of a wine brand (control of the commercialization stage). Each interview covered from 2 to 3 transactions depending on the supply chain stages controlled by the company and the information given by the respondents. Overall 20 transactions were analysed. The summary of the transaction analysed in the interviews can be found in figure 7. The respondents have different characteristics and control different stages of the supply chain (see table 9). Therefore, a description of the companies and their supply chain will be given hereafter.

- *Producer 1*: The company operates in the Umbria region and it produces about 1 million bottles per year. The producer applied VIVA in 2015 but sustainability has always been a concept applied in the company. It applies other sustainability projects. It controls all the steps of the supply chain from vineyard to commercialization. It sells the wines mainly to the big retail chains through a network of sales agents.
- *Producer 2*. The company operate in the Umbria region. It produces around 130.000 bottles per year. It applied to VIVA in 2014 considering sustainability for a longer period. It controls the processes from the vineyard to the commercialization using only grapes harvested in its vineyards. It sells the wine to catering companies or international airline companies directly.

- *Producer 3*: The company is in the Emilia Romagna region. It produces around 25 million bottles per year. It introduced VIVA in 2017. It buys all the grapes from cooperatives operating in the area and controls the stages from the production of the wine to the commercialization. The main suppliers are the suppliers of wine/grapes. It sells the wine through independent sales agents to ho.re.ca. and big retail chains.
- *Producer 4*: It is located in the Veneto region. It sells around 100 million bottles per year. It applied VIVA in 2017 but sustainability was already part of the company's policy. It buys wines all over Italy and controls the last steps of the wine production, bottling and the commercialization. The main suppliers are wine producers. It sells the wines directly to big retail chains and importers. Most of the revenues come from foreign markets.
- *Producer 5*: The company is located in the Piemonte region. It is a small producer selling around 12.000 bottles per year. The company was created in 2009 and the development of sustainability was pivotal from the beginning. It applied VIVA in 2013. It has its vineyard but the production of wine is performed by another producer. This producer of wine can be considered the main supplier. The company sells its wines through a local shop and contacts of the owner.
- *Producer 6*: It operates in the Umbria region. This company produces about 2.7 million bottles per year. Sustainability has always been considered by the company and the management decided to adhere to VIVA in 2017. It controls all the production steps from the vineyards to the commercialization. The company buys only 10% of the grapes from external producers. The most important suppliers are the producers of wine materials. It sells the wine to the big retail chains through sales agents or importers.
- *Producer 7*: The company operates in the Veneto region. It is part of a big cooperative producing about 32 million bottles per year. Only one brand of the cooperative applied VIVA in 2016. This brand has an independent production plant and it produces 350.000 bottles per year. The company buys grapes from the cooperatives member and it produces wine and commercializes it. This producer sells part of the wine directly and to ho.re.ca. through a network of independent sale agents.
- *Producer 8*: It operates in the Friuli-Venezia-Giulia region. The company applied VIVA in 2013 but sustainability development was already an important issue. It produces about 300.000 bottles per year controlling all the production stages from the vineyard to the commercialization. The main suppliers are the producers of the wine material. The company sells the wine through a network of independent sales agents mainly to the ho.re.ca.

- *Producer 9*: It is a cooperative operating in the Emilia-Romagna region. The organization produces about 3.2 million bottles per year. It applied VIVA in 2016. The company buys grapes or wines mainly from the members of the cooperative. This producer buys around 10% of the wine from other producers. It controls the stages of wine production, bottling and commercialization. It sells the wine to the big retail chains and to ho.re.ca.

4.3. Structured questions

Data has been collected through a semi-structured interview: a conversational style of interview that consists of a fixed start of questions and then flexible questions appropriate to the conversation (O'leary, 2004). This methodology gives the possibility to apply a pre-defined set of questions but also to personalise the interviews asking additional questions related to topics mentioned by the interviewees (Vaus, 2001). Some fixed questions were prepared before the interviews. The structure was followed during all the interviews adding some questions appropriate to the conversation with the aim to get more insights for the research. The questions are divided into four sections.

1. The first part focus on the general information concerning the interviewee, the company, the structure of the supply chain and the reasons for the adoption of the sustainability project.
2. The second part of the interviews has the aim to get insights on the level of integration with supplier and customers. This part aims to assess the level of supply chain vertical integration present and the effect of the adoption of the sustainability project on it. To assess the level of supply chain vertical integration, the measures used by Ghozzi et al. (2016) have been used. The transaction has been divided in formation, functioning and supervision. The first question refers to the formation part. It includes information about the setting of the relationship considering the selection of the supply chain partners and the duration of the contracts. The second question refers to the functioning of the relationship. The aim is to identify the level of collaboration present and the type of information exchanged (operational, organizational and strategic). The third question asses supervision. The purpose is to analyse the level of control and monitoring applied in the transaction. All the questions have been asked to evaluate both upstream and downstream integration.
3. The third section focus on the effect of the adoption of sustainability projects on asset specificity. Question about specific investments for sustainability in training, machinery, building, information systems or equipment have been done. This part of the interview

aims also to understand whether the efforts for sustainability are made independently or jointly with the supply chain partners.

4. The last section focuses on risks exposure. The aim is to get insights into the general risks of the wine industry and how they are affected by the adoption of the sustainability project. Part of this question also focuses on the risk in the relationships with the supply chain partners.

The complete structure of the questions can be found in the appendixes.

4.4. Data analysis

The interviews have been systematically analysed using thematic analysis. This is a methodology for qualitative research used to identify, analyse, organize, describe and report themes found within a data set (Nowell et al., 2017). A coding scheme has been developed for this study. The interviews have been analysed and coded manually using the program Microsoft Excel. The analysis consists of the following steps:

1. *Transcription*: The recorded interviews have been fully transcribed. The text has been organized following the structure of the questions used for the interviews.

2. *Organization of the text*: The content of each interview has been organized in a structured text in a worksheet of Microsoft Excel. Each question and answer of the interview have been reported with their related research hypothesis. The sentences have been split into cells according to their themes. Two or more following sentences of the interviewees referring to the same topic are grouped in the same cell.
   In this stage, a first selection of the text has been done according to the relevance of the answers. Suppositions, hypothesis and technical examples of the interviewees have not been considered. The aim is to consider just relevant information collected with the interviews.

3. *Organizations of the data:* Excel sheets for each research hypothesis have been created. The data are divided into questions and producers. The aim is to collate the answers of all the interviewees.

4. *Coding*: The coding scheme has been established and elaborated by the researcher. Each transcribed sentence or organized text has been examined numerous times. A first list of codes has been identified. This first list has been further elaborated into quantifiable codes.

5. *Defining themes*: The codes have been organized in themes and classified considering the variables described by the theoretical framework. Each answer counts and codes mention by only one producer are taken into consideration. Each producer can describe more than one code in each category. Codes not useful to reach the research objectives have not been considered. The themes with the coding rules are listed below and in table 10.
    - *Adoption:* In this theme, all the codes relative to the drivers for the adoption of sustainability projects were comprehended. The drivers have been divided into internal and external, taking into consideration paragraph 2.2.
    - *Risk exposure:* In this theme, all the codes describing the risks of the wine industry are considered. Risks are divided into internal, external and supply chain. The first part describes the general risks of the wine industry, the second the effect of the adoption of sustainability standards on risk exposure.
    - *Asset specificity:* In this theme, all the codes describe the effect of the adoption of the sustainability project on asset specificity. Codes describing internal investments or investments with suppliers or customers for sustainability have been grouped in this theme.
    - *Supply chain vertical integration*: In this theme, all the codes describing the relationship with suppliers and customers are comprehended. The codes are divided in formation, functioning and supervision, describing different parts of a transaction. A category describing the effect of the adoption of sustainability standard on supply chain vertical integration is included.
    - *Others*: This theme groups codes repeated various time by the respondents and not described by the previous ones. It considers only codes repeated by at least three producers.

Table 10: Description of the coding scheme divided by theme

Theme	Category	Codes	Code description
Adoption	**External drivers**	Demand of consumers	Mention of demand of sustainability projects/certification by the market
		Demand of Retail chains	Description of demand of sustainability project/certification by the retailers
		External activism	Mention of pressure by stakeholders
	Internal drivers	Strategic intentions	Description of intentions to improve the market position or access to new markets through sustainability
		Philosophy or ethical reasons of the management	Mention of adoption of sustainability projects due to personal decision or philosophy of the management
		Reduce cost of energy	Description of the intention of cost reduction thanks to energy saving
		Product improvements	Mention of purpose to improve products or processes through sustainability
Risk exposure	**External**	Availability of raw materials	Mention of risks of availability of raw materials or problems related to bad seasons
		Market position in case of bad seasons	Description of adverse effects in case of bad season on market position (for example price, quantity supplied)
		Volatility of demand	Description of uncertainty caused by consumers demand
		Volatility of foreign markets	Mention of instability of foreign markets.
		Price volatility	Mention of price instability as source of risk
	Internal	Production risks	Description of risk related to the production process.
	Supply chain	Power of retail chains	Mention of risks arising from the requirements of the big retail chains
		Dependency from the relationship with partners	Description of risks due to the dependency to the supply chain partner. Partners are interdependent and therefore there is uncertainty in the transaction
		Low risk with partners	Mention of low risk in the relationship with partners for high availability of partners/ materials or for trust in the relationship
Effect of the sustainability projects on risk exposure	**External**	Sustainability improves market position (-)[1]	Description of a reduction of risks for an improvement of market position, brand image or communication of the activity of the company
		More data availability reduces risks (-)	Mention of a reduction of risks due to the availability of more data after the adoption of sustainability
		Higher vulnerability to bad seasons (+)	Description of a rise of risks due to the application of sustainable/biological agriculture that increases the vulnerability to bad seasons
		Stakeholders appreciate sustainability (-)	Mention of appreciation by stakeholders of engagement in sustainability practices
		No effect on risk	Description of no effects of the adoption of the adoption of sustainability on risk exposure
	Internal	Cost reduction for energy saving (-)	Mention of growth of profit thanks to energy saving.
		Product quality improvements (-)	Mention of enhancement of product quality for sustainability
	Supply chain	Cost of sustainability without remuneration (+)	Describes a demand of sustainability from customers. Producers increase their costs for sustainability without a growth in prices
Asset specificity	**Internal**	Investments in equipment, machinery or technology for sustainability	Mention of investments to implement the certification in equipment, machinery or technology
		Investments in sources of renewable energy	Mention of investments in sources of green energy or to reduce energy consumption
		Training through internal communication	Mention of formation/training of the personnel through internal communication or meetings

		Internal investments not only for sustainability	Description of investments done not only with the purpose of sustainability but also for other reasons
		Investments in marketing	Description of creation of activities or material as marketing strategy after sustainability
	External	No effect on external asset specificity	Description of situation unchanged with the supplier of material
		Communication, training or informative material for supplier of wine or farmers	Mention of activities of communication, creation of informative material or training with farmers or wine suppliers.
Supply chain integration	**Formation**	Best market condition/ no contracts	Mention of selection of the best conditions on the market without written contracts. It describes no-recurrent transactions between unknown actors
		No contracts or short-term contracts with reliable partners	Description of relationships based on short-term contracts or just orders with reliable/known supply chain partners
		Long term contracts with reliable partners	Description of a long-term contracts with reliable supply chain partners. Companies collaborate always with the same trusted partners
	Functioning	Exchange relationship	Mention of communication of only price, quality and quantity information. Goods are exchanged at current prices.
		Communication and support	Mention of a relationship with support and communication. Not only operational information is given but also further information
		Partnership and common decisions	Description of a relationship with independent parties but taking common decision. Partners have frequent transactions but the ownership of the assets is separate
	Supervision	Not present/ in case of problems	Description of control and monitoring activities not present. Control is done just in case of problems with the material exchanged
		Control of the performance	Mention of monitoring activities of partners' performance indicators
		Coordination and meetings	Mention of monitoring activities through coordination and meetings with the partners
		Monitoring of all the materials	Mentions of monitoring of all the materials/activities involved in the transaction
		Monitored by the partners	Description of a situation with the respondent monitored by the supply chain partner
Effect of the adoption of the sustainability project		New partners introduced	Mention of contacts or contracts with new suppliers/ customers to implement sustainability
		Modification of materials exchanged	Mention of modification of the materials exchanged but maintaining the same suppliers/ customers
		Increased communication and support	Description of creation of new communication channels or creation of dedicated material in order to give support or communicate the theme of sustainability
		No effects on transaction organization	Description of an unchanged transaction organization after the adoption of the sustainability project
Others		Sustainability already part of the company	Mention of sustainability strategies already in practice before the adoption of the sustainability project
		Confusion of sustainability concept on the market	Description of confusion on the market about the sustainability concept
		Sustainability new topic in the wine industry	Description of sustainability at an initial stage in the wine industry

[1]+= risk growth, -=risk reduction

5. Results

The results are organized in five paragraphs. The first paragraph describes the reasons for the adoption of sustainability projects. The second paragraph focuses on risk exposure in the wine industry and the effects of the adoption of the sustainability project on it. The third describes the changes in asset specificity and transaction uncertainty after the adoption of VIVA. The fourth paragraph aims to describe supply chain vertical integration divided by transactions. To end, the last paragraph describes the theme "others".

5.1. Adoption of the VIVA "Sustainability and culture"

When asked about the reasons that led to the adoption of the sustainability project, respondents mentioned more internal drives than external ones (see figure 8). The adoption of VIVA because of personal decision or the philosophy of the management was mentioned by 7 interviewees. Furthermore, 4 producers adopted VIVA with the purpose to improve their market position or to access to new markets. This pattern was described by producer 6: *"The owner of the company strongly believes in the importance of sustainability and in the respect of the territory where the company is operating […] the more a company is sustainable, the better its image is on the market compared to others. Therefore, we want to spend sustainability also on the market".* Instead, 2 producers reported that, with the implementation of sustainability, they intended to reduce the cost of energy and therefore to increase profit. Only one respondent aims to improve product quality through sustainability. As for external drivers, they were considered by 4 respondents, particularly 3 mentioned growth in consumers demand for sustainable products or certifications while 2 companies, supplying directly big retails chains, faced an increase in their demand for sustainability. That's how Producer 4 explained the increasing demand that led them to adopt VIVA: *"[…] we have seen over the years growth of the sustainability requirements of the market and of the large retail chains that we supply.".* Instead, only one interviewee described external activism of people living near the company as a reason for the adoption of the sustainability project.

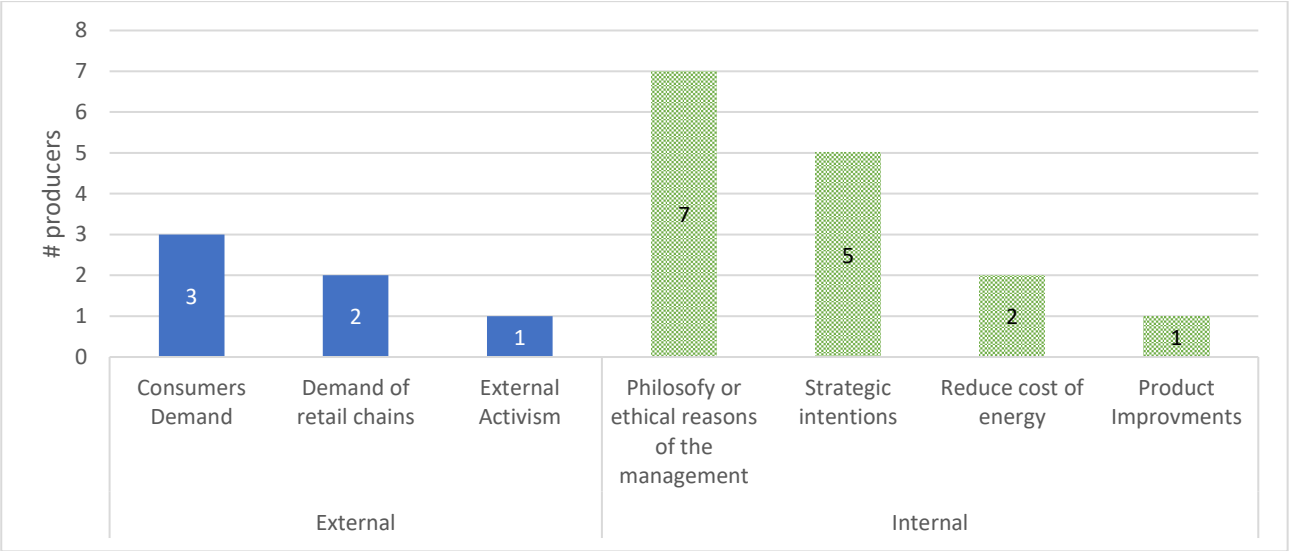

Figure 8: Overview of the main drivers for the adoption of the sustainability project (n=9)

5.2. Risk exposure in the wine industry

This paragraph will describe the main risks of the wine industry first and then the effect of the adoption of the sustainability project on them.

Most of the interviewees identified external sources of risks (see figure 9). 5 producers mentioned the availability of raw materials and seasonal evolution as the main threats for the wine industry; while the effect of bad seasons on market position, affecting prices and quality, was reported by 3 respondents. Producer 1 describes this pattern: *"The main problem of viticulture is that we depend on seasonal variability. […] difficult seasons are reflected also with problems on the market."*. Demand and price volatility were also described: the former by 3 producers, while the second by 2. The volatility of foreign markets was mentioned as a threat by 2 participants. Only 2 interviewees identified internal risks describing possible problems with wine production.

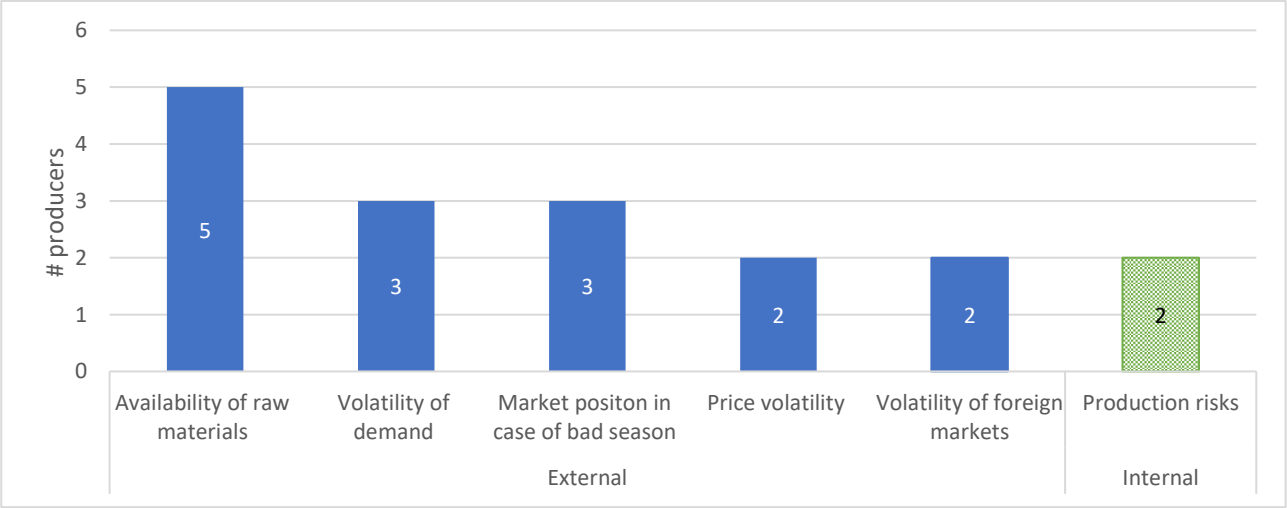

Figure 9: Overview of the risk exposure in the wine industry (n=9)

Most of the respondents believe that the adoption of the sustainability project reduces risk exposure (see figure 10). A decrease of uncertainty for improvements in market position or brand image was mentioned by 6 producers. Producer 5 explained: *"Sustainability improves the perception of customers: they are more sensitized to the topic and find an added value in our wines. They are encouraged to buy a sustainable bottle instead of a normal one for the story around".* Moreover, 2 respondents described that stakeholders appreciate sustainability and it improves the reputation of the company. 2 interviewees explained that the adoption of VIVA reduces risk because it requires improved data collection, supporting decisions. Considering internal risk, a respondent mentioned that sustainability increases income thanks to energy savings and another asserted that it increases product quality. Instead, 3 respondents believe that sustainability increases risk exposure for the higher exposition to bad seasons. Finally, only one producer believed that sustainability does not affect risk exposure.

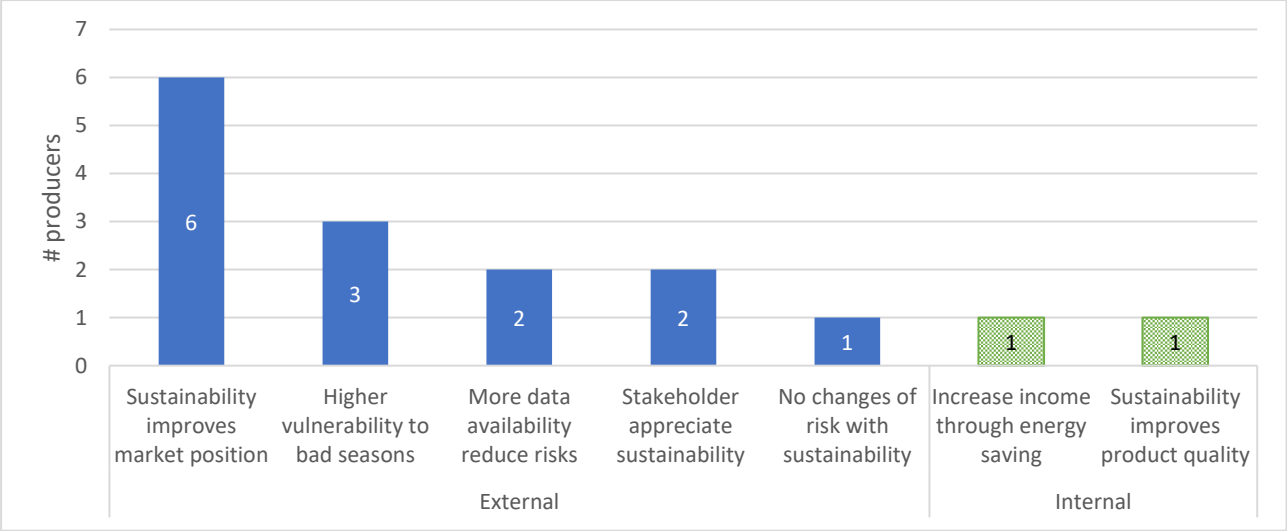

Figure 10: Overview of the effect of the adoption of the sustainability project on risk exposure (n=9)

5.3. Asset specificity and uncertainty

This paragraph will focus on the effect of the adoption of the sustainability project on the transaction attributes asset specificity and uncertainty. Transaction uncertainty has been analysed considering the codes for supply chain risks. First asset specificity will be described followed by uncertainty.

Respondents have invested only internally to implement sustainability. After the adoption of VIVA producers invested in physical assets, sources of renewable energy and internal training to implement sustainability in their activity. Furthermore, investments in marketing to promote sustainability were indicated by 2 producers. Other producers explained that investments are not made with the only aim to implement sustainability. This concept can be summarized by the quote

of producer 4: *"Investments are an interchange of different environments. It is not true that an investment in machinery will be efficient, economic and sustainable. But it is true that it will be never only efficient or only sustainable".* Considering external asset specificity, all the producers made no joined investments with supply chain partners. Therefore, in the sample, there is no growth in external asset specificity.

Respondents described a low level of uncertainty in transaction 1, 3, 4 and 5 because of the high availability of materials, the high availability of partners or for the high level of trust present with the partners. Uncertainty in transaction 2 was described as medium by producer 4 due to the dependency from the producers of wine. Instead, in transaction 6 high level of uncertainty for the high bargaining power of big retail chains was described by 2 producers. No respondents mentioned any effect of the adoption of the sustainability project on uncertainty in transaction 1, 2, 3, 4 and 5. Instead, in transaction 6 an increase in uncertainty was mentioned by 2 respondents. Retailers request sustainability to wine producers without any growth in price. Producer 4 described the uncertainty in transaction 6: *"Large retail chains make use of their important commercial role to acquire margins and best product at the best cost".*

5.4. Supply chain vertical integration

In this paragraph, the level of supply chain vertical integration divided by transactions (figure 11) will be described. A company will be considered fully integrated when it controls the transaction internally (hierarchical form). Spot market is considered with non-recurrent transactions within unknown partners. Finally, hybrid is considered with recurrent transactions within known partners but without shared ownership of assets. The results are summarized in table 11.

Transaction 1: vineyard/wine production. This transaction was analysed in 3 interviews while 5 companies controlled it internally. Producers 7 and 9 are cooperatives and buy grapes from their members. These transactions have been coded as hybrid because they are based on long term contracts with the exchange of grapes at a yearly agreed price. The cooperatives organize meetings with the members giving technical support. Producer 3, instead, buys grapes from external local farmers and the transaction is based on short term contracts. This respondent describes a relationship where only operational information is exchanged and where all the products are controlled. This is a highly integrated transaction because 5 companies organize it internally, while 3 companies described a "Hybrid" governance structure.

Considering the effect of the adoption of the sustainability project on supply chain vertical integration the effect is marginal. There are no effects for the producers managing the vineyard

internally, while for the cooperatives there is an increase in technical support to farmers for sustainable development.

Transaction 2: wine production/bottling. The transaction between wine production and bottling was analysed in one interview while 7 producers control it internally. The analysed case describes a long-term relationship with reliable suppliers. The parties, while staying legally independent, take some common decisions such as the production of the type of wine and work in partnership. The quality of all the material exchanged is controlled. This transaction has been classified as "hybrid" in the analysed case.

The adoption of the sustainability standard increased the communication of the theme of sustainability to the suppliers. Producer 4 explained: *"...with the occasion of the adoption of VIVA, we have started to communicate the theme of sustainability to our suppliers and to sensitize them."*.

Transaction 3: wine material/bottling. None of the respondents manage this transaction internally and it has been analysed in 6 interviews. This transaction is the closest to a "spot market" governance form. Most of the respondents described it as an exchange relationship with only operational information exchanged with no contract or short-term contracts. Monitoring is not present or it is done just in case of problems with materials. However, the transaction is repetitive with known suppliers. Therefore, even if some features of "spot market" governance structure are present, it is described as a "hybrid" relationship.

The adoption of VIVA hasn't modified the organization of the transaction. Companies buy the materials from the same suppliers and in some cases, they exchange more sustainable materials. The situation can be described by this sentence of producer 8: *"... our long-term partners were already committed with sustainability and we didn't change the material exchanged"*.

Transaction 4: bottling/ commercialization. This transaction has been analysed in one interview, while 8 respondents control it internally. Producer 5 described a relationship based on trust without any written agreement. The decisions are taken together with the suppliers and the monitoring is made through communication and meetings. The adoption of the sustainability project didn't have any effect on the level of supply chain vertical integration because the producer was already sustainable. The transaction is organized with a "hybrid" structure.

Transaction 5: commercialization/distributor. The distribution of wine through intermediaries, such as sales agents and importers, has been analysed in 5 interviews. The respondents illustrated a relationship with reliable partners with either long or short contracts. The relationship is mainly

based on communication and support to the distributors. The respondent described a "hybrid" governance form with repetitive transactions with known suppliers but with independent actors. After the adoption of the sustainability standard, wine producers increased the support and the communication with the distributors such as the creation of supportive material or organization of ad-hoc meeting to give information about sustainability. The pattern is summarised by this quote of producer 8: *"I involve the sales agents once a year with a big meeting. […] for sustainability, I have created a book in order to train our agents and to give them the same instruments and information".*

Transaction 6: commercialization/retailing. The distribution of the wine directly to retail chains, shops or ho.re.ca. has been analysed in 4 interviews. The respondents described a "hybrid" transaction form. They described a relationship based on orders without any written contract. In two cases a relationship with an exchange of just operational information was described. A producer 4 mentioned a situation where partners work in partnership explaining that "*[…] retail chains do select and monitor wine producers. Suppliers are honoured to be selected and try to fulfil all the requirements".* A respondent, instead, illustrated a relationship based on communication and support. The adoption of VIVA did not affect the organization of the relationship. In two cases, the producers increased support in order to communicate the required information to the final consumers. The others did not face any change for the adoption of the project.

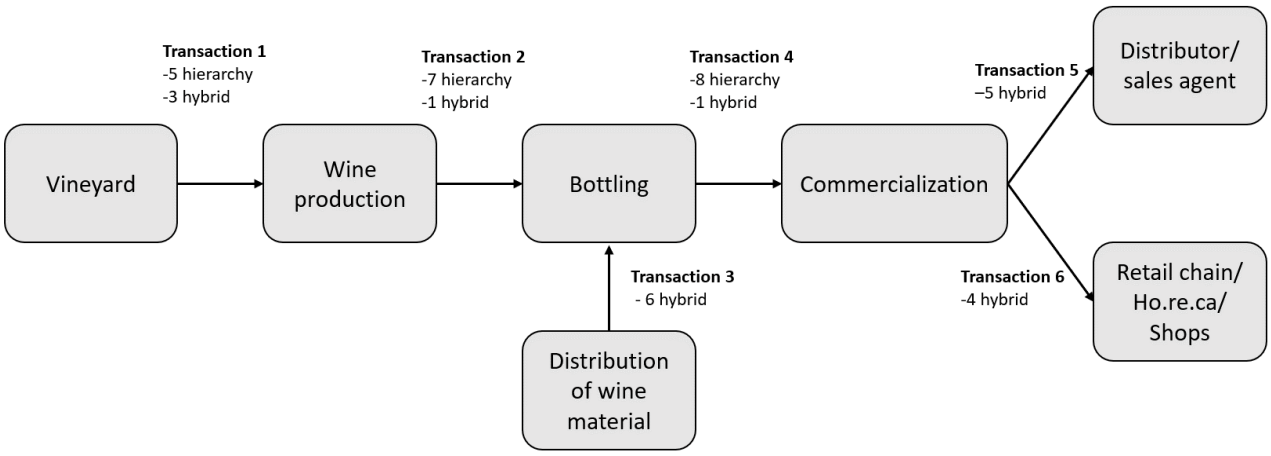

Figure 11: Overview of the governance structures described in each transaction

Table 11: Overview of the results for the theme supply chain vertical integration divided by transaction

Transaction	Category	Codes	# of producers
Vineyard/wine production.	Formation	Long term contracts with reliable partners	2
		No contracts/ short term contracts with reliable partners	1
	Functioning	Communication and support	2
		Exchange relationship	1
	Supervision	Monitoring all the materials	2
		Coordination and meetings	2
	Effect of the sustainability project	Increased communication and support	2
Wine production/ bottling	Formation	Long term contracts with reliable partners	1
	Functioning	Partnership and common decision	1
	Supervision	Monitoring all the materials	1
	Effect of the sustainability project	Increased communication and support	1
Wine material/ Bottling	Formation	Long term contracts with reliable partners	1
		No contracts/ short term contracts with reliable partners	5
	Functioning	Exchange relationship	6
	Supervision	Not present/ in case of problems	4
		Monitoring all the materials	1
		Coordination and meetings	1
	Effect of the sustainability project	Modification of material exchanged	3
		No effect on transaction organization	3
Bottling/ Commercialization	Formation	No contracts with reliable partners	1
	Functioning	Partnership and common decisions	1
	Supervision	Coordination and meetings	1
	Effect of the sustainability project	No effect on transaction organization	1
Commercialization /distributor	Formation	Long term contracts with reliable partners	3
		No contracts/ short term contracts with reliable partners	2
	Functioning	Communication and support	4
		Exchange relationship	1
	Supervision	Coordination and meetings	3
		Monitoring not present	1
		Control of the performance	1
	Effect of the sustainability project	Increased communication and support	5
Commercialization/ retailing	Formation	No contracts/ short term contracts with reliable partners	4
	Functioning	Exchange relationship	2
		Partnership and common decisions	1
		Communication and support	1
	Supervision	Monitored by the partners	2
		Monitoring not present	1
		Coordination and meetings	1
	Effect of the sustainability project	Increased communication and support	2
		No effect on transaction organization	2

5.5. Results for the theme "Others"

This theme grouped codes repeated various time by the respondents and not described by the previous categories. These codes describe the stage of sustainability in the wine industry. 5 producers mentioned that they were already applying sustainability in their activities before the adoption of VIVA. 3 producers described confusion on the market about the sustainability concepts. Producer 5 described the confusion on the market: *"Consumers pay more attention to organic logos instead of sustainability one. They don't know that sustainability is a wider concept.".* Finally, 3 producers mentioned that sustainability in the wine industry is still in an initial stage.

6. Discussion and conclusions

6.1. Discussion

The research aims to study the relationship between sustainability projects in the wine industry, supply chain vertical integration and risk exposure. The conceptual framework applied in this research integrates the transaction cost economics and the findings of the literature review. Most of the previous studies assessing the drivers for the adoption of sustainability project in the wine industry suggested personal values of the management as main drivers (for instance in Delmas & Gergaud, 2014; Gabzdylova et al., 2009; Gilinsky et al., 2016). This research confirmed that wine producers adopted VIVA mainly driven by philosophy and ethical reasons of the management. Once committed to sustainability, decision makers were found to spend their efforts on the market to improve their position. Other authors suggested that wine companies participate in sustainability projects reacting to a complex external environment. (Flint et al., 2011; Golicic et al., 2017). The results of this research specified that wine producers adopted VIVA driven by external pressure when supplying directly large retail chains (transaction 6). Large retail chains have strong bargaining power and can influence the decisions of wine producers (Fuchs et al., 2009). Facing growth of demand for sustainability from their customers, respondents in this research were found to adopt the sustainability project. In summary, this research suggests that wine producers adopt sustainability projects mainly for internal drivers, while producers supplying directly large retail chains face also external pressure, namely market demand.

As for the relationship between sustainability projects and risk exposure, various authors claim that sustainability increases the risk faced by companies. For instance, the reaction of stakeholders can create an adverse effect on the company (Giannakis & Papadopoulos, 2016; Hofmann et al., 2014). On the contrary, this research has found that the adoption of the sustainability project improves the image and the reputation of the company thereby reducing external risk. Moreover, the results of this research are in line with the findings of Gilinsky et al. (2015) and Delmas & Grant (2014) claiming that the adoption of sustainability projects improves market position and product quality, presuming a reduction of risk exposure. Additionally, the participants described a more accurate data collection required by VIVA supporting decision making and suggesting a decrease in uncertainty. On the other hand, the application of sustainability practices in the vineyard was found to increase the perception of the vulnerability to a bad season. The exposition to seasonality and the adverse effects that it has on the availability of raw materials, on quality of wines and on market position were found to be the main risk faced by wine producers.

Concerning transaction uncertainty, Foerstl et al. (2010) argue that sustainability can create risk due to the potential irresponsible behaviour of supply chain partners. Producers in this research described an unchanged situation concerning supply chain risk exposure: after the participation to VIVA, they merely increased training and support with wine and grapes producers (transaction 1 and 2). Furthermore, this research identified a high level of uncertainty in the relationship with large retail chains (transaction 6) due to their bargaining power and ability to influence wine producers' decisions. With the introduction of sustainability, wine producers face an increase in cost without any reward in price from the retail chains. Furthermore, TCE (Williamson, 1985) assume a higher level of asset specificity after the adoption of a sustainability project. An increased asset specificity predicts higher dependency to the supply chain partners. The results of this research were found to be in line with Grekova et al. (2014), suggesting that in the initial stage producers develop sustainability only in their internal processes without making interdependent investments with the supply chain partners.

Considering the relationship between sustainability projects and supply chain vertical integration, various authors suggested that a higher level of supply chain vertical integration is required to implement sustainable supply chains (Annunziata et al., 2018, Flint, & Golicic, 2009, Pagell & Wu, 2009). Also, transaction cost theory expects growth in the degree of supply chain vertical integration, due to the modification of the transaction characteristics and, therefore, transaction costs (Ménard, 2004, Williamson, 1985). On the contrary, the findings of this research suggested that the adoption of VIVA hasn't affected transaction characteristics and supply chain vertical integration. This might be explained by three reasons. First, in the Italian wine industry, sustainability was found to be still in an initial stage. The results were in line with Szolnoki (2017) suggesting that on the market there is confusion around the concept of sustainability often mixed with organic or biodynamic by both producers and consumers. Consequently, companies have just started to communicate the theme to their supply chain partners. Secondly, many companies were already found to apply sustainable practices before the adoption of VIVA. Therefore, a real effect on the organization of the transactions could not be observed. Lastly, the Italian wine sector is already highly integrated. Fernández-Olmos et al. (2009) suggested that high-quality wineries are more likely vertically integrated into the supply chain. In the analysed case, companies were found to be already vertically integrated before the adoption of the sustainability project controlling the vineyard and wine production internally. From these findings, it can be presumed that highly integrated wine producers are more willing to adopt sustainability projects.

This research found that in the Italian wine industry there is a high level of supply chain vertical integration, the concept of sustainability is an introductory stage and that the participation to VIVA

decreases risk exposure. These results and findings must be understood in the context of the industry and country considered for this research and may do not apply to other sectors. The sample considers only Italian companies participating to the VIVA project that was found to be different from other sustainability initiatives for the level of detail, for its completeness and because it is the only one promoted by the Italian Ministry of Environment. Additionally, in qualitative researches, saturation is the main concept in the decision of the sample size. Saturation is defined as "the point at which data collection process no longer offers any new or relevant data" (Dworkin, 2012). This research has not applied this principle because of the limited response of wine producers participating in the project. A wider sample considering other Italian or international sustainability projects might be more representative of the wine sector. An additional limitation of this study lies in the specific position each informant has in the company. For instance, interviews with different employees, such as a responsible for sustainability and a commercial manager, could improve the study validity considering the point of view of diverse expertise.

This study used semi-structured interviews to explore in depth the relationship between sustainability project, supply chain vertical integration and risk exposure in the wine industry. A limitation of the qualitative nature of this case study is the impossibility to make valid statistical generalization beyond the analysed case (Vaus, 2001). Testing the conceptual framework and the findings of this research through a quantitative study might be beneficial to get results expandable to the whole wine industry. Moreover, interviews were done through different channels. Face to face and Skype interviews were found to be longer compared to phone interviews. The standardization of the channel might improve the consistency and accessibility of the information; face to face interviews were found to be the best channel allowing to collect more information from the participants.

Considering the theoretical framework, the research applied only transaction cost economics (TCE). As discussed by Halldórsson et al. (2015), it is impossible to fully describe the complex concept of supply chain integration with the application of only one theory and, therefore, it is important to integrate other theories among those discussed in paragraph 3.4. Moreover, this research considered only 3 different governance structures: the use of more levels midway-between spot market, hybrid and hierarchy might improve the measurement of the degree of supply chain vertical integration enhancing the precision of the classification.

6.2. Conclusions

This research aimed to study the relationship between sustainability projects, supply chain vertical integration and risk exposure in the wine industry, focusing on the companies participating to VIVA (Italian Voluntary Sustainability Project). Specifically, the study answered the following sub-objectives:

Sub-objective 1- To review the relationship between sustainability projects in food supply chains, vertical integration and risk exposure.

Collaboration with supply chain partners is found to be crucial for the success of sustainability projects, for sustainable development along the whole supply chain, to gain competitive advantage and to reduce the cost of sustainability. Additionally, collaboration with suppliers and customers is found to improve both financial and sustainability performance of the whole supply chain. Concerning the relationship between sustainability projects and risk exposure, companies were found to adopt sustainability projects mostly driven by an external complex environment. Sustainability increases supply chain reputational risks and the reaction of the companies' stakeholders can trigger negative consequences for the firm. Lastly, sustainability generally decreases supply chain risks because it requires a higher degree of supply chain vertical integration.

Sub-objective 2- To analyse the relationship between sustainability projects in the wine sector and supply chain vertical integration.

The participation to the VIVA project has not affected the degree of supply chain vertical integration. Wine producers were found to be already highly integrated into the supply chain before the adoption of the sustainability project: 5 out of 9 respondents and 7 out of 9 were controlling respectively the vineyard and wine production internally. Additionally, sustainability was found to be still in an introductory stage in the Italian wine industry with confusion around the concept on the market. Furthermore, most of the companies participating to the project were already applying sustainability practices. Therefore, it is difficult to observe any effect on supply chain vertical integration.

Sub-objective 3- To analyse the relationship between sustainability projects and supply chain risk exposure.

This research studied both the role of external risk driving the adoption of the sustainability project and the way the participation to VIVA changes risk exposure. Respondents were found to adopt

VIVA mainly driven by internal reasons, while only wine producers supplying directly to large retail chains adopted the sustainability project driven by external risk.: retailers have strong bargaining power in the supply chain and request sustainability to their wine suppliers. Considering the effect on risk exposure, the participation to the sustainability project was found to decrease it, improving market position and the reputation of the company. Moreover, VIVA requires more data collection supporting decision making and presuming a risk reduction. Additionally, the application of sustainable practices in the vineyard was found to increase the perception of the vulnerability to bad season, suggesting a possible growth of external risk.

6.3. Further research

Despite the small size of the sample, this study has provided new insights into the relationship between sustainability project, supply chain vertical integration and risk exposure in the wine industry, such as the high level of supply chain vertical integration present in the wine industry, the novelty of the concept of sustainability in the context of the Italian wine industry and the fact that the participation to VIVA decreases risk exposure. These findings need further investigation to improve statistical generalization and widen the results to the whole industry. Further research could extend the sample including other Italian and international sustainability projects in the wine industry and examine it through a semi-structured interview, applying the saturation concept in selecting the sample size or making use of a close-ended questionnaire (i.e. Likert scale). Moreover, this research suggested a possible relationship between the level of vertical integration and the likelihood to adopt sustainability projects. Further researches could deepen this intuition and study whether highly integrated producers are more willing to adopt sustainability projects. Furthermore, the conceptual framework applied in this research considers only transaction cost economics. The framework could be implemented by integrating other theories analysed in paragraph 3.4. For example, the resource-based view would match with the findings of this research since respondents were found to improve their market position with the adoption of VIVA. Further researches could study whether sustainability projects and the high level of supply chain vertical integration are a source of competitive advantage.

References

Anderson, D. R., & Anderson, K. E. (2009). Sustainability risk management. Risk Management and Insurance Review, 12(1), 25-38.

Annunziata, E., Pucci, T., Frey, M., & Zanni, L. (2018). The role of organizational capabilities in attaining corporate sustainability practices and economic performance: Evidence from Italian wine industry. Journal of Cleaner Production, 171, 1300-1311.

Banterle, A., & Stranieri, S. (2008). The consequences of voluntary traceability system for supply chain relationships. An application of transaction cost economics. Food Policy, 33(6), 560-569.

Barber, N., Taylor, C., & Strick, S. (2009). Wine consumers' environmental knowledge and attitudes: Influence on willingness to purchase. International Journal of Wine Research, 1, 59-72.

Beske, P., Land, A., & Seuring, S. (2014). Sustainable supply chain management practices and dynamic capabilities in the food industry: A critical analysis of the literature. International journal of production economics, 152, 131-143.

Casini, L., Cavicchi, A., Corsi, A., & Santini, C. (2010). Hopelessly devoted to sustainability: marketing challenges to face in the wine business. In Proceedings of the 119th EAAE Seminar 'Sustainability in the Food Sector: Rethinking the Relationship between the Agro-Food System and the Natural, Social, Economic and Institutional Environments., Capri, Italy, June, 30th–July, 2nd.

Castellucci, F. Resolution CST 1/2008, OIV Guidelines for Sustainable Vitiviniculture: Production, Processing and Packaging of Products. Available online: http://www.oiv.int/en/technical-standards-and-documents/good-practices-guidelines/oiv-guidelines-for-sustainable-vitiviniculture .

Chen, L., Zhao, X., Tang, O., Price, L., Zhang, S., & Zhu, W. (2017). Supply chain collaboration for sustainability: A literature review and future research agenda. International Journal of Production Economics.

Chicksand, D., Watson, G., Walker, H., Radnor, Z., & Johnston, R. (2012). Theoretical perspectives in purchasing and supply chain management: an analysis of the literature. Supply Chain Management: An International Journal, 17(4), 454-472.

Corbo, C., Lamastra, L., & Capri, E. (2014). From environmental to sustainability programs: a review of sustainability initiatives in the Italian wine sector. Sustainability, 6(4), 2133-2159.

Cruz, J. M. (2013). Mitigating global supply chain risks through corporate social responsibility. International Journal of Production Research, 51(13), 3995-4010.

David, R. J., & Han, S. K. (2004). A systematic assessment of the empirical support for transaction cost economics. Strategic management journal, 25(1), 39-58.

Delmas, M. A., & Gergaud, O. (2014). Sustainable certification for future generations: The case of family business. Family Business Review, 27(3), 228-243.

Delmas, M. A., & Grant, L. E. (2014). Eco-labeling strategies and price-premium: the wine industry puzzle. Business & Society, 53(1), 6-44.

Dworkin, S. L. (2012). Sample size policy for qualitative studies using in-depth interviews.

Elkington, J. (1998). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. Environmental Quality Management, 8(1), 37-51.

Fernández-Olmos, M., Rosell-Martínez, J., & Espitia-Escuer, M. A. (2009). Vertical integration in the wine industry: a transaction costs analysis on the Rioja DOCa. Agribusiness: An International Journal, 25(2), 231-250.

Flint, D. J., & Golicic, S. L. (2009). Searching for competitive advantage through sustainability: A qualitative study in the New Zealand wine industry. International Journal of Physical Distribution & Logistics Management, 39(10), 841-860.

Flint, D. J., & Signori, P. (2014). Environmental Sustainability and the Supply Chain: Is Collaboration Necessary?. In 26th Conference Of The Nordic Logistics Research Network on Competitiveness through Supply Chain Management and Global Logistics (pp. 11-13).

Flint, D. J., Golicic, S. L., & Signori, P. (2011). Sustainability through resilience: The very essence of the wine industry. In 6th AWBR international conference.

Flynn, B. B., Huo, B., & Zhao, X. (2010). The impact of supply chain integration on performance: A contingency and configuration approach. Journal of operations management, 28(1), 58-71.

Foerstl, K., Reuter, C., Hartmann, E., & Blome, C. (2010). Managing supplier sustainability risks in a dynamically changing environment—Sustainable supplier management in the chemical industry. Journal of Purchasing and Supply Management, 16(2), 118-130.

Fuchs, D., Kalfagianni, A., & Arentsen, M. (2009). Retail power, private standards, and sustainability in the global food system. Corporate power in global agrifood governance, 29-59.

Gabzdylova, B., Raffensperger, J. F., & Castka, P. (2009). Sustainability in the New Zealand wine industry: drivers, stakeholders and practices. Journal of Cleaner Production, 17(11), 992-998.

Gallucci, C., & D'Amato, A. (2013). Exploring nonlinear effects of family power on the performance of Italian wine businesses. International Journal of Wine Business Research, 25(3), 185-202

Ghozzi, H., Platoni, S., Tillie, P., & Soregaroli, C. (2018). TCE determinants and governance forms in the EU "Non-GMO" soybean supply chain. Food Policy, 78, 68-80.

Ghozzi, H., Soregaroli, C., Boccaletti, S., & Sauvée, L. (2016). Impacts of non-GMO standards on poultry supply chain governance: transaction cost approach vs resource-based view. Supply Chain Management: An International Journal, 21(6), 743-758.

Giannakis, M., & Papadopoulos, T. (2016). Supply chain sustainability: A risk management approach. International Journal of Production Economics, 171, 455-470.

Gilinsky Jr, A., Newton, S. K., & Vega, R. F. (2016). Sustainability in the global wine industry: concepts and cases. Agriculture and agricultural science procedia, 8, 37-49.

Gilinsky, Jr, A., Newton, S. K., Atkin, T. S., Santini, C., Cavicchi, A., Casas, A. R., & Huertas, R. (2015). Perceived efficacy of sustainability strategies in the US, Italian, and Spanish wine industries: A comparative study. International Journal of Wine Business Research, 27(3), 164-181.

Gimenez, C., & Tachizawa, E. M. (2012). Extending sustainability to suppliers: a systematic literature review. Supply Chain Management: An International Journal, 17(5), 531-543.

Gold, S., Seuring, S., & Beske, P. (2010). Sustainable supply chain management and inter-organizational resources: a literature review. Corporate social responsibility and environmental management, 17(4), 230-245.

Golicic, S. L., Flint, D. J., & Signori, P. (2017). Building business sustainability through resilience in the wine industry. International Journal of Wine Business Research, 29(1), 74-97.

Gouda, S. K., & Saranga, H. (2018). Sustainable supply chains for supply chain sustainability: impact of sustainability efforts on supply chain risk. International Journal of Production Research, 56(17), 5820-5835.

Grekova, K., Bremmers, H. J., Trienekens, J. H., Kemp, R. G. M., & Omta, S. W. F. (2014). Extending environmental management beyond the firm boundaries: An empirical study of Dutch food and beverage firms. International Journal of Production Economics, 152, 174-187.

Grekova, K., Calantone, R. J., Bremmers, H. J., Trienekens, J. H., & Omta, S. W. F. (2016). How environmental collaboration with suppliers and customers influences firm performance: evidence from Dutch food and beverage processors. Journal of cleaner production, 112, 1861-1871.

Halldórsson, Á., Hsuan, J., & Kotzab, H. (2015). Complementary theories to supply chain management revisited–from borrowing theories to theorizing. Supply Chain Management: An International Journal, 20(6), 574-586.

Hoemmen, G., Altman, I., & Rendleman, M. (2015). Impact of sustainable viticulture programs on American Viticultural areas: Lodi AVA. Journal of wine research, 26(3), 169-180.

Hofmann, H., Busse, C., Bode, C., & Henke, M. (2014). Sustainability-related supply chain risks: conceptualization and management. Business Strategy and the Environment, 23(3), 160-172.

ICE, Italian trade agency (2017). Retrieved from: http://mefite.ice.it/settori/documenti/Scheda-ilsettorevitivinicoloitaliano2017.pdf (accessed 19 June 2019).

International Organisation of Vine and Wine. (2019). Retrieved from http://www.oiv.int/en/ (accessed 18/06/2019)

Ismea (2018). Vino. Vendemmia 2018: l'Italia si conferma primo produttore al mondo. Retrieved from http://www.ismea.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/10368 (accessed 19 June 2019)

Jayaram, J., Tan, K. C., & Nachiappan, S. P. (2010). Examining the interrelationships between supply chain integration scope and supply chain management efforts. International journal of production research, 48(22), 6837-6857.

Kembro, J., Selviaridis, K., & Näslund, D. (2014). Theoretical perspectives on information sharing in supply chains: a systematic literature review and conceptual framework. Supply Chain Management: An International Journal, 19(5/6), 609-625.

Lamastra, L., Suciu, N. A., Novelli, E., & Trevisan, M. (2014). A new approach to assessing the water footprint of wine: An Italian case study. Science of the total environment, 490, 748-756.

Loveless, K., Mueller, S., Lockshin, L., & Corsi, A. (2010). The relative importance of sustainability, quality control standards and traceability for wine consumers: a cross-national segmentation.

Marshall, R. S., Cordano, M., & Silverman, M. (2005). Exploring individual and institutional drivers of proactive environmentalism in the US wine industry. Business Strategy and the Environment, 14(2), 92-109.

Ménard, C. (2004). The economics of hybrid organizations. Journal of Institutional and Theoretical Economics JITE, 160(3), 345-376.

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: striving to meet the trustworthiness criteria. International Journal of Qualitative Methods, 16(1), 1609406917733847.

Ohmart, C. (2008). Innovative outreach increases adoption of sustainable winegrowing practices in Lodi region. California agriculture, 62(4), 142-147.

O'leary, Z. (2004). The essential guide to doing research. London. Sage.

Orth, U. R., Lockshin, L., & d'Hauteville, F. (2007). The global wine business as a research field. International Journal of Wine Business Research, 19(1), 5-13.

Pagell, M., & Wu, Z. (2009). Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars. Journal of supply chain management, 45(2), 37-56.

Pomarici, E., & Vecchio, R. (2014). Millennial generation attitudes to sustainable wine: an exploratory study on Italian consumers. Journal of Cleaner Production, 66, 537-545.

Pullman, M. E., Maloni, M. J., & Dillard, J. (2010). Sustainability practices in food supply chains: how is wine different?. Journal of Wine Research, 21(1), 35-56.

Ragatz, G. L., Handfield, R. B., & Petersen, K. J. (2002). Benefits associated with supplier integration into new product development under conditions of technology uncertainty. Journal of business research, 55(5), 389-400.

Raynaud, E., Sauvée, L., & Valceschini, E. (2009). Aligning branding strategies and governance of vertical transactions in agri-food chains. Industrial and Corporate Change, 18(5), 835-868.

Santini, C., Cavicchi, A., & Casini, L. (2013). Sustainability in the wine industry: key questions and research trends a. Agricultural and Food Economics, 1(1), 9.

Schoenherr, T., & Swink, M. (2012). Revisiting the arcs of integration: Cross-validations and extensions. Journal of Operations Management, 30(1-2), 99-115.

Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. Journal of cleaner production, 16(15), 1699-1710.

Shook, C. L., Adams, G. L., Ketchen Jr, D. J., & Craighead, C. W. (2009). Towards a "theoretical toolbox" for strategic sourcing. Supply chain management: an international journal, 14(1), 3-10.

Signori, P., Flint, D. J., & Golicic, S. (2015). Toward sustainable supply chain orientation (SSCO): mapping managerial perspectives. International Journal of Physical Distribution & Logistics Management, 45(6), 536-564.

Signori, P., Flint, D. J., & Golicic, S. L. (2017). Constrained innovation on sustainability in the global wine industry. Journal of wine research, 28(2), 71-90.

Szolnoki, G. (2013). A cross-national comparison of sustainability in the wine industry. Journal of Cleaner Production, 53, 243-251.

Teuscher, P., Grüninger, B., & Ferdinand, N. (2006). Risk management in sustainable supply chain management (SSCM): lessons learnt from the case of GMO-free soybeans. Corporate Social Responsibility and Environmental Management, 13(1), 1-10.

United Nations Global compact and BSR, 2010. Supply Chain Sustainability: A Practical Guide for Continuous Improvement. United Nations (UN).

Vaus, D., de (2001). Research Design in Social Research. Sage

Viticoltura Sostenibile, (2018). Retrieved from http://www.viticolturasostenibile.org/EN/Home.aspx (accessed 31/10/2018)

Waters, C. (2015). Supply chain risk management. London: Kogan Page.

Williamson, O. E. (1991). Comparative economic organization: The analysis of discrete structural alternatives. Administrative science quarterly, 269-296.

Williamson, O.E. (1979), "Transaction-cost economics: the governance of contractual relations", Journal of Law & Economics, 22 (2), 233-261

Williamson, O.E. (1985), The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting, Free Press, New York, NY.

Wong, C. Y., Boon-Itt, S., & Wong, C. W. (2011). The contingency effects of environmental uncertainty on the relationship between supply chain integration and operational performance. Journal of Operations management, 29(6), 604-615.

World Commission on Environment and Development (1987), Our Common Future, Oxford University Press, New York, NY.

Appendix

Appendix 1: Structured question used as a basis for interviews with producers

Objective	**Questions**
Information about the interviewee, the company, the supply chain structure and the reason for the adoption of sustainability projects	1. What is your role in the company? How long have you worked in this company? 2. How many bottles of wine do you sell per year? 3. How long have you been investing in sustainability? When did you apply VIVA? a. Do you also apply other sustainability certifications/projects? b. Why did you start to invest in sustainability? Did you have any external pressure from the market/competitors/stakeholders? 4. Which production stages does your company control? 5. Organization of the supply chain upstream a. What percentage of grape you process is produced internally? Was it the same before the adoption of VIVA? b. What are the main suppliers? 6. Organization of the supply chain downstream a. What are the main channels to sell your wine? b. What are the main customers? c. What percentage of wine do you sell directly (also through sales representative inside the company)?
Level of supply chain vertical integration	7. What is the average duration of the contracts? Is the renewal automatic? a. For suppliers b. For customers c. Is there any difference after the adoption of sustainability? 8. Are there any common tasks that are performed together with your supplier or just an exchange relationship? a. Are you involved in the supplier production process? To what extend are you involved? (information, technology, decision) b. do you take any strategic decision jointly (renewing labelling, investing in new production/information system)? c. do you take any organizational decision jointly (renew of processes, creation of new sale point)? d. do you take any operational decision jointly (tracking of products, deliveries, dimension of the orders)? e. have you noticed any change after the adoption of VIVA? 9. Are there any common tasks that are performed together with your customers or just an exchange relationship? a. Are you involved in the customer distribution process? To what extend are you involved? (information, technology, decision) b. Have you noticed any change after the adoption of VIVA? c. do you take any strategic decision jointly (renewing labelling, investing in new production/information system)?

	d. do you take any organizational decision jointly (renew of processes, creation of new sale point)? e. do you take any operational decision jointly (tracking of products, deliveries)? f. have you noticed any change after the adoption of VIVA? 10. Do you monitor the activity/performance of your supply chain partners? How do you do it? a. For suppliers b. For costumers c. Have you noticed any change after the adoption of VIVA?
Effect of sustainability projects on asset specificity	After the adoption of VIVA: 11. Have you invested in new personnel/training in order to develop sustainability? a. Have you invested in training of your suppliers to develop adequate know-how for sustainability (activity such as training, information exchange, monitoring activities)? b. Have you invested resources to select/train/monitor your customers/distributors/retailers? c. How were these activities before VIVA? 12. Have you done any specific investment (equipment, machinery, buildings, information system) with your supplier in order to make the production process more sustainable? Are these investments made jointly or independently? 13. Have you done any specific investment with your customers (equipment, machinery buildings, information system) considering sustainability? Is this investment made jointly or independently?
Effect of sustainability projects on risk exposure	14. Considering the investments for training/production/information system for sustainability. a. Would it be easy to change supplier and replicate these conditions? Is there any difference compared to the situation before VIVA? b. Would be easy to change distribution channel? (use another distributor) Compare also with situation before VIVA 15. What are the main unpredictable changes that could happened in the wine market? (volume, price volatility, raw material availability, bad season) 16. Do you think that the adoption of VIVA is changing the risks faced by the company? If yes, what are the main risks created by sustainability? 17. Do you think stakeholders are more careful about your activities and of your suppliers after the adoption of VIVA? If yes, how do you think the reaction of stakeholders can affect your business?