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*Evaluating Sustainability in the Supply Chains of Uruguayan
Agricultural Cooperatives*

by

Sofia Duarte Ventos

Dissertation submitted in partial fulfilment for the Degree of Master of Science in Supply
Chain and Logistics Management



Warwick Manufacturing Group University of Warwick

Submitted August, 2017

Abstract

Sustainable Supply Chain Management (SSCM) is a research field that examines how organisations move towards sustainable development principles in their supply chains. The agricultural sector is an example of one of the industries where sustainability has gained importance. Worldwide small farmers are facing tough competition from industrial farms, leading to weakened communities and environmental issues. Recent years have seen the growth of customer awareness on the social and environmental impacts of products. This concern has been transferred into an increase in demand for products with sustainable properties. Catering to these demands means that organisations must embody the Triple-Bottom-Line approach on sustainability (i.e.. economic, environmental, and social dimensions). Nonetheless, integrating all three dimensions into concrete practices remains a difficult feat to achieve, especially with regards to the social dimension which is usually overlooked.

It is important that organisations collaborate with shareholders, and more especially suppliers, to increase sustainability. Cooperatives have been suggested as an appropriate model for sustainability due to their social principles, however there is a lack of research on sustainability in their supply chains. To address this gap, this research evaluated the SSCM practices of agricultural cooperatives in Uruguay in their operations and that of their suppliers.

The research developed a questionnaire consisting of thirty sustainability practices. Findings suggest that cooperatives' principles are closely linked to those of sustainable development, which might enable them to be an inherently more sustainable model than non-cooperative farms. The results also show that, although there is some variance between agricultural sectors, sustainability practices are well incorporated within the internal operations of the cooperatives, particularly those of the social dimension. However, there is a need for improvement primarily with regards to environmental management systems, and transport pollution reduction. Results also suggest that Uruguayan dairy and livestock cooperatives are the driving force for the implementation of many sustainability supply chain initiatives, especially traceability. Findings suggest that agricultural cooperatives in Uruguay do not expect their suppliers to preserve the environment or create any benefits to communities. Their sustainability requirements are mostly concerned with fairness towards workers and safety of the products supplied.

Although results are promising, more collaboration with suppliers should be pursued. The study encourages more future research to be conducted on sustainability of cooperative supply chains, especially within the agricultural sector.

Keywords: Sustainability, Supply Chain Management, Cooperatives, Agriculture.

Acknowledgments

I would like these lines to express my sincere gratitude to all those people who have collaborated in the completion of this work.

Thanks to my supervisor, Nevgun Perry, for the guidance and continuous follow-ups.

Special recognition should go to CAF (Agrarian Federation of Cooperatives of), for their interest in this project. I am indebted to them for their collaboration in the provision of the necessary data for the accomplishment of the empirical part of this investigation.

Most importantly, I would like to thank the sponsors of my scholarship, whom enabled me to pursue this degree. I am grateful to the University of Warwick, ANII (National Research and Innovation Agency), and especially Chevening FCO.

I must also thank my family and boyfriend for their support and encouragement.

To all of them, thank you very much.

Declaration

I have read and understood the rules on cheating, plagiarism, and appropriate referencing as outlined in my handbook and I declare that the work contained in this assignment is my own, unless otherwise acknowledged.

No substantial part of the work submitted here has also been submitted by me in other assessments for this or previous degree courses, and I acknowledge that if this has been done an appropriate reduction in the mark I might otherwise have received will be made.

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Supply Chain & Logistics Management

The project should relate to the following topics: purchasing/outsourcing, material/production control, inventory reduction, material flow, warehousing and distribution, supply chain management or transport planning.

This project relates to the field as follows:

This dissertation evaluates the sustainability practices employed by Uruguayan agricultural cooperatives within their supply chains. Principles of sustainability are explored within the context of supply chain management to develop more integrated sustainable supply chains. This study matches the requirements of the course since it relates to supply chain management strategies, in this case regarding the nature of incorporating sustainable development principles. This should promote more socially and environmentally responsible supply chains.

The findings of this research would be useful for applying them not only in the agricultural sector, but may serve to guide other organisations towards sustainability through the cooperative model. The literature reviewed would enable the development of sustainable practices to improve other supply chains and help guide closer collaboration with suppliers towards sustainable goals.

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List of Abbreviations

CAF – Federated Agrarian Cooperatives (of Uruguay)

EMS – Environmental Management System

FAO - Food and Agriculture Organization of the United Nations

ICA – International Cooperative Alliance

ICO - International Labour Organization

TBL – Triple Bottom Line

SSCM – Sustainable Supply Chain Management

1. Introduction

1.1. Introduction

The purpose of this chapter is to introduce the problems that will be addressed in this research. Additionally, an overview of the structure of the document will be provided.

The problem that drove the project will be introduced in section 1.2. Section 1.3 identifies the objectives and aims of the research. The value that this research wishes to provide is presented in section 1.4. Section 1.5, describes the research structure, and lastly section 1.6 summarises the entire chapter.

Figure 1, below, illustrates the structure of this chapter, outlining the sections contained.

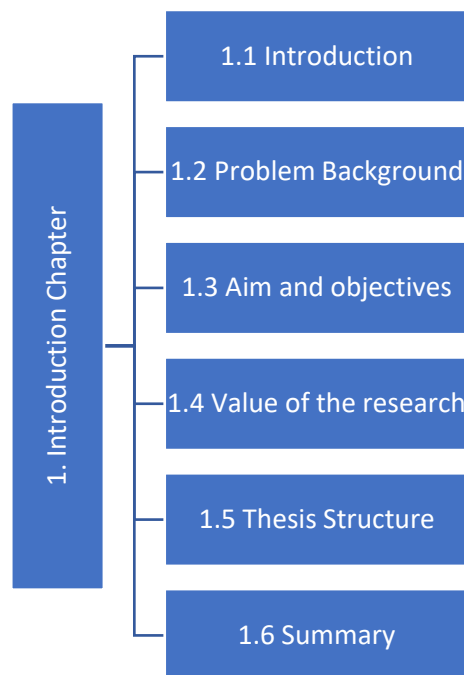


Figure 1- Chapter 1 Overview. Elaborated by author.

1.2. Problem Background

Agricultural supply chains are currently facing a myriad of problems, ranging from the use of dubious drugs on animals and crops (Case, 2017), pandemics of mad cow disease (BBC, 2015), to environmental problems triggered by the excessive use of pesticides (BBC, 2004). Changes in consumer habits, increasing demands on food safety and protection of the environment, as well as the social implications of production are some of the aspects that affect these systems. Within this context, the need arises to promote a more integrated, efficient, and respectful supply chain to society and the environment.

This need is even more important in the agricultural sector and has been continuously identified by various authors, who defend the growing need to promote agricultural production in a more sustainable way (Tilman et al., 2011). In this context, countries will depend on the degree of sustainable integration they achieve in their supply chain. In this sense, sustainable practices have been identified and studied by various scholars (Hobbs et al., 2008, Aubert et al., 2012, Romero et al., 2012), however, obstacles have been encountered in relation to the diffusion and application of these practices among small farmers who traditionally employ intensive unsustainable methods of production to remain competitive (Dogliatti, 2012).

Some studies suggest that participation of producers in associations or cooperatives could positively influence the acceptance of more sustainable practices by farmers (McGuire et al., 2013; Leite et al., 2014), and ensure their survival in a competitive global market. The International Labour Organization (Smith & ILO, 2014) exalted the contribution of cooperatives to meet sustainable development goals, and when analysing the concept of cooperativism, it can be said that it incorporates the essence of what sustainable development represents. It is a group of people organised to fulfil common purposes of an economic, and social nature (Münkner, 2015) by creating a democratically managed business.

Particularly, agricultural cooperatives are of great importance in social sustainability issues, due to their close link to the community they are inserted in (Gertler, 2001). Nonetheless, despite their close links to natural resources, the literature presents doubts on their environmental stewardship. Furthermore, despite presenting more favourable economic situation than non-cooperatives (Vo, 2016), they still present financial limitations. Therefore, it is unclear whether they are conducive to more sustainable results through their operations.

In the southern east coast of South America, nestled between the colossal Argentina and Brazil is Uruguay. This country is the second smallest in South America and has roughly the same size as England. With a human population of just over 3 million people (INE, 2016) and a cattle population of approximately 12 million (Samuelle, 2016), it comes as no surprise that agriculture plays a key role in the country's development strategy. The production of agricultural products is essential to Uruguay's economy. This is supported by the fact that products such as dairy, produce, wool, and meat, make up more than 70% of Uruguay's exports (CAF, 2014). Farm ownership has historically been in the hands of families, but the landscape has drastically changed in recent years.

Between 2000 and 2009 there was a rise in new farmers in the form of international agroindustry investment which, according to Arbeletche & Carballo (2006), went from being practically non-existent to representing 15% of producers and controlling 60% of the agricultural land. The farm ownership structure shifted because of the arrival of new competitors (Dogliotti, 2012). Family farmers were reduced both in total production area and number of producers (Arbeletche & Gutierrez, 2010). Furthermore, these changes brought about an increase in environmental issues derived from intensive production methods.

The rural population of Uruguay in the latest census (INE, 2011) consisted of only 175,000 (5% of the country's total population), a reduction of almost 50% from before the turn of the century. According to Bertullo (2014), one in four Uruguayans is linked to the cooperative system which reaffirms the national importance of this sector to the country's economy. Although the literature highlights the importance of these associations in Uruguay, a gap has been identified with regards to the evaluation of sustainable supply chains in agricultural cooperatives, both in Uruguay and elsewhere. To integrate small producers and prevent environmental issues, agricultural cooperatives are being promoted as a key solution to achieve sustainable supply chains.

Thus, the organisations involved in these chains face important challenges, since success depends not only on individual companies and their sustainability, but also on the coordination between suppliers and producers (Seuring & Müller, 2008). In this scenario, the strategy for the different actors involved in the supply chain would be to develop strategies focused on collective collaboration that permeates sustainability in producers and suppliers' activities.

These collective initiatives are intended to give a local vision to agriculture and propose a sustainable alternative to the global agricultural system (Stagl, 2002). They aim to transform supply chains through the transition from systems based on the misuse of resources towards an alternative paradigm that promotes community growth and futurity for future generations (Pretty et al., 2008).

The central premise is that agricultural cooperatives can successfully tackle ecological and social agendas while remaining economically viable. It is the belief of this research that cooperatives, and their presence in rural areas, would help stabilise vulnerable economies. Potentially, cooperatives could easily outperform their non-cooperative counterparts thanks to their unique structure, objectives, and principles. Furthermore, it could also be a playing field on which farmers can secure economic benefits for long-term growth.

Nonetheless, an extensive review of the literature has uncovered that there is a lack of research on the supply chain sustainability of agricultural cooperatives. An extensive search on academic databases revealed that no articles have been published specifically on the sustainable supply chain management of agricultural cooperatives. In response to the lack of literature, the research developed the following question to guide the investigation towards closing the gap:

To what extent do Uruguayan agricultural cooperatives employ sustainable practices in their supply chains?

The data collection consists of two stages. The first stage collects secondary data from peer-reviewed journals. The second stage gathers data from Uruguayan cooperatives through an empirical study conducted in collaboration with Cooperativas Agrarias Federadas (CAF). CAF is an organisation that represents and provides assistance to a network of more than 20 agricultural cooperatives in Uruguay which include more than 13,000 members (CAF, 2017), distributed throughout the country. These operate in different sectors such as livestock, fruit, and vegetables, as well as dairy and wool.

The following section will provide an overview of the aims developed to address the research.

1.3. Aims of the research

Considering the problem described above, it was considered necessary to conceptualise these subjects and draw parallels between them to study the practices and aspects related to the sustainable supply chains in the agricultural cooperative sector in Uruguay. To fulfil this objective, the research will aim to solve the following objectives:

Objective 1 - Understand the importance of sustainably managing agricultural supply chains in Uruguay.

Objective 2 - Examine the suitability for sustainability of agricultural cooperatives and non-cooperative farms.

Objective 3 - Identify current best sustainable practices in agricultural organisations, considering potential barriers to their implementation.

Objective 4 - Evaluate the sustainable practices employed in the supply chains of Uruguayan agricultural cooperatives.

1.4. Value of the research

This research wishes to investigate whether cooperative organisations can be an appropriate playing field for the development of Sustainable Supply Chains ensuring the survival of small farming communities in a competitive world, and integrating the concepts of environmental, economic, and social sustainability. The project is focused on evaluating internal sustainability of cooperatives as well as their criteria for its suppliers. This differs from previous studies, which did not investigate whether cooperatives' supply chains could be more sustainable than other organisations. Although international organisations such as the International Labour Organisation (Smith & ILO, 2014), promote cooperatives as a good organisational model conducive to sustainability, there is a lack of research in sustainable supply chain management. This work should provide a tangible understanding of how cooperatives sustainably manage their supply chains in Uruguay, and whether there is room for improvement. Additionally, valuable results could be gained on sustainability in agricultural organisations by comparing sustainability in cooperative and non-cooperative farms.

This study may offer managers a starting point for what is needed to develop sustainable practices, not only in agricultural cooperatives, but in other types of agricultural organisations by understanding how the cooperative model works. It will examine the sustainability practices

in Uruguayan agricultural cooperatives, with the aim to compare the identified practices with the best sustainable practices and discern if there is room for improvement in Uruguay or whether other organisations could take advice on sustainability from this small South American country and its cooperatives.

1.5. Thesis structure

This section outlines the structure of this project. The chapters are explained as follows:

Chapter 1. This chapter introduces the problem of the research and explains the value of the project to academia. The structure of the document will be presented and detailed. Finally, it states the objectives of the project, which will serve to determine the scope of the research.

Chapter 2. This first chapter of the literature review delves into the concepts of sustainability in supply chains with the objective of explaining the importance of sustainably managing agricultural supply chains within the agricultural landscape. In addition, it offers a background of the agricultural sector in Uruguay and the current status of agricultural cooperatives. It aims to introduce the main concepts that guide the research and explain the importance of investigating within the context of Uruguay and its cooperatives.

Chapter 3. The second chapter of the literature review introduces the concept of Cooperativism and draws comparisons with the principles of sustainable development. Particular emphasis is placed on describing the differences that might emerge between cooperative and non-cooperative farms when adopting sustainability. Its intent is to understand whether cooperatives are more suitable models for implementing sustainability.

Chapter 4. The third chapter of the literature review will identify the best practices in sustainably managing supply chains in agriculture. The objective is to create a framework for evaluating the sustainability in the internal practices of cooperatives, and their requirements on suppliers. The practices are discussed through real world examples, detailing barriers to implementation and successful cases, when relevant. Importantly, the interconnections that exist between the different sustainability practices are highlighted.

Chapter 5. This chapter will describe and justify the research methodology proposed for this research. This will include the research approach and design, data collection methods, given the nature of the problem discussed in the introduction and literature review. Additionally, the framework of best practices comprised from the literature review in chapter 4 will be presented to assist in the collection of primary data. Finally, the data analysis methods will be discussed.

Chapter 6. The chapter will present the findings of the primary and secondary data. It will review and analyse the results of the quantitative data collected, with regards to the qualitative input of the literature review. This will be examined based on the research methodology proposed and within the context of the literature review conducted.

Chapter 7. This chapter will compare the results collected with those of past research, in to discuss the findings in terms of their implications to the research field. Limitations of the research will also be discussed.

Chapter 8. This chapter concludes the research by summarising the work completed. It discusses how the research objectives have been answered and describes the suggests areas for further research.

1.6. Chapter Summary

Supply Chains can no longer ignore the effects their operations have on the environment and the community. This is more pressing in the agricultural sector where there not only is a strong link to nature and its resources, but also to the small farmer communities which struggle to make a living in an ever-expanding global context. Collaboration with stakeholders is a challenge, however it has the potential of developing integrated sustainable supply chains which create value for communities, and preserves the needs of future generations. International organisations have promoted the cooperative model as a solution to unsustainable production in agriculture. Nonetheless, their suitability towards sustainable supply chain management remains to be investigated.

Agriculture has always been one of the main drivers of Uruguay's economy, and the cooperative movement being present for centuries emerges as an interesting subject of

study. The main objective of this project is to appraise the sustainability of Uruguayan agricultural cooperatives' supply chains. This project will contribute to the literature as it would fill a gap with regards to the study of sustainability in the supply chains of agricultural cooperatives. It will analyse the status of sustainable practices in Uruguayan cooperatives' supply chain, specifically within their own internal operations and that of their suppliers. The results of this research will serve to understand and guide cooperatives towards greater supply chain sustainability, and potentially encourage other organisations to consider joining the *cooperative model*.

Literature Review

The purpose of the following chapters is to review the literature to provide an academic background to conduct an evaluation on Uruguayan agricultural cooperatives in order to understand their practices of enabling sustainability in internal operations and towards their suppliers.

The concept of sustainable development has affected many industries, and drives the need to incorporate different practices which are concerned with environmental and social goals while still managing to be economically viable. These pressures have also had implications for supply chain. The first chapter of the literature review will address how sustainable development principles have gained relevance and seeped into different management areas, specifically the management of supply chains. This chapter will introduce the concepts of sustainable supply chain management, and the importance of sustainably managing supply chains in agriculture, specifically within the context of Uruguay. Particular emphasis will be given to the situation of agricultural cooperatives in Uruguay, essentially proposing them as a conductor for successful sustainable supply chain management.

Section two will introduce the concept of cooperativism and draw links between its principles and those of sustainable development. The aim is to understand whether agricultural cooperatives can be an appropriate organisation for developing sustainable supply chains. The focus is set on comparing sustainability in cooperative and non-cooperative farms to answer whether a cooperative can be considered a more sustainable model.

The third section of the literature review will review and identify various sustainable practices in agriculture, practices that can be included throughout different agricultural sectors. There will be a focus on the barriers of implementation as well as successful examples. Moreover, the links between the different practices will be discussed. Through identifying best practices, the researcher will develop a framework to evaluate supply chain sustainability in agriculture.

Figure 2, below illustrates the structure of the chapters of the literature review. These intend cover some of the objectives of the dissertation, which have been introduced in the previous chapter.

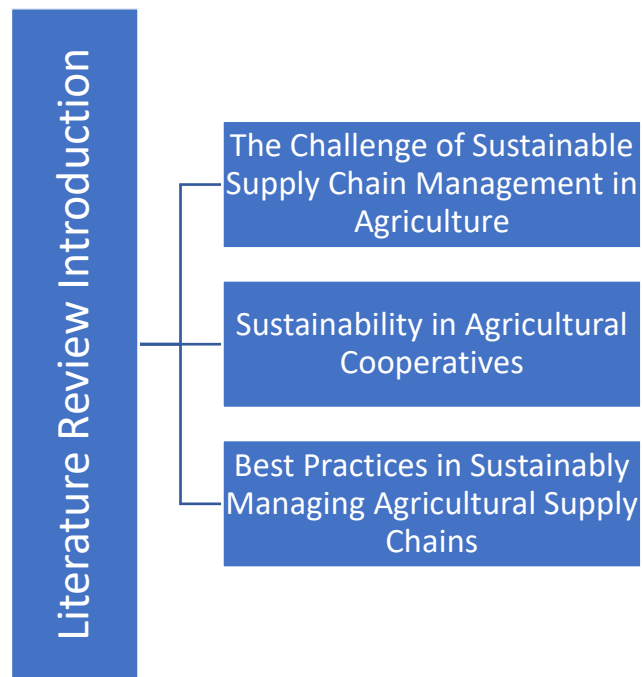


Figure 2 - Literature Review Overview. Elaborated by author.

2. The Challenge of Sustainable Supply Chain Agriculture in Uruguay

2.1. Introduction

Considering that this research will evaluate the sustainability of the supply chains of Uruguayan agricultural cooperatives, it is essential to understand what sustainable supply chain management in agriculture refers to, and why it is important in terms of Uruguay's context. A conceptual framework will be developed to explore the importance of Sustainable Supply Chain Management in Uruguayan agriculture. To this purpose, the structure of the chapter is detailed below.

The first part of this chapter introduces the concept of Sustainable Development, its origins and evolution, before focusing on the most prominent approach to sustainability: Elkington's Triple Bottom (Elkington, 2002). Subsequently, the influence of sustainability on supply chain management will be discussed. Finally, the importance of managing agricultural supply chains sustainably within the context of Uruguay is highlighted.

At the end of the chapter there is an emphasis on the importance for the research to investigate sustainability in Uruguayan cooperative supply chains due to the lack of literature in this area, and exploring the widespread presence of cooperatives in Uruguay.

2.2. Introduction to Sustainable Development

Within the context of this research, it is important to understand the concept of sustainable development because its principles guide nations and organisations forward in their quest for sustainability. Due to the socio-economic and environmental problems faced by agriculture today, the understanding of this concept will help establish a conceptual framework for sustainable supply chain management in agriculture, based on the Triple Bottom Line approach to sustainability.

In recent decades, the challenge of sustainable development has placed itself at the forefront of humanity's present and future priorities. During the twentieth century, economic growth acquired an unprecedented speed, supplying goods and services to an expanding global population which, in turn, increased its levels of consumption (Sachs, 2004). The expansion of this new economic model triggered a growing demand for natural resources (Seuring, 2013)

which resulted in the dissemination of environmental and social problems globally (Sachs, 1999). The belief that development and accumulation could be prolonged indefinitely over time, collided with the limited nature of Earth's resources. It is in this context, of a constantly expanding globalised world, that the principles of Sustainability emerged and spread like wildfire among and beyond the academic community.

The Brundtland report (1987), by the World Commission on Economic Development, was the first to officially introduce and define the term Sustainable development as '*the development that meets the needs of the present without compromising the ability of future generations to meet their own needs*' (WCED, 1987). The report united the concepts of economic and social development with environmentalism and raised the need to avoid deterioration of the environment when in pursuit of economic development. Although widely criticised for its ambiguity (Hart, 1995; Robinson, 2004), this report gave rise to various interpretations in search for a broader definition of the concept. Among the most prevalent is Elkington's model of the Triple Bottom Line (2002).

Elkington (2002), presents the concept of sustainability in organisations as being multidimensional, and identifies a triad of principles that must be considered (illustrated in Figure 3, below): Economic, Environmental, and Social factors. His argument is that economic sustainability occurs when the activity that moves towards environmental and social sustainability is financially possible and profitable.

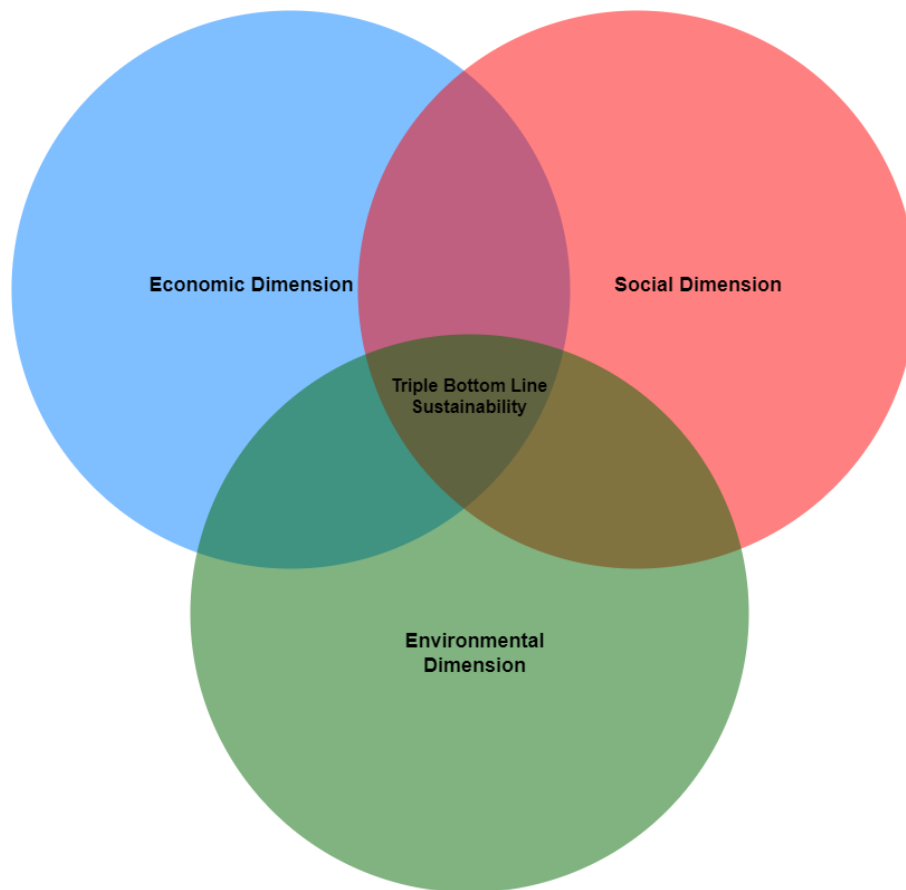


Figure 3 Triple Bottom Line of Sustainability - Elkington (2002)

As the three dimensions of the Triple-bottom-line concept (Elkington, 2002) are inter-related, they may influence each other in multiple ways (Johnston et. al, 2007). Authors such as Kahuthu (2006) and Carter & Easton (2011) support the Triple Bottom Line and argue that sustainability is only achieved once the balance between these dimensions has been reached, with human development in society, enabling wealth generation in the economic system, and protecting the environment's natural resources.

However, this representation of sustainability has been criticised for its limitations in terms of providing more information on which and how many elements of the three dimensions should link together to create sustainability (Hove, 2004). Furthermore, it is criticised for not considering the trade-offs that exist between economic growth and social and environmental development (MacDonald & Norman, 2007). Meaning that the choice of one dimension will affect the others in ways that may jeopardise overall sustainability. Despite these criticisms, the concept of Triple Bottom Line will serve to guide this research because of its wide recognition as an effective framework for achieving sustainability in the long-term (Pagell & Wu, 2011). Therefore, this research believes that the three dimensions are an effective tool in guiding

sustainability, however it is important to draw on the links between the dimensions and consider trade-offs between them.

Nonetheless, due to the myriad of different conceptualisations available for sustainability in the literature, and to avoid confusion with other terms, this dissertation will conciliate some of the most prevalent sustainable development definitions to create one concept. Table 1 presents a synthesis of different approaches to sustainable development. The keywords are shown separately to develop a single definition.

Table 1- Conceptualising Sustainable Development. Elaborated by author based on WCED (1987); Houghton (1999), Sikdar (2003) and Sachs (2004)

Definition	Key words	Authors
It is a development that meets the needs of the present without compromising the possibilities of future generations to meet their own needs.	Present needs, future generations, future needs	WECS (1987)
Sustainable development encompasses five principles based on equity: futurity, equality, intergeneration, social justice, cross-border responsibility, procedural fairness, and interspecies equity.	Equity, futurity, equality, social justice, intergeneration, responsibility, fairness, interspecies equity.	Houghton (1999)
A wise balance between economic development, environmental stewardship, and social equity.	Economic development, environmental stewardship, social equity	Sikdar (2003)
Sustainable development is centred on five pillars that compel humanity to work in counterpoint to the conventional economy. They are: social, economic, territorial, and political.	Social, economic, territorial, political.	Sachs (2004)

As discussed in the present section, there is no consensus regarding a universal definition of sustainability. However, based on the keywords above, sustainable development is ecological, economic, and of social equity, both for present and future human generations. It can be considered an alternative to the pursuit of short-term economic benefits and the irrational use of natural and human resources. The most important departure of the sustainability concept from the original Brundtland report (WCED, 1987) lies not only in dismissing the vagueness of the initial concept, but in the distinction that a single-minded focus on one of the three pillars is not sufficient to reach sustainability.

Although this research argues that the model should be used in this study, it proposes that the dimensions should be analysed in a systemic way to understand the relationship between them. From the principles and criticisms presented above, the use of the Triple Bottom Line

should guide the identification of sustainability practices within agriculture to create a framework that can evaluate sustainability practices in Uruguayan agricultural cooperatives. Moreover, it should be remembered that, in practice, the dimensions presented are interrelated and trade-offs exist between their different aspects.

Having established that these principles constitute the conceptual cornerstone on which this research bases its understanding of Sustainability, its implications on Supply Chain Management will be discussed in the following section.

2.3. Conceptualising Sustainable Supply Chain Management

Within the context of this research, it is important to understand how the concept of sustainable development permeates into the field of supply chain management for its subsequent application in the evaluation of Uruguayan agricultural cooperatives. This section will conceptualise sustainable supply chain management and identify its application within the operations of an organisation and that of its suppliers. It discusses how supply chains seldom incorporate the social dimension within its practices, and the need to do so.

The classical approach to supply chain management followed the thinking of economists such as Friedman (1962), who defended that companies should pursue profit maximisation to the benefit of shareholders, with no further consideration of a company's impact on the world. However, as voiced by the Brundtland report (WCED, 1987), there is no place for this view in today's globalised world. Following critiques by scholars and consumers, demanding more socially and environmentally responsible corporate behaviour (Roome, 1992), organisations turned to integrating social and environmental policies into their strategies across their supply chains (Vachon and Klassen, 2006). Therefore, companies face growing pressures to incorporate sustainability standards on the putting at risk their reputations (Leppelt, 2014).

The literature points out that sustainable development in the business context is usually reduced to environmental improvements (Mentzer, 2001; Malviya and Kant, 2016), disregarding aspects related to the social dimension. Claims on the social dimension going unrecognised in many industries are supported by studies conducted by Matos and Hall (2010) and Seuring and Müller (2008) which claim that social issues are little explored in the sustainable supply chain management literature. Additionally, a study by Klassen et al. (2014)

identified that most of the supply chain management literature between 2002 and 2014 failed to acknowledge the social dimension. However, Crum et al. (2011) stated that the dimensions are usually approached in a standalone way, without integrating all three. These claims, therefore point to the need for organisations to effectively involve the three dimensions of sustainability with a strong focus on social factors.

Control over sustainable practices is an important part of Sustainable Supply Chain Management (SSCM). Following Elkington's Triple-Bottom-Line approach, Jennings and Zanderbergen (2005) echo that sustainable supply chains should be evaluated on environmental, social, and economic principles. In line with this, Hult (2011) argues that an organisation is not only responsible for its own sustainable actions but must also maintain control over the actions of its suppliers and distributors. Hall and Matos (2010) go further still and say that sustainable supply chains must recognise the interests of stakeholders *within* and *outside* their supply chain. Hence, the effective introduction of sustainability practices would require actions that *go beyond organisational boundaries*, working in unison towards stakeholder interests. This means that companies' sustainability should be analysed according to their own internal operations and their interactions with stakeholders and suppliers.

Close collaboration with stakeholders in achieving inter-organisational socio-economic and environmental objectives is essential for sustainable supply chain management (Seuring & Gold, 2013). Santa-Eulalia (2010) argues that collaboration with supply chain partners is the key to achieving sustainability. This is corroborated by Seuring and Muller (2008), who reviewed over 190 papers on sustainable supply chains. The emerging concepts advocated that collaborative supply chains are an efficient mechanism for improvements in sustainability. Nonetheless, according to Matos and Hall (2007), applying collaboration may face difficulties due to the existence of various stakeholders who may interpret the dimensions differently.

In conclusion, the literature has predominantly focused on environmental practices as can be seen by the dominance of environmental criteria over an integrated Triple Bottom Line in the literature (Seuring and Müller, 2008; Morali & Searcy, 2013; Ahi & Searcy, 2013). This means that there should be more focus on incorporating social concerns. Furthermore, collaborative relationships between supply chains members has been considered a determining factor for sustainability success (Santa-Eulalia, 2010). Therefore, sustainability practices should extend to

the supplier selection process, seeking partnerships with companies that share the same sustainability principles.

As the challenges of integrating sustainability reveal themselves, attention now shifts towards strategies with a new set of criteria and dynamics (Quarshie et al., 2016): putting plans into practice and scaling economic, environmental, and social sustainability operations across and beyond the network. It is in this light that the following section will discuss sustainability in agricultural supply chains and its importance in the context of Uruguay.

2.4. Sustainable Agricultural Supply Chains in Uruguay

The following section presents the need to consider the concept and implications of Sustainable Supply Chain Management within the perspective of this research, namely from the context of Uruguayan Agriculture. This is due to the differences that may arise depending on the industry and country (Carter & Easton, 2011).

The inclusion of sustainability becomes an important point in the management of the agricultural supply chains worldwide for several reasons. In the first place, agriculture is said to be one of the great sustainability challenges of future generations (World Bank, 2008). This is influenced by a projected worldwide population growth, which brings with it an additional need for food from the fields (Alexandratos & Bruinsma, 2012). Similarly, the 2011 report by FAO (Sims & FAO, 2011) highlights the risks of resource depletion and environmental degradation on the future ability to grow food and sustain livelihoods in agricultural communities. In this scenario marked by scarcer resources, it can be said that demands for water, food, and energy (SARE, 2015) will increasingly be linked to the productive capabilities of companies, communities, and farmers. O'Brien and Leichenko (2000) reinforce the notion that agriculture is exposed to many pressures with regards to ecological, economic, and social issues, either from outside the company or from within, which reinforces the importance of developing and managing sustainable agricultural supply chains.

During the last decades, agriculture in many countries of Latin America has followed a path of intensification and specialisation of production systems in response to ever decreasing economic profit (IFAD, 2011). This process has expelled many farmers from the agricultural sector, mainly family producers (Dogliatti, 2012). Over-exploitation and pollution of water

sources, erosion, loss of nutrients in the soil, as well as the impact of weeds, pests and diseases in crops have become common problems in Latin American agriculture (Salles Filho et al., 2010).

The path followed by the Uruguayan agricultural sector during the last decades is no exception. Although the rural population consists of merely 175,000 people (INE,2011), the economic and social importance of the agricultural sector for Uruguay is strategic. Along with satisfying the food needs of its population, it is an important generator of labour and means of access to international markets, since seventy percent of its exports are agricultural (Dogliatti, 2012). Moreover, over 70% of the land is dedicated to agriculture (Arbeletche & Gutierrez, 2010), making it much more important that its production is done sustainably.

The increase of globalisation and the continued pursuit of greater efficiencies are increasingly shifting agricultural production to large industrial farms, affecting the livelihoods of small farming communities (Jaffee, 2003). Between 1990 and 2000 the number of producers specialised in fruit and vegetables in Uruguay declined by 20% (Dogliatti, 2012). The number of family farmers reduced their production area, and many stopped producing due to the pressures of new international players (Arbeletche & Gutierrez, 2010). Those who continued, chose to intensify and specialise their production systems and, as a result, there were major effects on the environment (Tiscornia et al., 2014). This suggests that sustainable agriculture in Uruguay faces serious environmental constraints due to intensive use of resources, and is affecting the survival of small farmers.

Considering the issues above, the last decade has seen a growing concern in sustainable production in the country (Hjorth et al., 2011). These growing pressures on sustainability have resulted in government regulations in Uruguay requiring farmers to, for example, trace all their livestock from cradle to grave (IICA, 2009). This has earned the sector renouncement worldwide and opened doors to many international markets (Sierra & Zurbruggen, 2015). This reaffirms the importance that is currently being given to sustainable issues internationally and in the local sphere, and how companies and governments can channel these concerns to create more value.

Ilbery and Maye (2005) claimed that, in practice, agricultural organisations are mainly focused on applying sustainability in their own operations and usually forget about their supplier's sustainability. Recent research started integrating supplier requirements for sustainability (Foerstl et al., 2010). Literature on sustainable requirements for agricultural

suppliers is scarce (Gualandris et al., 2015). Considering these concerns, it is needed to determine whether this issue affects Uruguayan agricultural cooperatives, and to what extent they seek control over their supply chains, especially with regards to supplier specifications. More control would ensure higher levels of security along the supply chain and offer guarantee of environmental and social stewardship, enabling the country to continue on a path of sustainable agricultural growth.

In summary, while Uruguay presents many challenges when it comes to incorporating sustainability into its agriculture, characterised by an intensive use of resources, market incentives pave the way in establishing more sustainable supply chains. Within this context, whether the cooperative movement is the way to reach sustainability in the supply chain remains to be established. The last section of this chapter, will offer a view of the cooperative sector in Uruguay, specifically with regards to agricultural cooperatives.

2.5. Cooperatives in Uruguay

Within the context of this research, the need arises to create more sustainable supply chains in agriculture, and cooperative organisations are proposed as a model that could potentially benefit this type of development (ILO, 2014). Nonetheless, a search on databases uncovered that despite there being articles on agricultural cooperative's sustainability, no articles had been published specifically on the sustainable supply chains of agricultural cooperatives until February of this year (Hooks et al., 2017). However, the latter article was focused on viability, and resilience and only superficially mentioned sustainability in agricultural cooperatives' supply chains. Within this context, the following section will discuss the importance of agricultural cooperatives in Uruguay to understand its relevance as a research subject.

With regards to the magnitude of the cooperative movement in the country, it can be inferred that cooperatives are of great importance to Uruguay's economy and society. According to the 2016 Census of the Uruguayan National Institute of Statistics, the country's current population is of approximately 3 million, of which more than 900,000 individuals are associated to a cooperative (INE, 2016). Therefore, it could be said that almost 1 in 3

Uruguayans are involved with the cooperative movement in some extent, which reinforces the importance of the sector in the country's economy.

There is no shortage of successful examples of cooperatives in Uruguay, one such being the National Cooperative of Milk Producers (CONAPROLE), a dairy cooperative which makes out more than 70% of the country's national production of dairy (PFMC, 2014). Some of the main cooperatives in the country have approximately 50 decades of experience in international commerce (CAF, 2016), which suggests that cooperative organisations have achieved an important degree of competence and economic sustainability. Nonetheless, paradoxically, it is argued that the main difficulty for cooperatives' ability to compete internationally is not being able to count on enough capital necessary for commercialisation (Sabourin et al., 2015), which makes their survival in a global context much more challenging.

The CAF organisation (Federated Agrarian Cooperatives) is the guild of agricultural cooperatives in Uruguay, which brings together 24 agricultural cooperatives, which make out over 30% of the agricultural production of the country (CAF, 2016). The impacts of regional integration and globalisation have been positive for Uruguayan cooperatives based on their long presence in the sector, and the importance they play in the country's economy (Bertullo, 2014). However, the main obstacle to the continued growth of the sector is the difficulty of financing their activities. In some cases, the strong indebtedness of the cooperative sector has been a major obstacle to achieving more significant growth (Sabourin et al., 2015). Nonetheless, despite the economic hardships, and considering the role cooperatives play in the country, it emerges that this type of model could be a suitable environment for establishing sustainable supply chains in the region.

Cooperatives in general are dynamic, complex, and diverse organisations, as will be seen in the next chapter. The broad and precise knowledge that can be generated from agricultural cooperatives will determine whether they can be understood as privileged tools to address and deepen sustainable rural development, considering their impact on their communities and suppliers. In this chapter, the importance of sustainable management of the supply chain, addressed within the Uruguayan agricultural context is proposed. This will serve as a foundation which will support the research.

3. Sustainability in Agricultural Cooperatives

3.1. Introduction

Following from the previous chapter's understanding of sustainability, and its importance in agricultural supply chains, the following section will initially explore the concept of Cooperativism. Later it will appraise cooperatives' suitability towards sustainability by comparing sustainability in cooperative and non-cooperative agricultural organisations. This is important in the context of the research as it connects the concepts of cooperativism and sustainability, enabling to fill the gap of sustainable management of supply chains in agricultural cooperatives.

3.2. Defining Cooperatives

Fairbairn (1994) reported that the emergence of cooperativism occurred as a means to overcome the negative impacts brought on by the Industrial Revolution. In fact, as Zeuli and Cropp (2004) reported, cooperatives are created in periods of social and economic stress. Fairbairn (1994) stated that this model initiated a great movement at world level to counter the issues communities were facing because of capitalism. In this respect, it can be said that the emergence of the cooperative model resembles the appearance of sustainable development, which also emerged as a response to the economic backdrop of its time.

Although several authors and organisations have defined the concept of cooperative, the one most prominent is the International Cooperative Alliance's, which describes it as an autonomous association of people who willingly unite to create a mutually owned and democratically managed business, to reach shared economic, social, and cultural needs and objectives (MacPherson, 1995). Van der Walt (2008) complements the need for members to be completely involved in all decisions and processes. Table 2, below, provides examples of the earlier and later definitions.

Table 2- Conceptualising Cooperatives. Elaborated by author based on literature review.

Author	Definition
Birchall (1994) (Young, 2008)	People-centred businesses in ownership and reward .
MacPherson (1995) – ICA definition	Autonomous of individuals voluntarily associated to accomplish common economic, social, and cultural needs . The enterprise is jointly-owned and democratically governed .
Gertler (2001)	Enterprises that foster cultural, organisational, and technological changes
Skurnik (2002) (Young, 2008)	Members can be described as customer-owners .
Zeuli & Cropp (2004)	Development tools that promote both social empowerments and economic goals .
Chaddad & Cook (2004)	A firm that makes alliances to serve the interests of a group of economic agents .
Van der Walt (2008)	Business organizations, voluntary and willingly established by individuals with shared needs and goals . Actors are fully involved in the decision making process.
Von Ravensburg (2009)	Associations that facilitate access to goods and services that had not been previously available.

From the above, some keywords are prevalent in the different definitions of Cooperativism. It is possible to note the presence of two common elements related to the composition of cooperatives: *association of people* and *cooperation*. Words such as *association of individuals*, *groups*, and *members*, highlight the fact that the affiliates of these organisations are numerous and homogenous. Furthermore, there is an emphasis on the *voluntary* or *willing* nature of these affiliations and the *participatory* and *democratic* nature of the governance. Decisions are made in a democratic way, so each member of a cooperative has the right to make his voice heard.

Among the keywords, there is also an emphasis on *mutual benefits* or rewards, such as economic goals, empowerment, needs and goals. In addition, Skurnik (2002) claimed that members are customer-owners, which highlights the *duality of cooperative members*, whom are both workers and customers of their own enterprise. Thus, according to the author's interpretation of the literature, the three main principles of a cooperative which distinguish it from other organisations, are joint ownership, shared benefits, and customer-ownership. From the examination of cooperative definitions and characteristics, cooperatives emerge as an attractive choice for the creation of sustainable organisations.

The International Cooperative Alliance (ICA) is the international organisation that brings together and promotes the cooperative movement in the world (Münkner, 2015). The basic cooperative principles outlined by the ICA are seven, and are illustrated in Table 3 below.

Table 3 - Principles of Cooperatives - Elaborated by author based on Münkner (2015)

Cooperative Principles	Description
Voluntary and open membership	Voluntary membership open to all people, without discrimination .
Democratic management	Members are actively involved in the management and decision-making process. Members have equal voting rights .
Economic participation	Equitable distribution of profit and benefits among members.
Autonomy and independence	Autonomous organisations managed by its members. Decisions must not endanger the cooperative's democracy and autonomy .
Education, training and information	Cooperatives provide education and training to their members, to promote the growth of the organisation and for diffusion to society about the benefits of the cooperative movement.
Cooperation between cooperatives	Strengthening the cooperative movement through partnerships with other cooperatives.
Concern for Community	Cooperatives are involved in the community .

From the above table, it can be interpreted that cooperativism shares many of the ideals and values of sustainable development. Resulting from this, it can be interpreted that the integration of social and economic goals could be an adequate basis for overall sustainability. Table 4, below pairs each principle with one of the three dimensions of the Triple Bottom Line to further understand the suitability of cooperatives towards sustainability.

Table 4 - Cooperatives principles and Sustainability. Elaborated by author based on Münkner (2015) and Elkington (2002)

Cooperative Principles	Sustainability dimensions
Voluntary and open membership	Social dimension
Democratic management of partners	Social dimension
Economic participation of partners	Social & Economic dimension
Autonomy and independence	Economic dimension
Education training and information	Social dimension
Cooperation between cooperatives	Social dimension
Community interests	Social dimension

Gertler (2001) viewed cooperatives in a broad sense within the sustainability perspective stating that cooperatives are enterprises which are ideal for encouraging the kind of changes required to transition into sustainable development. Tables 3 and 4 support this. It is clear from

an evaluation of table 4, that cooperatives' objectives are within the socio-economic dimensions of the Triple Bottom Line and do not allude specifically to environmental principles, which might result in issues when incorporating sustainability.

In the context of this research, the findings of this section suggest that while cooperatives can be interesting vehicles towards economic and social development, it is unclear whether it can achieve environmental sustainability. Considering the number of different sectors in which cooperatives are present, it is important to establish the suitability of agricultural cooperatives with regards to the agricultural sector. It is in this context that the next section compares sustainability in cooperative and non-cooperative farms, to begin to evaluate whether cooperatives can achieve higher degrees of sustainability.

3.3. Sustainability in cooperatives and non-cooperative farms

The following section discusses the differences between small farmers' attitudes towards sustainability practices, with regards to the three dimensions of the TBL. The intent is to further discuss the suitability of cooperative models towards the development of sustainable supply chains. In the context of this research, it will serve to understand the challenges which cooperatives might face in applying sustainability and whether they would face less difficulties than non-cooperative organisations.

3.3.1. *Economic Dimension*

Although economic viability is a cornerstone of sustainability in agriculture supply chains, focusing solely on this aspect will not result in supply chain sustainability. A study conducted by Ikerd (2001) identified that in conventional agriculture, the practices selected by farmers, either sustainable or unsustainable, are done solely for profit. Furthermore, farmers who had adopted sustainable practices stated that this had been possible due to a positive financial situation (Fairweather, 1999).

McGuire et al. (2013), claim that sustainable management is seldom utilised by small farmers. This is supported by Leite et al. (2014), who identified that economic aspects influence the implementation of sustainable practices in both cooperative and non-cooperative farms.

However, the literature identifies a divergence between small farmer's attitudes towards sustainable practices (Chouinard et al., 2008). Many farmers have a natural respect for the environment which permeates into their practices, while others wish only to pursue profit-maximisation (Abaidoo, 2002). Despite the existence of sustainable awareness among small farmers, several studies recognise that economic factors are the drivers of decision making, especially when it comes to adopting social or environmental practices (Jan & Klein, 2011).

Research conducted by Wandel and Smithers (2000) on Canadian farmers concluded that higher profits are conducive to more implementation of sustainability. As stated by Horne and McDermott (2001), a solution for small farmers to maximise profit would be to compete in international markets. According to a study by Jang and Klein (2011), small farms are unable to produce the required efficiencies to compete in international markets. Profit growth achieved by accessing niche markets, through organic or fair-trade products, prove inaccessible to small farmers, due to the associated costs and risks (Canfora, 2016). Therefore, the conventional approach to agricultural economics, is usually not compatible with long term sustainability.

Van der Walt (2008) states that small-scale farmers through joining cooperative organisations can improve their profitability. Nonetheless, Vo (2016) revealed that, although cooperatives are financially more secure than small farmer ventures, their resources also face limitations and difficulties when competing with large private businesses. These concerns cast doubts on the economic viability of farmer cooperatives. Nonetheless, the difference lies in that cooperatives are better suited than small farmers in coping with and managing the risks associated with their processes (Ravensburg, 2009). This is because cooperatives pool together their resources and can benefit from collaborative management.

Capitalist organisations are criticised for yielding to the pressures of immediate profit instead of staring at the bigger picture and planning for futurity (Thurow, 2009). In contrast, according to the Wales Rural Observatory (2011), farmers are concerned with futurity of their business for future generations but are unable to make long-term plans due to financial uncertainty. Due to their financial situation, cooperatives could persevere in the long run by making decisions and investment in longer terms that promise to generate significant profits in the future, even if that future is distant. This is supported by a study which revealed that cooperatives tend to survive many small enterprises (Clement & Bouchard 2008).

Therefore, cooperativism becomes a very interesting formula to promote sustainable economic development through its goals focussed on people and community as well as its joint resource management that better enable them to compete and achieve economic outcomes that are difficult to reach individually (Menguzzato, 1992). This is echoed by Ciruela (2003), who argues that cooperation in the form of cooperative associations may enable farmers to receive higher profit in increasingly competitive markets. This, in turn, should enable the cooperative to invest in processes and social actions to move closer to sustainability. However, Jan and Klein (2011) point towards the opposite, arguing that farmers would make a higher profit if they were not involved in cooperatives due to not sharing profit, although this would involve higher risks due to unstable demand.

Therefore, it is the belief of this research that cooperatives, and their presence in rural areas would help stabilise vulnerable economies. Nonetheless, the financial situation of cooperatives is not clear, since they may still face economic hardships. The characteristics mentioned above, not only illustrate the close-knit relationship between the economic and social dimensions of sustainability, but also paves the way for our next subsection comparing social dimension in cooperatives and non-cooperative farms.

3.3.2. *Social Dimension*

Creating sustainable agricultural organisations, according to Pretty and Hine (2001), depends on collaboration between organisations and the public. This means establishing, for example, social initiatives like promoting education for employees and rural communities. Nonetheless, according to research by Paulson (1995), social issues are usually ignored by farmers within their sustainable management practices. This is echoed by Ikerd et al. (1997) and more recently by Collins et al. (2015), in a study in which farmers ranked social aspects the lowest behind economic and environmental factors. On the other hand, cooperatives are social organisations with strong links to the community and social issues, which should result in greater implementation of social practices. Nonetheless, researchers have uncovered cases in which farmer communities are coerced into joining cooperatives. Pinto (2009) mentions some cases in Latin America where governments play a major role in pressuring small farmers to join

cooperatives. This means that, in some cases, cooperative members might not feel empowered by joining cooperatives due to the coercive nature of their association.

Since cooperatives promote cooperation and collective action, they provide an organisational way of addressing collective socio-environmental interests. This is a key contribution to sustainable development, as according to Gertler (2001), most organisations often fail in their attempts to turn communal interests into appropriate action. Cooperatives also have strong links with social movements (Engles & Gliessman, 2015) centred on the environment, health, and education. These movements can be strategic allies for the realisation of important social practices and mean that cooperatives also help build sustainable communities that are both a goal of sustainable development and a decisive component for the implementation of social growth.

As Pretty and Hine (2001) had established, farmers will not be successful in their sustainability initiatives unless they educate workers. This is backed by Suvedi et. al (2010) who identified the absence of training as the main obstacle for farm sustainability. Since education is a cooperative principle, cooperatives can provide communities and workers with the appropriate skills to enable sustainability. Therefore, cooperatives can be effective schools for sustainable development, when compared to less sustainable forms of development. In a cooperative context, community and employee training, advanced education, and environmental awareness become more viable practices.

Therefore, cooperatives are well suited to face the challenge of developing sustainable agricultural supply chains. Their focus on developing communities through education represents a step towards a sustainable society, but it can also relate to the efficient application of other practices in that knowledge may develop sustainable change and enable environmental or economic practices. The environmental dimension within cooperatives will be discussed in the following section.

3.3.3. *Environmental Dimension*

In light of the evaluation of cooperative principles, the main impediment of cooperatives towards sustainability is that environmental stewardship is not among its ranks. This suggests that environmentally, cooperatives do not have ethical obligations, at least in writing, to be

more environmental. Nonetheless, as agricultural cooperatives work in natural resource-based sectors this could suggest that agricultural cooperatives may be more inclined to implement environmentally sustainable practices. This also might serve to illustrate how the dimensions of sustainability are interrelated and affect each other. By preserving the environment, a company is helping to provide for present and future communities, which could be considered a social prerogative.

Despite doubts on the environmental aspects of cooperatives stated at the beginning of this chapter, Leite et al. (2014) identified that the use of environmental management is greater among producers who are associated with cooperatives. These authors noted, for example, efficient resource management, biodiversity preservation and lower pesticide use among cooperative producers was more prevalent than in non-cooperatives. Therefore, it may seem environmental sustainability could be important for cooperatives, despite not being stated in its principles.

This chapter introduced the concept of Cooperatives, and discussed its principles within the context of sustainable development. Although positive correlations could be done between the economic and especially social dimensions and cooperativism, doubts remain on whether cooperatives can successfully incorporate environmental practices. Furthermore, cooperatives were compared to small farmers regarding their suitability to develop sustainably. Positive results emerged towards the cooperative movement, nonetheless questions regarding the economic viability of cooperatives in the long-term remain, as well as their commitment to environmental stewardship. Following these findings, the next chapter will present the best practices in sustainable agricultural management. This will serve to create a framework for evaluating sustainable supply chain practices of Uruguayan agricultural cooperatives, both within the organisation, and towards its suppliers. Practices will be explained and exemplified, and the interrelations (trade-offs and links) between the practices will be illustrated.

4. Best Practices in Sustainably Managing Agricultural Supply Chains

4.1. Introduction

Following the discussion on sustainability in agricultural cooperatives, this section wishes to create a framework to evaluate whether Uruguayan cooperatives are sustainable within their supply chains. This chapter identifies the best practices in sustainable supply chain management of agriculture, considering practices on organisational and supplier level. The following sections consider barriers to the implementation of sustainable practices and the trade-offs between each dimension.

According to Bausch et. al (2014), practices in sustainability are generally structured considering hierarchical levels. This is evidenced by the *Sustainability Assessment of Food and Agriculture Systems (SAFA)* guidelines developed by FAO (2014). This research follows this structure, where the hierarchy begins with a pillar of sustainability. Further down, the dimensions are broken down into blocks, which branch out to reveal individual practices. This is illustrated in Table 5 below.

This chapter proposes the creation of a separate theme within each dimension to capture the environmental, economic, and social requirements on suppliers. To create more clarity, each dimension is presented independently with its own themes and blocks of practices. Each dimension is divided into a set of blocks discussed in terms of the most common economic, environmental, and social practices implemented in agricultural enterprises towards sustainability, it does not include all practices since it would be very challenging for a single research to cover all of them.

The purpose of this section is to present the practices employed by farmers to achieve sustainability, considering the relationships and trade-offs between the different dimensions (MacDonald & Norman, 2007). These practices would later be utilised to develop a framework for evaluating the use of these practices in the supply chains of Uruguayan agricultural cooperatives.

Table 5 - Best practices in Sustainable Management in Agriculture. Elaborated by author.

Dimensions	Blocks	Practices
Social Dimension	Health and Safety	(S1) Occupational hazards prevention.
		(S2) Health and safety management system
		(S3) Contingency plans for occupational hazards.
	Growth and Equity	(S4) Fair contracts
		(S5) Fair salaries
		(S6) Member training
	Community	(S7) Transparency
		(S8) Involvement in social actions (access to education, culture, nutrition, etc.)
	Suppliers	(S10) Local suppliers
		(S11) Worker safety and fairness.
		(S12) Involvement of suppliers in social actions (access to education, culture, nutrition, etc.)
		(S9) Fair contracts
Environmental Dimension	Environmental management	(ENV1) Implementation of an environmental management system
		(ENV2) Monitoring environmental goals
	Conservation of resources and environment	(ENV3) Soil
		(ENV4) Biodiversity
		(ENV5) Energy efficiency
		(ENV6) Water efficiency
		(ENV7) Waste management
		(ENV8) Transport pollution
	Product safety	(ENV9) Reduction of chemicals in processes
		(ENV10) Traceability
	Suppliers	(ENV11) Reduction of chemicals in processes
		(ENV12) Traceability
		(ENV13) Efficient use of resources (soil, water, energy, etc.)
Economic Dimension	Short-term viability	(EC1) Positive cash flow
		(EC2) Dependence on loans.
	Long-term viability	(EC3) Long-term business plan for decision-making.
		(EC4) Involvement in international trade.
		(EC5) Investment in the organisation.
	Suppliers	(EC6) Positive financial situation

4.2. Environmental practices

The practice of environmental management in a supply chain corresponds to both internal operations and activities spanning the entire supply chain. According to Zhu et al. (2008), this involves the development of Environmental Management Systems; setting environmental goals and following through with monitoring. Moreover, long-term environmental sustainability requires the protection of resources and the conservation of biodiversity (Bennet et al., 2015). The practices identified in the literature involve the incorporation of environmental management, product safety, and environmental conservation.

The research decided to group environmental practices found in the literature into three main environmental themes related to product quality and safety, conservation of ecosystems (i.e., biodiversity, efficient resource use, waste management and transport pollution), and environmental management. The list of practices is illustrated in Table 5, above, and should not be considered exhaustive. It could be constantly complemented based on a wealth of literature on sustainability practices.

4.2.1. *Environmental management Systems*

Managing the links between agriculture, conservation of natural resources and the environment should be an integral part of the use of agriculture for sustainability purposes, the objective being the realisation of more sustainable supply chains. Therefore, according to the literature, the application of an Environmental Management System should be the cornerstone of the environmental dimension in agricultural supply chains where all the other environmental practices are built upon and monitored for improvement (Williams & Wilmshurst, 2009).

According to Van Hoof et al. (2008) Environmental management is an administrative tool that an organisation uses to achieve continuous environmental improvement. According to Williams and Wilmshurst (2009), the implementation of *Environmental Management Systems* has emerged as a response to growing concerns on environmental scandals derived from agricultural production. Nonetheless, despite its growing application in other industries, Environmental Management Systems (EMS) in agriculture is still in an initial stage. Its use in the

sector is mostly contained in developed countries (Grolleau et al., 2007), where Australia is recognised as the world leader in this respect (Carruthers & Vanclay, 2012).

Within environmental management companies can adopt different practices which provide guidelines for improving the way environmental impacts are managed (Williams & Wilmshurst, 2009), the motivators for adopting an EMS are, on the one hand, the monitoring of environmental objectives in terms of the impact on the environment (Van Hoof et al., 2008), and on the other hand, economic factors such as greater access to markets and differentiation of products (Carruthers & Vanclay, 2012). Nonetheless, a study conducted by Cary and Roberts (2011), revealed that farmers did not implement EMS unless there were financial incentives to do so. This suggests that financial benefits are a stronger driver than environmental stewardship to commit to sustainability.

Much of the difficulties regarding the application of EMS in agriculture spawns from the belief that the implementation costs are high (Grolleau et al., 2007) and that it requires training employees (Williams & Wilmshurst, 2009). Therefore, a connection can be made between the economic and social dimensions with regards to the use of this practice. While economic viability of an organisation must be considered before applying an EMS, there must also exist within the organisation a culture of employee training (social dimension).

Sustainability has many dimensions and uses environmental practices to preserve water, air, soil, and natural resources. Therefore, these conservational practices will be discussed in the following section.

4.2.2. Conservation of resources and the environment

Considering that agriculture is one of the predominant land uses in the world, occupying about 40% of the land area according to FAO (FAO, 2013), it is fundamental to promote the conservation of biodiversity and resources in agricultural operations. The main issue that emerges with regards to the environmental dimension is the indiscriminate use of natural resources in agriculture. Scholars and international organisations defend the need of more efficient water management (Romero et al., 2012), energy management (Sims & FAO, 2011), soil conservation, waste reduction management and the reduction of transport pollution. One

of the barriers to resource conservation in some countries may be the low prices of resources (Dorward, 2013), which makes farmers use resources indiscriminately.

The efficient use and reuse of wasteful by-products in agriculture is presented as a sustainable solution to avoid waste of water and other inputs, since the technique is aimed at controlling negative impacts on the environment (Wassenaar et al., 2014). Although many studies agree that utilising agricultural by-products, like manure or composting, present benefits such as improvements in soil quality, its application among small farmers faces limitations (Westerman & Bicudo, 2005). This is mainly because if not done properly, waste management can cause potential life hazards (Lindgren, 2003).

A waterborne E-Coli epidemic in 2000 is an example of waste management gone wrong. In 2000 a rural community in Canada became ill when a town's water supply was contaminated because of manuring a field (Lindgren, 2003). It is for this reason that scholars suggest that some forms of waste management practices may face limitations in their application due to public fears of contamination (Westerman & Bicudo, 2005). Nonetheless, others argue that this can be countered by educating the farming population on correct management of waste (Wassenaar et al., 2014). Therefore, this section, reiterates the interconnectedness of sustainability management practices and the trade-offs that exist between the dimensions. It is important that when identifying practices, the company also specifies reduction goals and trains employees.

Moreover, from an economic perspective, it can be beneficial to incorporate resource conservation and waste management, due to cost reductions obtained by efficiently employing resources (Pannell et al., 2014). Nonetheless, some scholars claim that implementing these actions may prove challenging, mentioning that if not enough resources are invested and training is not correct, productivity might decrease (Pittelkow, 2015). This reinforces the links between the dimensions, while economic resources are needed to invest in environmental practices, economic benefits can also result from the efficient use of resources.

4.2.3. *Product safety – use of chemicals and traceability of products*

Agriculture interacts with the environment in various ways that directly affect human health. Therefore, it is essential that companies make sure they are using approved chemical substances in their production (Cilberti et al, 2008), and are able to trace back the safety of their supplier's products, this proves even more important in goods for human consumption. Agricultural supply chains are very susceptible to security issues (Whipple et al., 2009). On the one hand, this is due to the importance of product safety, since most agricultural products are ultimately for human consumption and, therefore, must be produced bearing health implications in mind (Akkerman et al., 2010). On the other hand, Voss and Whipple (2009) suggest that there are safety risks that can emerge in the current structure of supply chains which are long and global.

The potential harmful effects of the indiscriminate use of pesticides, both in soil and society, has been documented for decades (Aktar et al., 2009). In addition to affecting soil quality, contamination also affects workers and consumers (Zhang et al., 2016). Nash and Hoffmann (2011), promote the reduction of pesticide use through correct pest monitoring. This is echoed by Gomiero et al. (2011), who add that entirely eradicating chemicals from production is the most effective way to ensure product safety.

The results of a study conducted as a collaboration between Nordic countries (Hjorth et al, 2011) showed that fruits and vegetables from South America have a higher frequency of pesticide residue than those of European origin. The authors attributed this to a lack of training in developing countries, and the use of chemicals to increase productivity. This claim is also supported by a study by Fan et al (2015), which added that sustainability in China is threatened by the extensive use of pesticides. This has negative effects on the community, environment, as well as the entrance of Chinese products to international markets. This further illustrates how a sustainable practice, or unsustainable in the case of Chinese agriculture, can affect other dimensions such as hindering economic growth by hindering its entry to international markets.

Therefore, the harmful use of chemicals in production can affect both the environment and society (workers and community) making it more relevant to approach sustainability from an integrated perspective. Therefore, within the supply chain context, organisations should

concern themselves with ensuring that the inputs they are purchasing, as well as what is leaving their organisation is free of harmful chemicals, it is within this context that traceability plays an important part.

Traceability is understood as the tracing and tracking of products along all stages (Matopoulos et al., 2012), to ensure compliance with product requirements. This, in turn, allows for the generation of trust in the safety of a product in all stages of the supply chain (Chrysochou et al., 2009). To the extent that certifications are developed, traceability has gained relevance and has even become mandatory in the consumer markets of developed countries (Mosquera et al, 2013).

In the last decade, global beef exports have been threatened by scandals regarding mad cow disease (BBC, 2015), which triggered the emergence of more strict standards for livestock with regards to traceability. It is for this reason that livestock was a pioneer in the application of traceability in the agricultural sector, unlike the fruit and vegetables sector which continues to face problems in its application mostly due to low returns on implementation costs (UNCTD, 2015).

Although competing in international markets is an incentive for incorporating traceability (Maldonado-siman et al., 2012), due to the promise of higher profit margins, however, it is worth noting that progress in traceability worldwide is far from satisfactory, as there are many obstacles that still need to be addressed if systems are to be considered effective. The most common detriment in adopting traceability is the high capital investment, due to the necessity of training workers and implementing new technologies (Bosona & Gebresenbet, 2013). Therefore, it is important that organisations have a positive economic situation, and training programs in place to effectively implement traceability. This further illustrates how economic, environmental, and social practices are connected.

4.3. Economic practices

The following subsections discuss the ways to evaluate economic practices in terms of short and long-term economic sustainability. The appropriate links will be drawn between economic practices and the application of other dimensions.

4.3.1. *Short-term viability*

A research by Koleda, et al. (2010) on economic viability in agriculture revealed that there is a great variation between countries in what makes farms economically viable. Slavickiene and Savickiene (2014) add that these differences derive from the different natural environments, government policies, and access to markets, etc. Due to these differences, this research will follow Slavickiene and Savickiene's (2014) suggestions on incorporating practices that evaluate the organisation's current financial position.

According Olde et al. (2016), measuring cash flow and level of indebtedness is a good initial way of evaluating a farm's current economic position. Nonetheless, differences between sectors can still influence both cash flow and dependence on loans. For example, dairy production generally generates a relatively uniform cash flow throughout the year, while fruit production has a temporary cash inflow due to greater seasonality (Derpsch & Friedrich, 2009). This suggests that evaluating an agricultural company's current financial position, especially in some sectors, at one given time might offer only an image of their economic viability that is true only for that given moment and does not reflect the wider picture. Therefore, it is important to assess long-term viability, which will be discussed in the following subsection.

4.3.2. *Long-term viability*

Sustainable economic management, within the agricultural context, is defined as the management of agricultural operations to ensure the achievement of economic gains for present and future generations (Pretty et al., 2014). One of the main words that stands out from this definition is the creation of benefits for future generations, as well as present. What can be inferred from this is that organisations must not only pursue short-term profitability but be able to create long-term plans to provide benefits for future generations. As mentioned in chapter 3, companies usually face challenges when it comes to long-term planning because of the pressures of obtaining immediate profits (Thurow, 2009).

An important part of long-term viability, should also be the investment level of the organisation for its continued improvement (Gerdessen & Pascucci, 2013). According to Bruwer et al. (2014) higher profits enable greater investment capacity among farmers, and as stated by, the United Nations Conference on Trade and Development (UNCTD, 2014) international

trade is a powerful catalyst for economic development. Empirical studies support this assertion with strong evidence that increased participation in international trade can stimulate economic growth (Shahbaz et al., 2013), which can be considered a necessary condition for achieving broader environmental and social development outcomes.

Considering that developing countries can access higher profitability in international markets (Anderson, 2010), this type of trade places countries in a better position to promote their social and environmental development goals as it has already been discussed that economic factors affect the implementation of social and environmental issues. Furthermore, due to the high sustainability standards in the international markets of developed countries (Chiputwa, & Qaim, 2016), international trade enhances the diffusion of environmental goods and services and environmentally friendly production methods and processes in all countries.

However, commercialising in international markets does present issues to sustainability. Despite the economic benefits international trade can affect the environment by impacts caused by greenhouse gas emissions from transporting products over long distances (UNCTD, 2014). This further illustrates the trade-offs between sustainable dimensions, in that economic development by commercialising in international markets carries a negative environmental footprint.

4.4. Social practices

The social dimension is related to the continued satisfaction of basic human needs and the growth and safety of communities (Elkington, 2002). For the purposes of this research, Social practices have been divided into three blocks: Health and Safety, Growth and Equity, and Community involvement. This was done according to the perceived links between the different practices.

4.4.1. *Health and Well-being*

According to Sustainable Agriculture Initiative's 2015 Principles and Practices for Sustainable Dairy Farming, fair and safe work conditions should be at the forefront of social practices in agriculture (SAI, 2015). The literature identifies a high incidence of occupational

risks for farmworkers in developing and developed countries alike, where workers face hazards related to exposure to chemicals, machinery, and the environment (Hennebry et al., 2010). Therefore, it is important that agriculture is done in a way that preserves the well-being of workers.

Research suggests that the assurance of safe working conditions should be done by training employees (Vyas, 2012), jointly with the incorporation of protocols to prevent and react to workplace related accidents (Hagel et al., 2013). The practices in the Health and Safety block in this section, therefore, are concerned with how the organisation manages to maintain a good working environment, which involves the observance of safety protocols such as a safe workplace and emergency protocol compliance (Heizer & Render, 2008).

Nonetheless, Hagel et al. (2013) revealed that farmers with economic problems were more likely to have laxer safety protocols and high incidence of work-related accidents. Workers may work for more hours to increase productivity (Hall, 2007) and by doing so increase the occurrence of accidents. This illustrates how economic factors affect the safety of farm workers and reiterate some of the interconnections that exist between the dimensions making it that more important for an equilibrium to be reached.

4.4.2. *Equity and Growth*

The Growth and Equity block concerns firstly the fair conditions related to labour laws such as fair living wages and fair contracts (Nelson & Treviño, 2010). This block supports that all workers are given equal rights and fair payments, as well as granting opportunities to vulnerable workers to improve their lives.

A recent case of unfair work conditions is presented in a study conducted by Leland (2006), who uncovered the working conditions of illegal immigrants working in United States farms. Many farms were found to be employing illegal employees, who worked more hours and received lower salaries than legally employed personnel. Management should ensure that processes are conducted in complete regard for fair conditions, and within the supply chain context, it is reasonable to assume that organisations should ensure that suppliers also keep up to the same standards.

Moreover, a company that wishes to be socially sustainable should also concern itself with the continued growth of its employees, offering training platforms to learn and develop (SAI, 2015). In the previous sections, this had been identified as a factor that affects the effective implementation of environmental practices as well, further proving the interconnections between dimensions. According to SAI (2015), another important feature of social practices is community involvement, which will be discussed briefly in the following subsection.

4.4.3. *Community Involvement*

The support of communities and social movements is identified as important since it allows to improve the inclusive capacity of organisations (De Schutter, 2010). Pretty (2003), claims that through involvement in social initiatives, farms can be an effective lever for community inclusion and development. Pretty (2003) identifies that organisations can help develop communities by implementing social initiatives. Table 6 identifies some of the community initiatives in which farms have been involved with.

Table 6 - Social actions for community development. Elaborated by author based on literature review.

Social Initiatives	Author
Access to education.	Bortoleto & de Moura (2012), Engles & Gliessman (2015), Di Iacovo et al. (2016), Hooks, et al. (2017).
Culture	Sumner et al (2010)
Food/nutrition.	Engles & Gliessman (2015)
Environmental awareness.	Engles & Gliessman (2015), Garcia-Llorente, at al. (2016)

These practices are oftentimes developed by private farms or cooperatives (Di Iacovo, 2016) in collaboration with different government or NGO organisations, or other voluntary associations. An example of these kinds of community activism is the existence of a law in Brazil, which mandates that agricultural cooperatives must create a reserve specifically for community education and other social initiatives (Bortoleto & de Moura, 2012).

However, no articles in the literature suggest these activities are carried out by small farmer organisations, this might be down to the high costs of investing in these activities (Garcia-

Llorente et al., 2016), or due to the lack of regulations regarding compliance with these initiatives specifically for small farmers (Bortoleto & de Moura, 2012). This is supported by FAO (Derpsch & Friedrich, 2009) who highlights that it is down to governments to promote the adoption of social practices.

As a second component to the community block, Beske et al. (2014) highlight the importance of transferring knowledge and information to stakeholders for successful sustainability practices. In this context, transparency plays an important role in sustainable supply chain management. A recent scandal from the Brazilian meat supply chain had international repercussions and strengthened the need for increased supply chain transparency.

In the beginning of 2017 it emerged that several of the main Brazilian meat producers adulterated meats with chemical products to hide that the products were rotten and did not meet international standards for export (BBC, 2017). This issue reinstates the importance that producers be committed to transparency in their activities, not only to inform of product safety and environmental practices, but to reflect their sincerity to sustainability. Therefore, companies have a responsibility to communicate to stakeholders the aspects related to their production practices. It can be interpreted, that when it comes to a company that incorporates sustainability into its practices, through transparency they should demonstrate how their activities benefit and develop the organisations, its employees, and the community.

4.5. Sourcing

According to Nelson and Treviño (2010), creating sustainable supply chains means that organisations must understand that it is not enough to only incorporate sustainable actions. Supplier's practices must also be accounted for, because they affect overall sustainability. Furthermore, this could potentially impact the company's reputation (Gualandris et al., 2015). Therefore, organisations must demand sustainability from their suppliers and monitor them to ensure that they share the same principles and act upon them.

Nonetheless, Faustini and Alves (2009), revealed that companies in Brazil are not concerned with controlling their suppliers' sustainable practices if the actions of suppliers do not negatively impact the company's quality, safety, or brand image. This is an issue that could

jeopardise the company's overall sustainability, making it that more important that organisations consider suppliers as an extension of their own sustainability pursuits.

Taking into consideration the sustainable practices exposed in this chapter (economic, environmental, and social), and what has been mentioned in this subsection on suppliers, it is important that the sustainable practices within the organisation be taken as requirements for suppliers as well. Therefore, the practices mentioned above should be extrapolated into another block contained in each dimension to evaluate the organisation's criteria for sustainable suppliers.

Pretty et al. (2008) state that sustainable practices should make efforts to employ local resources efficiently. In line with this, Ilbery and Maye (2004) argue that farmers determine their suppliers mainly by price. Nonetheless, prioritising inputs sourced from the local community, would benefit communities by pooling in these transactions into the local economy. This allows economic benefits to revert to the rural population, enabling the growth of local economies and improving the livelihoods of communities. Furthermore, prioritising local suppliers would also impact the organisation's economic and environmental results. On the one hand, the organisation could save money on transportation due to shorter distances to supplier production facilities (Brunori et al., 2016). Secondly, shorter transport distances translate to reduction of CO₂ emissions.

5. Research Methodology

5.1. Introduction

This chapter will present the formulation of the research design and methodology for this study. The study proposal, population and sample will be defined, as well as the tools for data collection, including the methods applied to uphold validity and reliability.

5.2. Research Aims

This research has identified a gap in the literature, and confirmed that no research has been conducted on the correlation between the cooperative model and achieving sustainable management in supply chains. The intent of the survey is to evaluate whether cooperatives are better equipped than traditional agricultural enterprises to achieve sustainability in their supply chains. To achieve the purpose of this study the following objectives were established:

- 1. Understand the importance of sustainably managing agricultural supply chains in Uruguay.**
- 2. Examine the suitability for sustainability of agricultural cooperatives and non-cooperative farms.**
- 3. Identify current best sustainable practices in agricultural organisations, considering potential barriers to their implementation.**
- 4. Evaluate the sustainable practices employed in the supply chains of Uruguayan agricultural cooperatives.**

The **first objective** seeks to provide background information on the main concepts of the research. The purpose is to define Sustainable Development and introduce its implications towards supply chain management in agriculture, specifically within the context of Uruguayan agriculture and its cooperatives.

The **second objective** is partially addressed in the literature review, however, due to the lack of literature on sustainable supply chain management in agricultural cooperatives it proved necessary to resort to primary data collection methods. As discussed in chapter 2, to be considered truly sustainable a cooperative would have to successfully meet the conditions of the Triple-Bottom-Line (Elkington, 2002), implementing both social and environmental practices identified in the literature review while remaining economically viable as an

organisation. How both cooperatives and non-cooperatives approach sustainability will be discussed and contrasted.

The **third objective** reviews the current sustainable practices employed in agricultural supply chains and the perceived barriers to their implementation. This objective serves to fulfil the fourth and final objective, because the best practices identified will be used to create a framework for evaluating sustainability in Uruguayan agricultural cooperatives.

The **fourth objective** is resolved by referring to both the secondary data collected in the literature review, primarily on the findings of objective 3, and the primary data identified in the data collection and analysis. Links will be drawn with the literature review to answer the objectives. While the first and third objectives can be achieved by conducting an extensive literature review through the collection of secondary data, the second objective will also need to draw on the primary data analysis to resolve cooperative's suitability to sustainable supply chain management.

5.3. Research Philosophy

Before defining a research approach or method, it is essential to understand the different research paradigms which support the study. A research paradigm is related to certain beliefs and assumptions an individual has about reality, about how things are and how human knowledge is constructed (Saunders et al, 2009). The paradigm resulting from these beliefs and assumptions is what guides the present research methodology and development.

The literature is mainly divided into two camps, defending different philosophical positions: Positivism and Interpretivism. On the one hand, the positivistic paradigm believes in a unique reality that can be measured reliably using scientific principles (Saunders et.al, 2009). On the other hand, the interpretative paradigm supports the existence of multiple realities. These realities can present various interpretations depending on the researcher's own perspective (Onwuegbuzie and Leech, 2005). Therefore, interpretivism relies on subjectivism and is not so easily measured in a reliable way (Saunders et. Al, 2009). Nonetheless, some scholars argue that the two paradigms represent the extremes of a spectrum in which researchers can position themselves according to their own philosophical inclinations (Collis and Hussey, 2003).

The present research falls between the spectrum of positivism and interpretivism, the researcher objectively analyses the information to reach the objectives of the study. This approach influenced the selection of a mixed research method combining quantitative and qualitative research. This method which collected and analysed both quantitative (closed-ended) and qualitative data (from the literature review). Although the survey created prioritised the use of closed ended questions, some open-ended questions prove necessary, which lend themselves to qualitative analysis and interpretation. Furthermore, a qualitative evaluation will be necessary to compare the primary data gathered on sustainability in cooperatives, with those in non-cooperative agricultural enterprises, through secondary data collected from published, secondary data in the literature review.

5.4. Research Approach and Design

Within the context of this research and its objectives, the *deductive approach* was selected as the research approach. This approach enables the researcher to prove or disprove a hypothesis through empirical methods (Saunders et al, 2009). In this case the hypothesis, that agricultural supply chains of cooperatives are more sustainable than traditional agriculture enterprises, will be tested by means of the literature review and survey.

The survey method was identified as the most suitable for the evaluation of sustainability in agricultural cooperatives. Mouton (1996) described the survey as a data collection method that gives insight on a group of individuals (i.e. population). The information collected, for example, can be related to the target population's features or views on certain topics. The main features of this method are the interest in producing quantitative descriptions of a population by making use of a predefined instrument, usually a questionnaire (Lancaster, 2005).

The research presents the characteristic of being cross-sectional, since the intention is to describe and analyse the state of the variables at a given moment. This one-off analysis was selected as the most appropriate due to time constraints (Saunders et. al, 2009). Furthermore, the data collection was conducted online due to the geographical distance of the researcher and the participants.

5.4.1. Survey Population

A population is defined as the entire set of elements necessary (events, individuals, or objects) to be included in a study (Saunders et. al, 2009). Therefore, the sample of the population would be a selection of elements or individuals examined to understand a total population (Mouton, 1996).

The population sample for this research was comprised of all the agricultural cooperatives associated to the CAF organisation in Uruguay. CAF (Federated Agriculture Cooperatives) is an organisation which offers support and guidance to an estimated 13,000 individuals throughout the country which work in agricultural cooperatives. At present, 24 agricultural cooperatives associated to CAF are active in production (CAF, 2016).

With regards to the territory variable cooperatives had to be within the boundaries of Uruguay. Regarding sector, it was decided to group the different agricultural sectors into six large groups 1) Livestock 2) Production of fruits and/or vegetables. 3) Dairy 4) Products for animal feed. 5) Seed. 6) Wool. The criterion applied for this grouping was based on the agricultural sectors in which cooperatives operate in the country (CAF, 2016).

5.4.2. The Sampling Criteria

The sample used in this study was probabilistic, since all elements of the population had the same chance of being selected, which made the results generalizable. Respondents included in the population sample were selected to meet the following criteria:

- Be a member of an agricultural cooperative.
- Occupy a managerial position in the cooperative. Even though all cooperative members, because of the inclusive governance system, would be able to respond the survey questions, the selection of the respondents was done taking into consideration two factors. Firstly, individuals with roles that are associated with office work would be able to answer the online survey with more ease as part of their daily work routine, whereas individuals which are involved in activities outside the office, including manual labour, might not have such immediate contact to a computer/tablet for accessing the survey.

Participation in the survey, in that case, might deter their work activities. Secondly, managerial members would have more knowledge regarding economic position of the company, and specific social and environmental practices employed.

- Be willing to participate.
- Be 18 years or older.
- Be of any gender or race.

The participants of the survey are individuals in managerial positions in agricultural cooperatives operating in different agricultural sectors. The selection of the population may have limitations due to the assumption that all agricultural cooperatives are registered with the CAF organisation. There is a possibility that cooperatives outside the organisation are not represented in this study, nonetheless there is no available information regarding their existence neither in CAF's records (CAF, 2014) nor in the national census on cooperatives (INE, 2016).

5.5. Instrument for data collection

Data was collected from both primary and secondary sources. Secondary data was retrieved from peer-reviewed articles, books, and online newspapers to establish the framework for the research as well as answer some of the objectives. The lack of studies on sustainability in the supply chains of agricultural cooperatives drove the need to select an instrument for primary data collection as well.

The primary data collection instrument was a questionnaire/survey based on a sustainability evaluation framework constructed from the literature review. An advantage of using questionnaires is that they are a standardized data collection tools (Sapsford, 2007) therefore the information collected is easier to quantify.

Bearing in mind the research objectives and following an extensive literature review, the questionnaire was chosen because of the following reasons:

- Applying a questionnaire requires low time and effort for the researcher (Hopkins & Gullickson, 1989). This is important, considering that the survey population is located

thousands of miles away from the researcher, spread across Uruguay.

- Online surveys may allow respondents to remain anonymous and answer questions more truthfully.
- It offers uniformity of measurement due to its standardised structure.

However, the use of questionnaires faces limitations such as the prospect that respondents may not answer the questions accurately and may respond what they believe the surveyor wants to hear (Hopkins & Gullickson, 1989). The anonymity of the online questionnaire and the fact that respondents are completing it at their own pace and convenience, might help ensure that the answers are sincere. In addition, due to the brevity of the answers valuable, in depth, information may be lost (Hopkins & Gullickson, 1989).

Continuing with the disadvantages of this method, Couper (2011) refers to the large number of responses that can be missed when the questionnaire is sent by email. As a solution to this problem, the percentage of missed responses was reduced thanks to the collaboration of the CAF organisation, which assisted by sending frequent reminders to the cooperatives. As CAF represents the guild of cooperatives, the organisation has more leverage to persuade respondents to complete the survey and hence achieve a higher response rate.

Furthermore, online accessibility issues for the cooperatives are not a concern for this survey. All cooperatives registered with CAF have a strong online presence either through websites, blogs, or Facebook pages. CAF's website encourages visitors to contact the cooperatives and provides their emails, website addresses and phone numbers (CAF, 2017). Nonetheless, if the internet access were unreliable and a cooperative was unable to complete a survey, respondents would have to be alternatively contacted through the phone to complete the survey via telephone call. However, this method is more intrusive and jeopardises the anonymity of respondents, which is not desirable. Despite the limitations and drawbacks pointed out, the obvious advantages of the questionnaire should not be ignored.

5.5.1. *Ethical Concerns*

Ethical considerations were observed, among these the assurance of the confidential and anonymous nature of the information collected. Informed and voluntary consent was essential, and it was maintained by providing potential respondents with a Participant Information Leaflet (included in Appendix B). No Consent form was provided prior to applying the survey because completion of all or parts of the survey is considered as given consent and permission to use the data provided.

The Biomedical & Scientific Research Ethics Committee (BSREC) from the University of Warwick certified that the research was being conducted under its ethical code. The ethical approval is included in Appendix A, under reference number: REGO- 2017-WMG-0242.

5.5.2. *A Framework for Developing the Survey Questionnaire*

A systematic review of the literature uncovered that no studies have evaluated the sustainability of cooperatives' supply chains. The third objective of the research aimed to present the best practices in sustainable supply chain agriculture, for which the best practices in sustainable agriculture were collected and discussed.

The first step in developing the questionnaire was the identification of sustainable practices from the literature. These practices should cover the, previously mentioned, Triple-Bottom-Line dimensions (economic, social, and environmental). The identification of sustainability practices was done by reviewing and selecting those that could be applied to all agricultural sectors.

The literature search was performed using primarily Google Scholar, Proquest, Science Direct, and Wiley databases with a combination of the keywords "agriculture", "sustainability", "supply chain", and "practices". The resulting framework incorporated a block within each dimension which represented the economic, social, and environmental requirements placed by the organisation on suppliers (*refer to ch. 4*).

This framework should be understood as a broad approach that incorporates the relationship between agriculture and the global environment and the social, economic, dimensions. Sustainability must be seen as a permanent search for new points of balance

between these different dimensions that can be conflicting with each other (Caporal & Costabeber, 2013). Therefore, dimensions are interrelated and practices affect each other.

This framework, illustrated in Figure 4 below, is what guides the survey questionnaire and considers that agricultural systems should be perceived as a complex ecosystem, considering the environmental effect of agricultural practices, incorporating the environmental and social cost into the economic equation of production and its extension towards suppliers as well as community. One of the differences of this framework with the approach of traditional intensive agriculture is that it seeks solutions in accordance with the needs and aspirations of the communities, as well as in the prevailing environmental and economic conditions.

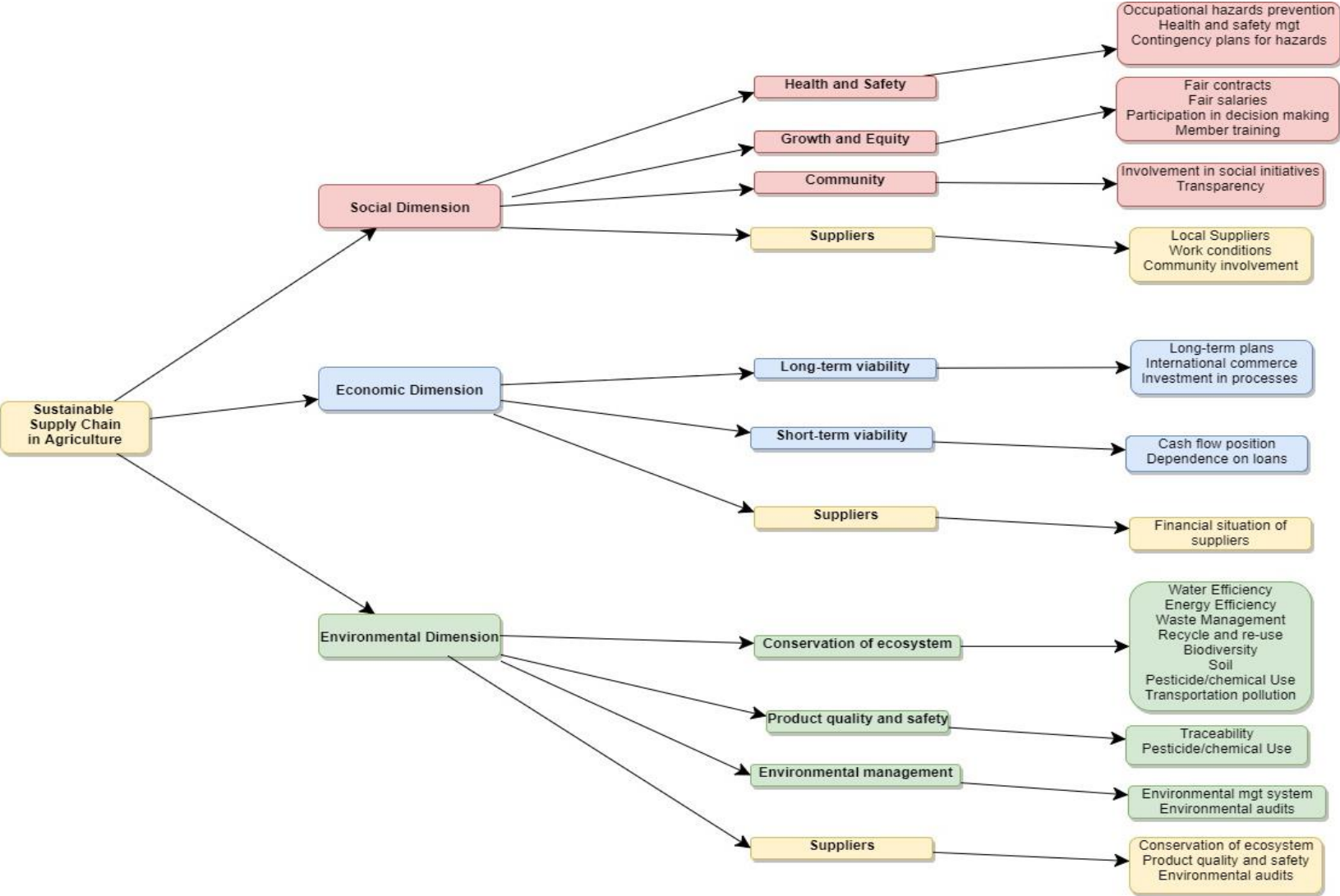


Figure 4 - Framework for evaluating sustainability in agricultural supply chains. Elaborated by author, based on Chapter 4 Findings.

5.5.3. *Developing the Questionnaire*

The questionnaire prepared for this survey is based on the findings from the literature review, mainly on the sustainable practices identified in agricultural supply chains (pictured in Figure 4). To measure the implementation of these practices in cooperatives, the use of closed questions was prioritised because they are easier to tabulate and statistically analyse (Ruane, 2005). Closed questions were used throughout parts 2 to 5 except for part 1, where multiple choice questions with open ended options were used for gathering background information on the companies. The closed questions used a 5-point Likert scale, where 1 represents *Totally Unimportant* or *Strongly Disagree* and 5 represents *Extremely Important* or *Strongly Agree*.

The questionnaire (*available in Appendix C*) has the questions grouped and ordered in five parts, namely:

Part 1 - Cooperative background information. This section is comprised of 4 multiple choice questions. The first two questions are about the size and agricultural sector of the surveyed cooperative. The third and fourth ones inquire whether the cooperatives apply sustainable practices, and their reasons to do so, respectively. This section is the only one that includes open questions and dichotomous questions (questions with only two possible answers). These are necessary when trying to gain background information on the cooperatives. The answers to these questions will not achieve the objective of the survey, namely to establish whether the cooperative is sustainable, however the answers might shed some light on how different characteristics may affect sustainability in the cooperative (example, size, agricultural sector of the cooperative).

Part 2 - Evaluation of the Social Dimension. Part 2 consists of three sections: the first section seeks to identify the practices with social implications applied within the cooperatives (worker health, safety, and growth) from a table to be marked comprised of 7 items. The second section consists of social actions concerning the community (outside the cooperative). Options are identified from a table comprised of 2 items. The third section asks the respondents to rank social actions in order of importance for the cooperative.

Part 3 -Evaluation of the Environmental Dimension. Part 3 seeks to identify the environmental practices applied by the companies from a table to be marked, comprised of 10 items (regarding efficient resource management, waste management, reduction of pollution,

and safe use of chemicals, etc).

Part 4 –Evaluation of the Economic Dimension. The aim of this section is to assess the economic performance of the organisation. Its main blocks consist of practices that evaluate short and long term economic viability. Questions are in a table to be marked, comprised of 5 items.

Part 5 – Evaluation of Sustainability in Suppliers. This part seeks to evaluate whether the implementation of sustainability practices translates into sustainable requirements for suppliers. It seeks to identify which sustainable dimensions are most valued by the companies during the process of selection of their suppliers (from a table to be marked with 9 items (being: environmental, social, and economic dimensions, etc).

The implementation of a pilot test is crucial since it tests the data collection method and can suggest modifications before the complete sampling (Ruane, 2005). A trial run was conducted, and the questionnaire is expected to take the respondents no more than 10 minutes to complete. The web-based questionnaire was created and distributed using the Qualtrics website. A template of the Survey questionnaire is available in Appendix C.

5.6. Data analysis methods

The analysis of the qualitative data consisted of a qualitative evaluation of the findings of the literature review. Kelder (2005) defends the use of secondary analysis of qualitative data to review the primary data findings from multiple perspectives. This enables the researcher to view the findings in a different light from those provided by previous studies. According to Moore (2006), using data from previous studies saves time, avoids unnecessarily overloading research participants, and adds confidence to the interpretation of the primary data itself. Nonetheless, it is criticised for being highly subjective (Ratner, 2012), relying on the researcher's philosophy and bias for interpretation.

All questionnaires answered were analysed and tabulated in spreadsheets prepared in the IBM SPSS Statistics and Microsoft Excel. From this data, the following analyses were performed:

Descriptive statistics. The primary data collected from the survey will be analysed on several

levels moving up the hierarchical level of the evaluation framework. Firstly, the data will be assessed on individual practices, followed by the blocks, and finally on overall results for each dimension. To this purpose, the descriptive statistics provide insight into the most valued sustainability practices by cooperatives within the company and with regards to the supplier selection process.

The mean and standard deviation were calculated for each block of the survey. Average mean scores for each practice were calculated and listed in descending order to list the most valued practices by order of importance. Furthermore, the standard deviation was also presented in order to understand how responses varied between respondents.

5.7. Reliability

Ensuring that procedures are *reliable* is a fundamental step in ensuring that results can contribute to the research field (Lancaster, 2005). Reliability certifies that the procedures used in the study could be successfully implemented in other studies with the same level of accuracy. To ensure reliability of procedures, this research calculated *Cronbach's alpha* for the results on the sustainable practice blocks using the IBM SPSS Statistics application. According to Hair et al. (2009), Cronbach's alpha varies from 0 to 1.0, where 0.6 is the lowest accepted value for the data to be considered reliable.

The methodology followed in this research used practices contained within the Triple-Bottom-Line triad of dimensions, to assess the sustainable supply chain of Uruguayan agricultural cooperatives. Cronbach's alpha was employed to measure reliability, although the coefficient was not applicable in terms of the economic evaluation of suppliers because only one item was evaluated rendering the Cronbach alpha unusable (Gliem & Gliem, 2003).

5.8. Chapter summary

This chapter presented the research methodology of this study, given the gap identified in the Literature Review for supply chain sustainability in agricultural cooperatives. The philosophical approach selected was a mixture of positivism and interpretivism, given the need to analyse both qualitative and quantitative data to fulfil the objectives.

In terms of data collection, applying a survey on the entire agricultural cooperative population was deemed the most appropriate, despite its limitations. Nonetheless, measures were taken to ensure limitations were countered. The data collection and analysis was conducted considering generalisability and reliability of research results, and in view of ethical concerns.

The following chapter will present the findings of the data collection and analysis to fulfil the research problem and objective.

6. Results and Data Analysis

6.1. Introduction

The following chapter presents the results of the data analysis for the qualitative data (from secondary sources) and quantitative data (from survey). The collection and subsequent analysis of the data was done in response to the problem posed in chapter 1 of this dissertation. Two main goals drove it: namely to develop an understanding of sustainability in agricultural cooperatives as opposed to that of non-cooperative farms, and to fill the gap existing in the literature with regards to supply chain sustainability in agricultural cooperatives. The findings presented in this chapter demonstrate the potential for future study in this area.

Figure 5 presents the structure of this chapter:

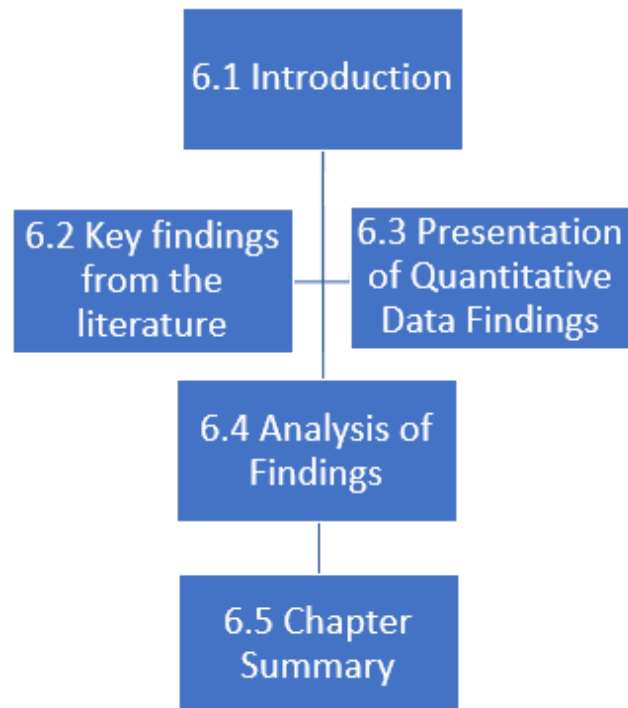


Figure 5 - Structure of Chapter 6. Elaborated by author.

The next section will present the key findings from the literature, which will assist in the analysis of the data.

6.2. Key findings from the literature

The literature review contains the results of the first stage of this research. As had been discussed in the Research Methodology chapter, the research objectives will be resolved by qualitative data (from literature) and quantitative data (from survey). The researcher has reviewed the literature relevant to the study and this section presents the key findings of those chapters, which will assist in the analysis of the research findings. Key findings are presented using figures and tables to ensure continuity and clarity before the analysis of results.

The **first** aim of the research was to understand the importance of sustainably managing an agricultural supply chain in Uruguay. The chapter findings, illustrated in Figure 6 below, introduced the concepts of sustainable development and its influence on various sectors, mainly supply chain management and more specifically towards agriculture in Uruguay. It described the landscape of agricultural cooperatives in Uruguay and proposed cooperatives as a vehicle to achieve supply chain sustainability. This second chapter of this study identified a gap in the literature regarding sustainable supply chain management in agricultural supply chains, which set the foundations for the research. Figure 6 presents the main theory presented in the literature and the challenges that emerged from those theories. Lastly, under *Findings*, the researcher's critical evaluation of both theory and challenges to present the main outcome of the critical discussion.

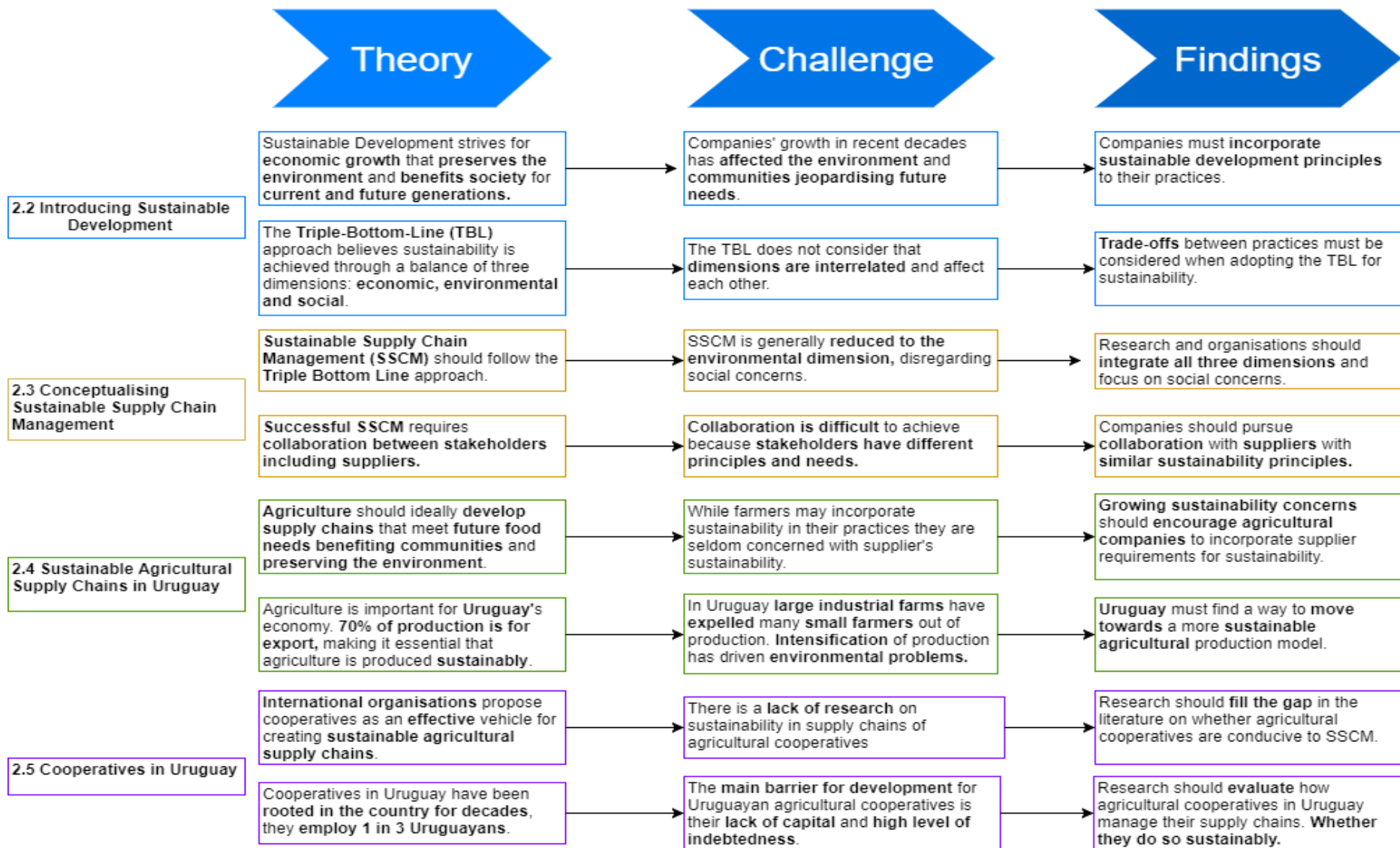


Figure 6 - Key Findings from Chapter 2: The Challenge of Sustainable Supply Chain Agriculture in Uruguay. Elaborated by author.

Following Chapter 2, **aim 2** was created to understand the suitability of cooperatives in applying sustainability in their organisations as opposed to smallholder farms. The research established that the concept of cooperativism has convergence with that of sustainable development where economic development is aligned with social growth. The Venn diagram below (Figure 7), illustrates where the principles of Cooperatives fall within the dimensions of the Triple-Bottom-Line. It can be perceived that while economic and social goals are aligned with TBL dimensions, environmental principles are lacking for cooperatives to be considered truly sustainable.

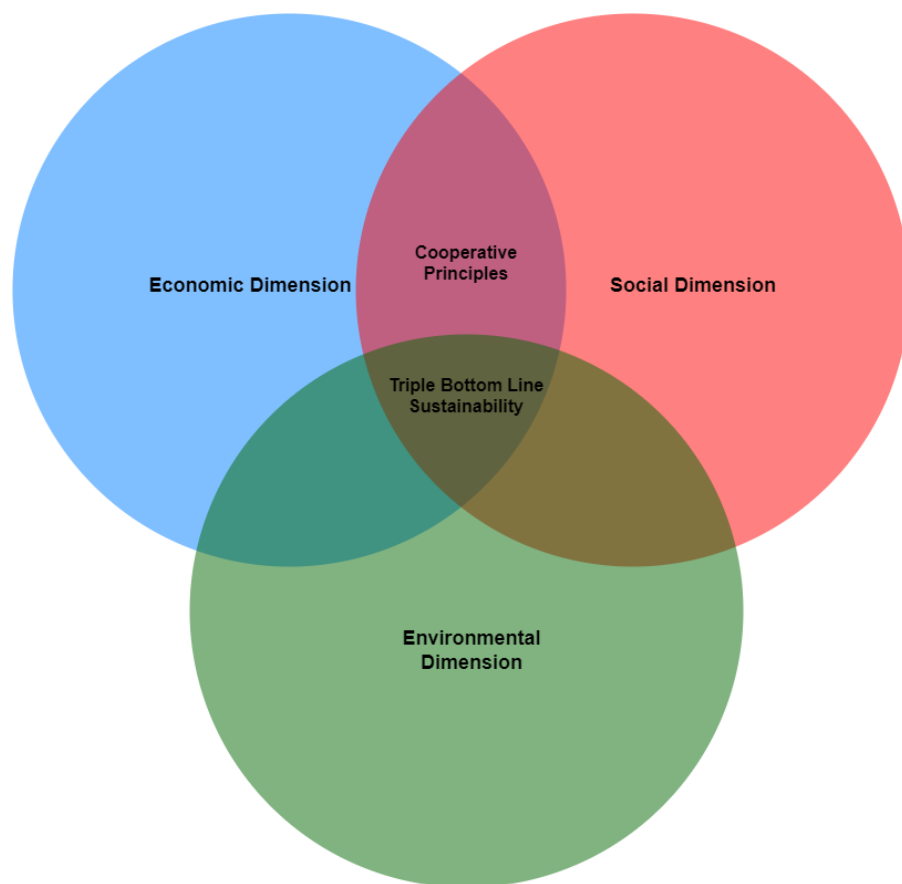


Figure 7 - Cooperatives principles and Sustainability. Elaborated by author based on Münkner (2015) and Elkington (2002)

Table 7 below compares and contrasts the differences identified between cooperative and non-cooperative farms with regards to sustainability.

Table 7 - Key Findings from Chapter 3 - Differences between sustainability in Cooperative and Non-Cooperative farms. Elaborated by author.

Dimensions	Non-Cooperatives	Cooperatives
Economic	Economic factors drive the adoption of sustainable practices.	Given cooperatives' social principles economic and social drivers may also guide the adoption of sustainable practices.
	Small farmers usually face strong financial hardships.	Economically more prosperous than non-cooperatives but still face financial limitations .
	Usually unable to compete in international markets.	Cooperatives can create the capabilities to compete in international markets.
	Difficulty making long-term plans due to pressures of immediate profit.	Better equipped for long-term decision making are less pressured on profit.
Social	Social concerns are usually ignored .	Driven by Social goals .
	Lack managerial and environmental training is a barrier for implementing sustainable practices .	Education is a cooperative principle which promotes employee training.
Environmental	Applying environmental concerns	Environmental concern is not a cooperative principle. This may affect overall sustainability.
	Fewer environmental management adoption than cooperatives.	Higher environmental management adoption than non-cooperatives.

It was concluded that although cooperatives may still face limitations in the economic dimension, overall, they could be better prepared to tackle sustainability issues in the supply chain as opposed to smallholder farms especially when creating economic and social benefits for the community. Their suitability for achieving environmental sustainability was not clear, however it was suggested that because agricultural cooperatives are concerned with futurity of their organisations, they would be more concerned with conserving the environment for the long-term. Because of the uncertainty with regards to cooperatives' suitability towards sustainability, **aim 2** requires to be analysed in tandem with the primary data collection to be fulfilled.

Aim 3, on the other hand, planned to highlight the best sustainable practices utilised in agricultural organisations. The practices identified in Chapter 4, are illustrated in Figure 4 of the Research Methodology, and involve economic, environmental, and social practices in the internal operations of organisations and those of their suppliers.

The main barriers identified to the application of sustainable practices were mostly to do with the economic dimension, which in turn affect organisations' capacity to apply sustainable practices in the long-term. Creating an organisation that promotes education of its members, and community enables practices to be implemented properly. Therefore, the practices within

the dimensions of sustainability are interrelated and affect each other. The existence of one factor may either benefit or hinder the application of another. The interrelations identified in the literature are more clearly illustrated in Figure 7, below.

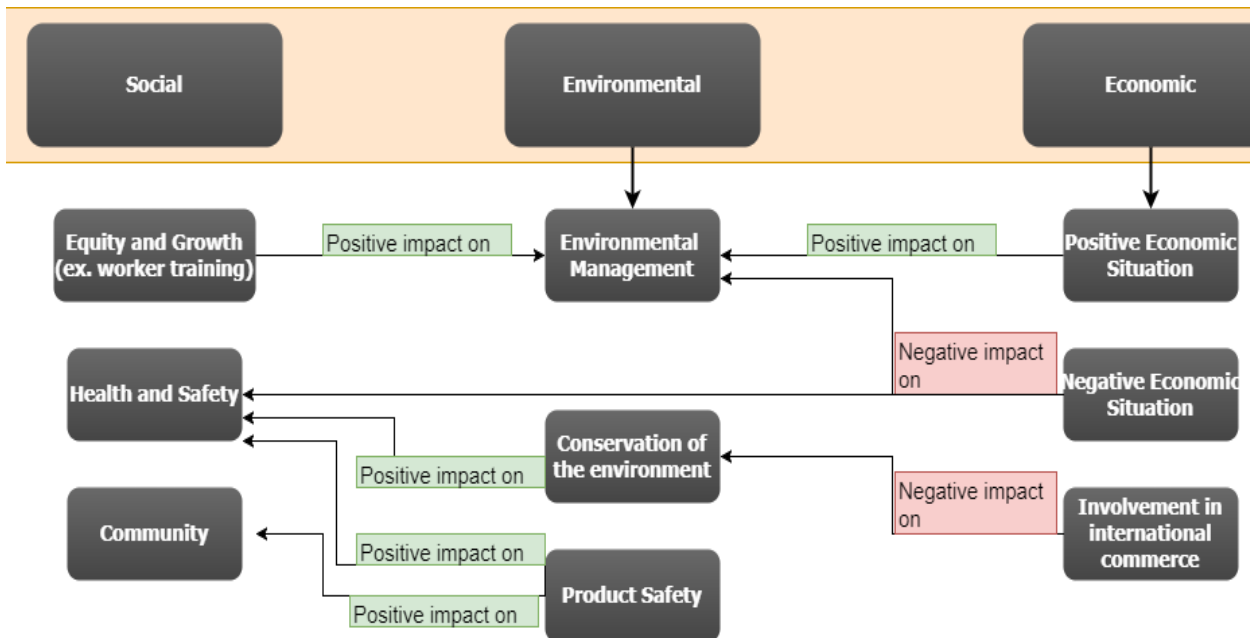


Figure 8 – Key findings from Chapter 4. Example of interrelations between sustainable practices in agriculture. Elaborated by author.

The sustainable practices identified in chapter 4 enabled the development of a framework for evaluating sustainability in Uruguayan agricultural cooperatives (**Aim 4**). This section serves as a summary of the main findings of the literature and should assist in the fulfilment of Aims 2 and 4. The following section will present the findings of the primary data collection.

6.3. Presentation of Quantitative Data Findings

The following section will present the results of the survey questionnaire with the aim of answering the fourth objective regarding supply chain sustainability of Uruguayan agricultural cooperatives. Moreover, it will assist in resolving the second objective with regards to the cooperatives suitability towards sustainability.

6.3.1. *Response Rate*

Surveys were distributed among the cooperatives identified as subscribed in the CAF (Federated Agriculture Cooperatives) of Uruguay. The questionnaires were sent to the entire population of agriculture cooperatives, all operating within different agricultural sectors. The results of this study were obtained based on the questionnaires answered. The answers given are represented in the tables that integrate this chapter.

6.3.2. *Cooperative Characteristics*

Although not part of the objectives of this study, the initial questions of the survey served to characterise the respondents' cooperatives by size and sector, as well as whether they applied sustainability and their reasons for doing so. This data was collected to describe the respondents of the sample and to assess any influence that these characteristics might pose on the research findings. These questions do not serve the purpose of answering the objectives of the research but helps to explain any patterns that may emerge from the data.

Initially, respondents were requested to mark the agricultural sector most appropriate to their cooperative, as well as the size by number of members (Figure 9). This first section of the survey was created to understand how the size and agricultural sector characteristics of the cooperative may affect the practices that are employed in the evaluation of the dimensions.

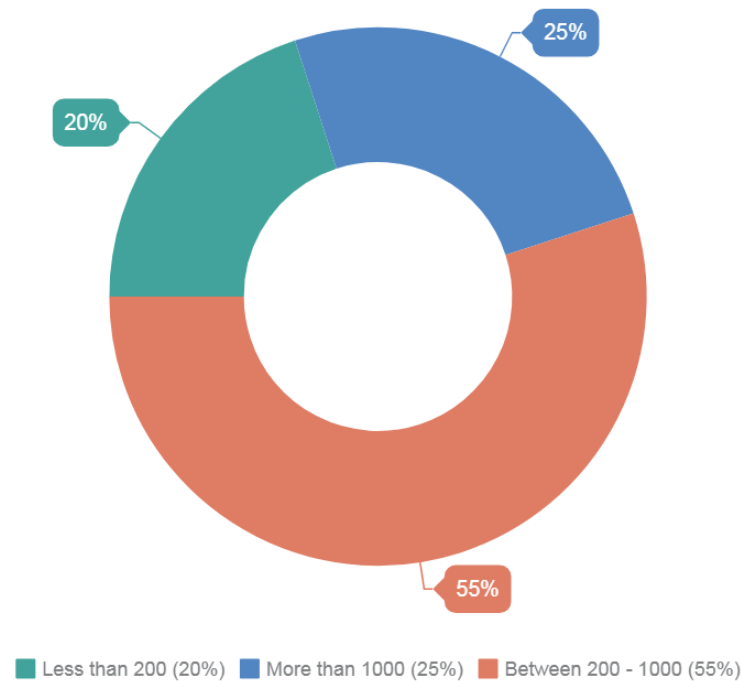


Figure 9 - Cooperative sizes by number of members. Elaborated by author.

Regarding the size of the cooperatives among the respondents, 4 (20%) have less than 200 members, 11 (55%) have between 200 and 1000 members, and 5 (25%) have more than 1000 members.

As far as the agricultural sector is concerned, amongst the companies that responded to the survey, the majority are distributed among 4 main areas: livestock, dairy, fruit and vegetable production, and wool. Wool production had the lowest number of respondents, and therefore its results can't be used to make generalisations regarding its sector. It should be noted that those companies that operate in livestock appear to also operate within the dairy sector. In addition, cooperatives that produce fruits and vegetables, or wool appear to only operate exclusively in these areas.

Reasons for Being Sustainable

A further observation on the reasons for applying sustainability in the supply chain revealed that the cooperatives are driven to sustainability not because of external pressures, as was mentioned as one of the main reasons for sustainability concerns (Leppelt, 2014), but due to

social factors. As illustrated by the results on Figure 10, Community Well-Being was the practice recognised by cooperatives as the most relevant among the reasons why cooperatives implement sustainable practices. Such concerns can be justified based on the principles of cooperatives which are driven by social needs (*refer to ch. 3*). This was followed up by *Building long term relationships with community and workers*, and *Environmental Concern*. This concern for the community is what guides and drives the cooperatives, and it is only natural that this concern drives all sustainability practices.

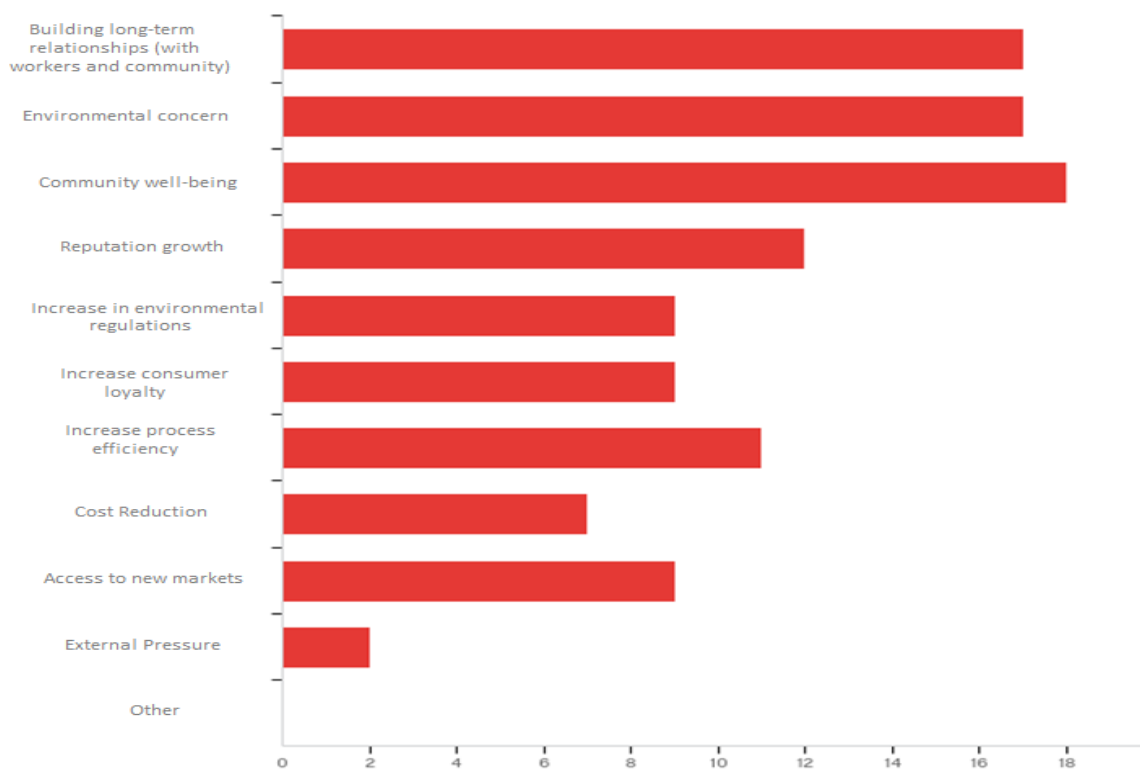


Figure 10 - Reasons for implementing sustainable practices. Elaborated by author.

However, it is interesting to find that Environmental Concern is among the main reasons for applying sustainability considering what has been previously discussed regarding environmentalism not being among the principles of cooperatives. The results suggest that despite not being guided by principles of environmentalism, the conservation of nature plays an important place among their drivers. This may also relate to cooperative's concern for futurity which means that they wish to create value for future generations as well, and this is not possible without preserving the resources that enable their trade.

6.3.3. Sustainability in the Internal Operations of Cooperatives

The following sections analyse and discuss the results of the survey with regards to the internal sustainability practices of cooperatives. The procedure for the assessment of each subtheme is the same; the respondent is asked to rate the importance or their degree of agreeance on aspects related to the cooperative's sustainability practices. The responses are evaluated on a five level Likert scale which is later used to calculate the mean value marked by the respondents, scores therefore range between 1 and 5, being 5 the highest.

The subsequent sections will present and analyse the results for each dimension, blocks, and practices individually. The tables presented will show the mean values scored for each practice (obtained by the descriptive analysis), ranked from higher to lower frequency. Furthermore, the mean scores obtained for the blocks and the reliability coefficient (Cronbach's alpha) for each block of the questionnaire, will also be presented.

Results of the Social Dimension

The results on the different blocks (i.e. Health and Safety, Growth and Equity, and Community) for the Social Dimension in Uruguayan cooperatives are presented and discussed in the following subsections.

Health and Safety

The score on the Health and Safety block is based on the average mean score of three subthemes (Table 8). The results do not imply that there is any difference between sectors for any of the subthemes, with little variance on the standard deviation.

The subthemes cover the cooperative's approach to farm safety and response to work-related incidents (i.e., occupational hazards), implementation of health and safety management systems, and contingency plans. Although all results suggest that health and safety is very important for cooperatives, the application of contingency plans was the lowest subtheme.

Table 8 - Health and safety block survey results. Elaborated by author.

BLOCK	Sustainable practices (ranked by importance)	Mean Score	Standard Deviation	Mean Score per block	Cronbach Alpha
Health and Safety	The cooperative has an updated <i>health and safety management system</i>	4.25	0.55	4.15	0.76
	The cooperative has <i>contingency plans</i> to respond quickly to occupational hazards.	4.05	0.61		

Growth and Equity

Scores for the block Growth and Equity are derived from four subthemes (Table 9). No major differences were identified between sectors for any of the themes. The high scores on the subthemes on fair contracts and salaries reinforce that cooperatives are committed to providing decent livelihoods to its members. Nonetheless, it is worth noting that the respondents may not be willing to admit, even anonymously, if the cooperative acts unfairly towards its employees. This is due to what was mentioned in Chapter 5, regarding the answers respondents may give to please the surveyor (Hopkins & Gullickson, 1989).

The subtheme on member training covers the importance that the cooperative gives to educating its members. Scores were also high in this category, which was to be expected considering Education is one of the principles of cooperativism. On the other hand, special support for vulnerable workers presented slightly lower results than the other categories...

Table 9 - Growth and Equity survey results. Elaborated by author.

BLOCK	Sustainable practices (ranked by importance)	Mean Score	Standard Deviation	Mean Score per block	Cronbach Alpha
Growth and Equity	The cooperative ensures that contracts with members are <i>fair</i> .	4.6	0.50	4.3	0.81
	The cooperative applies measures to establish that members receive <i>fair salaries</i> .	4.45	0.61		
	The cooperative provides <i>special support</i> to vulnerable workers.	3.95	0.51		
	The cooperative provides <i>training</i> to its members.	4.35	0.59		

Community

Themes of education emerged strongly once more among the results of the community block (Table 10 & 11). All cooperatives expressed that they were involved in social initiatives within the community, although there was some variation among the actions chosen. A ranking of the practices that cooperatives were most involved in placed *Access to education* as the most valued, once again reinforcing the importance of developing the community, and having members and their families grow. Table 11 illustrates the ranking of these practices.

Table 10 - Ranking of social actions implemented by the cooperatives. Elaborated by author.

Ranking of social actions by Importance
1. Access to Education (38%)
2. Culture (25%)
3. Food and Nutrition (23%)
4. Environmental Awareness (14%)

Transparency was also highly valued among the organisations (Table 11), with little variation with regards to the score. This is an important feature when it comes to committing to sustainability, because the appropriate links are established with the community to communicate the company's values and position (*refer to ch. 4*).

Table 11 - Community block survey results. Elaborated by author.

BLOCK	Sustainable practices (ranked by importance)	Mean Score	Standard Deviation	Mean Score per block	Cronbach Alpha
Community	The cooperative ensures <i>transparency</i> with all stakeholders and community.	4.05	0.61	4.2	0.74
	Involvement in social actions (access to education, culture, etc.)	4.25	0.42		

Results of the Environmental Dimension

The tables in the following page present the results of the environmental evaluation, regarding the practices applied in the internal operations of agricultural cooperatives. Also presented are the mean values scored for each practice (obtained by the descriptive analysis), ranked from higher to lower frequency. Furthermore, the mean score obtained for each block of practices is presented as well as for the entire dimension. While the social dimension had the highest Cronbach coefficient, the blocks of the environmental dimension had lower coefficients, which suggests that there was far more variation among the answers of the different agricultural sectors. The following subsections will discuss the results of the blocks individually.

Environmental Management

The block for Environmental Management consists of two subthemes (Table 12). The main difference between sectors was evidenced in the subtheme of *Implementation of an environmental management system*. The results suggested that livestock was the sector that implemented the system the most, far ahead of other sectors. This is consistent with the fact that the livestock sector in Uruguay operates in international markets (*refer to ch. 2*), where environmental standards are higher (*refer to ch. 4*). Incorporating an environmental management system represents the commitment to adhering to these standards when entering international markets.

Table 12 - Environmental management block survey results. Elaborated by author.

BLOCK	Sustainable practices (ranked by importance)	Mean Score	Standard Deviation	Mean Score per block	Cronbach Alpha
Environmental Management	Implementation of an environmental management system.	3.47	0.91	3.2	0.75
	Monitoring environmental goals	3	0.80		

The monitoring of environmental goals received disappointingly low results, and no patterns can emerge with regards to the different agricultural sectors. However, it is surprising to see that monitoring goals is not important for the livestock sector, which had answered that it employed Environmental Management Systems (EMS) the most. An important part of EMS is to keep track of environmental objectives (*refer to ch. 4*). This suggests that the EMS compliance might be just for certification purposes for international markets but it might not be implemented consistently or correctly if no monitoring is done.

Conservation of Resources and the environment

The block for *Conservation of resources* covers the most subthemes, six in total (Table 13). No major differences were identified between the sectors with regards to water, energy, soil, biodiversity, or waste management, while the main difference was found for the subtheme on transport pollution. Transport pollution had a score of 2.75, making it the lowest overall in the entire dimension.

Table 13 - Conservation of resources block survey results. Elaborated by author.

BLOCK	Sustainable practices (ranked by importance)	Mean Score	Standard Deviation	Mean Score per block	Cronbach Alpha
Conservation of resources and environment	Promotion of adequate management of <i>soil</i> .	4.35	0.88	3.7	0.65
	Promotion of adequate management of <i>biodiversity</i> .	4.2	0.89		
	Establishing specific goals for <i>energy efficiency</i> .	3.8	0.89		
	Establishing specific goals for <i>water efficiency</i> .	3.45	0.89		
	Establishing specific goals for <i>waste management</i> .	3.65	0.67		
	Establishing specific goals for minimising <i>freight transportation pollution</i> .	2.75	0.89		

Product Safety

The Product safety block consists of two subthemes (Table 14). Differences between sectors were found for both practices. The Fruit and Vegetable production sector was the most concerned with reducing the use of chemicals in its processes. Nonetheless, results for chemical reduction was high overall.

The subtheme on traceability also presented high deviation levels, where the Livestock sector was the most concerned with tracing products. The high deviation in the results of the traceability resulted in a low Cronbach value, below the accepted mark, which means the results do not hold internal consistency and would difficult generalisation.

Table 14 - Product safety block survey results. Elaborated by author.

BLOCK	Sustainable practices (ranked by importance)	Mean Score	Standard Deviation	Mean Score per block	Cronbach Alpha
Product Safety	Establishing specific goals for the reduction of <i>chemicals</i> in processes.	4.1	0.57	3.9	0.45
	The assurance of product <i>traceability</i> .	3.75	1.12		

Results of the Economic Dimension

The Economic Dimension consists of two main blocks: Short-term and Long-term economic viability. The results on both subthemes will be discussed in the following subsections.

Short-term viability

This block consists of two subthemes, and results for both subthemes are shown in Table 15 below. All cooperatives surveyed answered that they had a positive cash flow, with very low deviation, all answers falling between 4 and 5 in the Likert scale. This suggests that the immediate cash position of the cooperatives is favourable. Nonetheless, there was much divergence between the *dependence on loans* subtheme. This suggests that the economic position of the cooperatives is dependent on external funding. This supports the main challenge that had been identified in the literature with regards to the economic limitations faced by cooperatives (Vo, 2016), and especially in the context of Uruguay where the cooperatives' indebtedness was identified as one of the main obstacles to their growth (Sabourin et al., 2015).

Table 15 - Short-term viability survey results. Elaborated by author.

BLOCK	Sustainable practices (ranked by importance)	Mean Score	Standard Deviation	Mean Score per block	Cronbach Alpha
Short-term viability	The cooperative has a positive cash flow.	4.1	0.31	3.6	0.74
	The cooperative has not taken out a loan recently.	3.1	0.85		

Long-term viability

The block on long-term viability covers three subthemes (Table 16 below). The Cronbach alpha is below the accepted value of 0.60, which suggests that there is not enough consistency among the practices. The most variance was in the last two practices, which evaluated whether the *cooperatives had enough cash to invest in processes and technology*, and whether the *cooperative is involved in international trade*. It was identified that there was much variance among the sectors when it came to international trade, livestock and dairy were the ones who presented more involvement in international trade among the sectors.

Overall, no differences were found in the scores on *long-term planning*, which confirms what was uncovered in the literature, that cooperatives plan for futurity to leave a viable organisation for future generations.

Table 16 - Long-term viability survey results. Elaborated by author.

BLOCK	Sustainable practices (ranked by importance)	Mean Score	Standard Deviation	Mean Score per block	Cronbach Alpha
Long-term viability	The cooperative has a long-term business plan for decision-making.	4.42	0.51	3.6	0.56
	The cooperative has capital to make investments in improving technology and/or processes.	3.4	0.82		
	The cooperative is involved in international trade.	3	1.38		

6.3.1. Sustainability of Suppliers

Table 17 below presents the results found regarding the sustainable practices valued by cooperatives in their suppliers. The table below presents the results of the descriptive statistics conducted on the primary data. Firstly, the mean values for each practice are presented and ranked in order of importance, in descending order. The results of the Cronbach's alpha, for all blocks of the questionnaire, are also presented to assess internal reliability of results. Moreover, the standard deviation for each practice provides insight into the variation among respondents. Lastly, the mean values for each block and dimension is presented.

The following subsections discuss the results for each dimension for supplier sustainability criteria.

Table 17 - Evaluating supplier sustainability survey results. Elaborated by author.

Dimension	Sustainable practices (ranked by importance)	Mean Score	Standard Deviation	Mean Score per block	Cronbach Alpha	Mean Dimension
Social	Local suppliers are prioritised during the selection process.	4.35	0.49	3.5	0.72	3.45
	Worker safety and fairness is essential for supplier selection.	3.7	0.92			
	Involvement of suppliers in social actions is essential for supplier selection.	2.55	0.69			
Environmental	Controlled and safe use of chemicals is essential for supplier selection.	4.05	0.85	3.1	0.639	
	Traceability of products is essential in supplier selection.	3.2	1.40			
	Performance of <i>environmental audits</i> .	2.75	0.64			
	Efficient use of resources (water and/or energy) is essential for supplier selection.	2.5	0.51			
Economic	Positive economic situation of suppliers is essential for supplier selection.	3.75	0.79	3.75	-	

Supplier's Environmental practices

Practices that keep suppliers in compliance with environmental practices obtained an average mean of 3.1 points, which is the lowest score overall for the three dimensions. It presented the highest ranges in answers, from 1 to 4, being considered by some cooperatives Not Important to Important, according to the Likert scale. Such variation could be attributed to the different agricultural sectors, and the importance that each practice might present to the sector. This is corroborated by the fact that traceability was present in both livestock and dairy sectors, and severely lacking in the fruit and vegetables sector, as has been mentioned previously. Among livestock and dairy production, traceability was ranked highly among the most important environmental practices.

The controlled use of chemicals was the practice which presented the highest importance among all sectors with low variation between sectors and cooperatives.

Supplier's Social practices

The social dimension of supplier selection, according to the questionnaire, obtained an average mean score of 3.5 points, being considered by the cooperatives of some importance to very important. Prioritising local suppliers was the most important requirement identified for supplier selection, which is in line with the cooperatives' principles of benefiting the community. The welfare of the workers was also considered important. Nonetheless, cooperatives were not concerned in how suppliers create value in the community. This suggests that cooperatives in Uruguay care that their suppliers do not negatively affect the community, but are not concerned about the suppliers creating value in the community (i.e. development).

Supplier's Economic practices

There is no Cronbach alpha to ascertain reliability of the data on this block because this measure can't be used on single items (Osburn, 2000). Despite this issue, observing the results of the standard deviation shows that there is a slightly high variance among respondents, which suggests that results are not consistent among cooperatives. Nonetheless, this requirement

was valued favourably among cooperatives, with results ranging from medium to high importance, obtaining an average score of 3.75 points.

6.4. Analysis of findings

This section analysis and brings together the findings from the qualitative and quantitate data collection. The aim of this section is to continue on the path to fulfil the research objectives and fill the gap in the literature regarding sustainability in the supply chains of agricultural cooperatives.

The following section will evaluate the qualitative data from the literature review with regards to sustainability in cooperatives as opposed to smallholder farms, to understand whether cooperatives are conducive to more sustainability for farmers.

6.4.1. Analysis for Aim 2 - Cooperative Suitabilty for Sustainable Supply Chains

This section discusses the second objective of the research, namely with regards to cooperatives suitability towards sustainability. It uses findings from the literature review and contrasts it with quantitative data from the primary data collected by survey to answer the objective. Table 18, below, presents the differences between the findings of the literature in cooperatives and non-cooperatives, and compares it to the findings of the survey. Subsequently, the differences and similarities will be explained and their implications towards the second objective revealed.

Table 18 - Cooperative and Non-cooperative sustainability. Comparison between literature findings and Survey findings. Elaborated by author

Dimensions	Literature findings – Non-Cooperatives	Literature findings – Cooperatives	Survey results Uruguayan Cooperatives
Economic	Economic factors drive the adoption of sustainable practices.	Given cooperatives' social principles, social drivers may also guide the adoption of sustainable practices.	A social driver was ranked the highest among <i>reasons to implement sustainable practices</i> while economic drivers ranked the lowest. (matches literature)
	Small farmers usually face strong financial hardships.	Economically more prosperous than non-cooperatives.	Cooperatives overall had positive cash flow. (matches literature)
		May face financial limitations. Indebtedness is a barrier for development of cooperatives in Uruguay (ch. 2).	Results show variance in loan dependence which may suggest financial problems. (matches literature)
	Usually unable to compete in international markets.	Cooperatives can create the capabilities to compete in international markets.	<i>Divergence in international market commercialisation.</i> Not all cooperatives compete in international markets. (opposes literature) .
	Difficulty making long-term plans due to pressures of immediate profit.	Better equipped for long-term decision making are less pressured on profit.	Long-term decision making ranked highest. (matches literature)
Social	Social concerns are usually ignored	Driven by Social goals.	Driven by social goals. (matches literature)
	Lack of managerial and environmental training is a barrier for implementing sustainable practices.	Education is a cooperative principle. This promotes employee training and thus encourages sustainable practices.	Education ranked highly in worker and community level. Suggests favourable environment of sustainability. (matches literature)
Environmental	Uruguayan small farmers' intensification of production affects the environment (ch. 2).	Environmental concern is not a cooperative principle. This may affect overall sustainability.	Environmental concerns ranked second in reasons for implementing sustainability. (opposed findings)

According to the findings of chapter 3, the cooperatives' *focus on the social dimension* is in stark contrast to non-cooperative farmers (Collins et al., 2015) where the interests of the shareholders come before those of the community. While traditional companies aim to maximise profits to shareholders, the driver of a cooperative is not solely to make a profit but to *pursue the well-being* of its members and society. The survey findings reflected on this, it was clear by the predominance of social reasons for implementing sustainability over economic ones. It is this concern which might lead to higher implementation of sustainability practices.

Despite cooperatives' drive to achieve social goals for its members and community, the literature cast doubts on environmental and economic sustainability. The fact that environmental concerns are not directly mentioned in cooperative principles had suggested that cooperatives may not be intrinsically driven to introduce environmental practices into the organisation. Nonetheless, research also showed that cooperatives implement environmental

practices more than non-cooperatives (Leite et al., 2014). The survey results opposed fears that, since environment was not a cooperative principle, the organisation may ignore its importance. The respondents of the survey placed *Environmental concerns* second within a ranking of 10 reasons for applying sustainable practices, economic reasons ranked the lowest. Considering that unsustainable environmental practices may have negative impacts on customers and communities, as can be the case with irresponsible pesticide use, if a cooperative does not act responsibly towards the environment it may well cause damage to the community it wishes to assist.

The literature presented another issue that may affect cooperative's ability to be sustainable in the long-term. Although cooperatives are more financially prosperous than non-cooperative farmers, they may still face economic hardships (Vo, 2016). This had also been identified as an issue in Uruguayan cooperatives (*refer to ch. 2*). The survey results showed divergence between the cooperatives' economic results, mainly on loan dependence and commercialising in international markets. Those who depended less on loans appeared to compete in international markets. The variance in international markets and loan dependency might suggest that some cooperatives' high dependence on loans affects their capacity to compete.

Nonetheless, overall financial results were positive with the highest being long-term planning. The fact that cooperatives effectively plan for futurity means that they are an innately more economically sustainable than non-cooperatives, by planning for the long-term and avoiding the pressure of immediate profit gain. Since several studies recognise that economic factors drive the adoption of social or environmental practices (Jan & Klein, 2011), cooperatives in Uruguay seem well placed financially to implement sustainable practices.

Key findings of the literature stated that successful sustainable agriculture lies in educating workers. The lack of training in small farms is a barrier to applying sustainability (Suvedi et al., 2010). With regards to cooperatives, it was suggested that since education initiatives are a cooperative principle, cooperatives might be able to create the capabilities to apply sustainability in their organisation. The survey results in Uruguay showed that education plays an important role in their activities. These results support the literature findings and reinforce the suitability for cooperatives to develop sustainably

The results of this section suggest that the survey findings mostly confirm those of the literature. Nonetheless, there appear to be divergences in some respects. While the divergence in international markets is negative towards economic growth, the fact that environmental issues are important for cooperatives is a positive result. The variance with regards to cooperative's commercialisation in international markets may suggest cooperatives can't always create the capabilities to compete internationally which may limit their profits. The fact that the survey findings revealed that environmental issues are the second most important driver for sustainability is essential in establishing agricultural cooperatives' suitability for an integrated Triple-Bottom-Line model. This was the dimension in which the literature suggested cooperatives might suffer the most.

It appears that agricultural cooperatives in Uruguay appear to be inherently more sustainable than non-cooperatives in their drivers for implementing sustainability. This represents a step mainly towards a socially and economically sustainable society. It is unclear how these factors will affect the way the Uruguayan cooperatives apply sustainability in their organisation or whether their stewardship goals extend towards their suppliers. Ilbery and Maye (2005) claimed that agricultural organisations are mainly focused on applying sustainability in their own operations and only few consider themselves responsible for their supplier's sustainability. Despite the collaborative nature of cooperatives, there is no evidence to suggest that cooperatives extend sustainability concerns towards their suppliers. It is in this context that the next section will present and analyse the results of the primary data collection, regarding sustainability in the internal practices of cooperatives and those of its suppliers, and compare the findings with the literature to answer objective 4.

6.4.2. Analysis for Aim 4 - Uruguayan Cooperative Sustainable Supply Chain

The following section consists of an analysis of the survey findings to fulfil the fourth objective of the research. This objective aims to evaluate the sustainable practices employed in the supply chains of Uruguayan agricultural cooperatives through a survey to fill the gap in the literature. This section will discuss the sustainable practices employed in the internal practices of Uruguayan agricultural cooperatives and those requested from their suppliers.

Uruguayan Cooperative's Internal Sustainability Analysis

To illustrate the results of internal sustainability graphically the median scores of each block, previously presented in the findings of the survey, have been transferred to percentages to increase visibility. These results are illustrated in the Sustainability polygon below (Figure 11) to enhance clarity and assist with the analysis. From the three dimensions observed, the practices from the social dimension are the ones with highest implementation margins, while the other two, although not critical, still present room for improvement.

The social sustainability evaluation of Uruguayan cooperative farms showed results of over 80% for all three blocks the social dimension. The performance on the environmental dimension, however, fell between 80% and 60% among all blocks of the dimension, with the lowest recorded as 64%, for the *Environmental management* block. This means that there is a need for more improvement in the internal environmental management of cooperatives. Both short-term and long-term economic viability had the same results, 72% for both, shows that results are positive although there is still room for improvement.

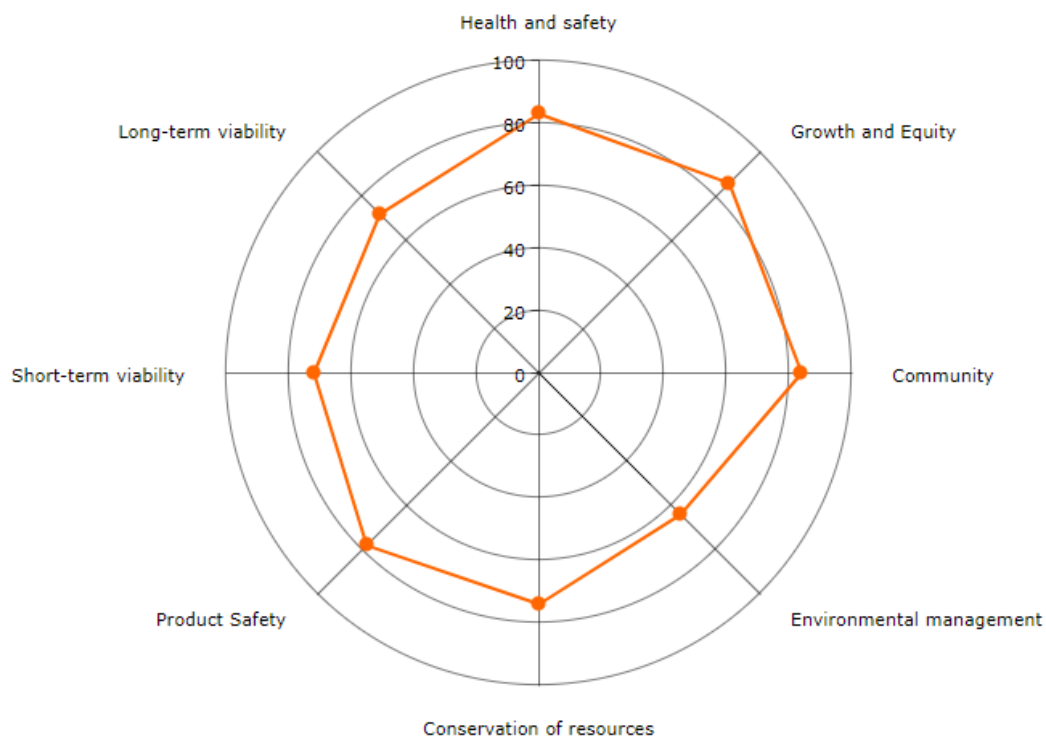


Figure 11 - Sustainability Polygon of internal practices. Elaborated by author.

The overall results for the *social dimension of the internal practices* of Uruguayan cooperatives presents the highest mean of the three sectors. Likewise, the alpha coefficient for the blocks is the highest among the dimensions, suggesting that the items have relatively high internal consistency among all sectors. Strong positive results emerged in the internal sustainability evaluation of Uruguayan agricultural cooperatives. The high results and internal consistency confirm what was mentioned regarding the cooperative's focus on the community (*refer to ch. 3*). Results confirm the high value that cooperatives place on the social aspects of sustainability.

With regards to *internal environmental practices*, despite the deviation in some results, themes could be identified. The results revealed that that the most important blocks of practices according to the cooperatives were the *Conservation of resources and the environment*, and *Product Safety*. The *Product safety* block presented the highest mean value of 3.9, which is consistent with the fact that agricultural products are intended for human consumption where safety should be paramount.

While the statistical tests show that *Conservation of resources* and *Product Safety* practices were considered very important, the Environmental management block, whose practices relate to compliance with certified environmental requirements, obtained the lowest score overall for all three dimensions. The block was considered of minor importance by the cooperatives, or *moderately important*, according to the Likert scale adopted. Therefore, there is room for improvement in the environmentally sustainable practices of cooperatives, mainly in the performance of audits and the reduction of transportation pollution. Moreover, the low results on environmental management are surprising considering it was mentioned that cooperatives' focus on educating workers would favour the implementation of other sustainable practices.

Moving on to differences between agricultural sectors, product traceability and transport pollution scores were low for the fruit and vegetable sector, as opposed to livestock and dairy. The results on traceability are consistent with the literature findings, which stated that the livestock sector implements traceability the most due to concerns with food safety (*refer to ch. 4.1.3*). Furthermore, the law in Uruguay requires all livestock to be traceable throughout its supply chain (IICA, 2009). Due to this, Uruguay is recognised as a reference in product traceability worldwide, which favours its inclusion in international markets. This helps explain

both the high results of the sector in traceability as well as its high involvement in international commerce, which differ from the other sectors.

Within the results of *internal economic practices*, short-term and long-term viability had positive results. Nonetheless, some answers showed variances, for example, implying that some cooperatives relied on loans while others did not. Dependence on loans is an impediment for economic sustainability and had also been reported as an issue that affects the development of Uruguayan cooperatives (Sabourin et al., 2015). Despite the variation in loan dependence, the overall economic results for cash flow were positive and confirm that cooperatives are economically sustainable.

In analysing the results of long-term viability, the practice with the highest frequency is *Long-term business planning for decision making*. This matches what was suggested in chapter 3, regarding the cooperative's ability to make long term plans for the future (*ch. 3*). It was revealed in the results for positive cash flow, cooperatives appear to have positive finances prosperous they can successfully plan for future generations.

Moreover, the livestock sectors' involvement in international markets reinforce what was suggested by Ciruela (2003), that while small farms are usually unable to compete in international markets, by joining cooperatives they can aspire to compete and gain higher profit margins. Nonetheless, the overall results showed variance among sectors, with some cooperatives not competing internationally. This also validates Vo's findings (2016), which suggested that cooperatives could still struggle financially and that affects their viability and hence their ability to expand to new markets.

As mentioned in chapter 4 of the literature review, links can be drawn between the implementation of different practices in the survey results. Firstly, between competing in international markets and environmental impact. According to Ilbery and Maye (2005) commercialising in the local markets has better social and environmental effects than sourcing or commercialising internationally. Moreover, transportation costs are lower in local supply chains as opposed to global (Hobbs et al., 2008), while the profit margins are higher in more developed countries. Therefore, the decision of competing in international markets has various implications which can affect the sustainability of an organisation.

Considering that training had been promoted as an enabler for sustainability practices in agriculture (*refer to ch.4*), the survey results reaffirm the relationship between the sustainable dimensions. Cooperatives possess an environment favourable for knowledge transmission, in which their culture of training favours the application of other sustainable practices. This is supported by the survey results, which showed that education within the cooperative and in the community level is highly valued.

Uruguayan Cooperatives' Supplier Sustainability Analysis

To illustrate the results of suppliers' sustainability graphically the median scores of each block, previously presented in the findings of the survey, have been transferred to percentages to increase visibility. These results are illustrated in the Sustainability polygon below (Figure 12) to enhance clarity and assist with the analysis. The findings on ***sustainable supplier practices*** showed that cooperatives are not much concerned with disseminating the concepts of sustainability in their supply chains. It can be said that the most valued practices in the supplier selection of the supply chains of Uruguayan cooperatives are those that involve the reduction and safe use of chemicals in and collaborating with local suppliers, while results for the environmental practices are unsatisfactory.

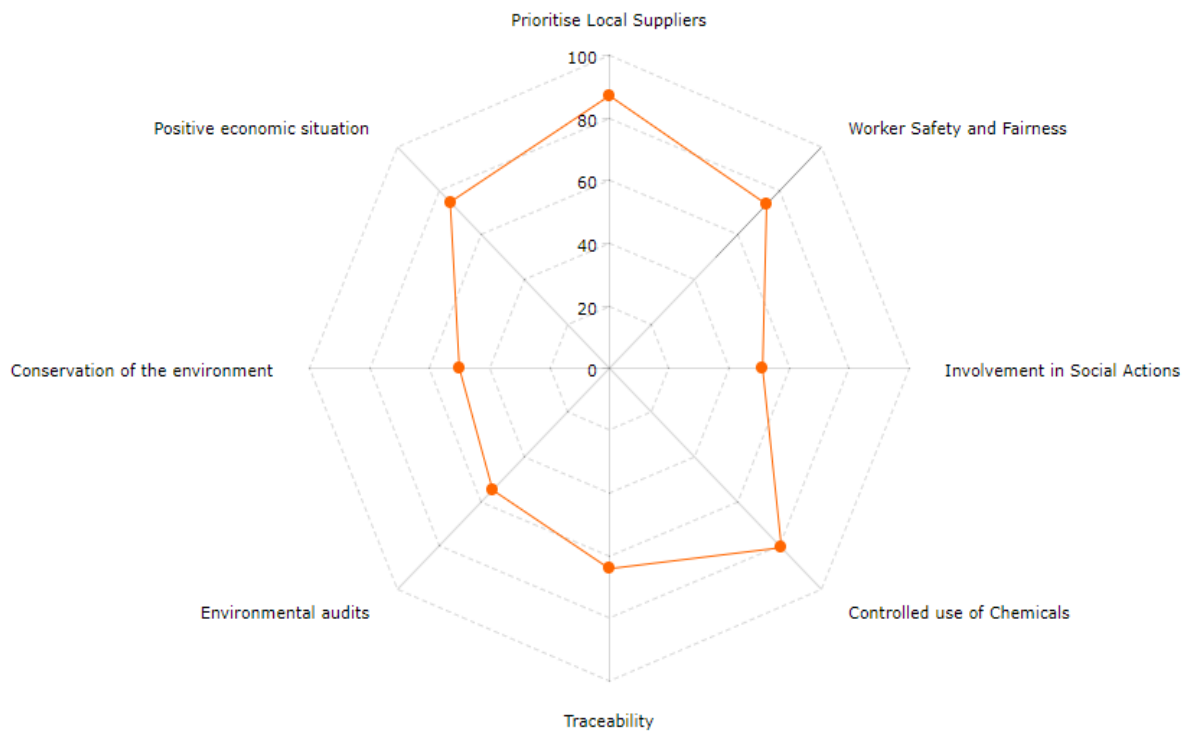


Figure 12 - Sustainability Polygon of supplier practices. Elaborated by author.

The overall results of the internal sustainability assessment revealed that the *social dimension* is the most important for cooperatives. The social practice of prioritising local suppliers in Uruguayan cooperative farms showed results of 87%, the highest among all practices. Nonetheless, despite being concerned with the fairness and well-being of their suppliers' employees (74%), they do not expect suppliers to promote any added value into the community (51%). This suggests that, although cooperatives do not want suppliers to harm members of the community, they are not concerned with the suppliers creating social growth.

The fact that both the *Social and Economic* blocks for sustainable suppliers present the highest mean scores is consistent with the driving principles of cooperatives (*refer to ch. 3*), which present the social and economic well-being of the cooperative and community as the most important. The positive economic situation of suppliers received a 75% importance. This, paired with the high importance given to local suppliers, reinforces that cooperatives want economic growth for the community, not just cooperative members (*refer to ch. 4*). Nonetheless, cooperatives are not concerned on supplier's social activities as long as they do not negatively affect the wellbeing of the community.

Concerning the *Environmental Dimension*, it can be inferred that a supplier's adherence to environmental sustainability is only relevant to the cooperative if it directly affects the product's safety. Conservation of the environment on the part of suppliers is not required or even expected, in Figure 11 it is presented at a mere 50%. As cited by Faustini and Alves (2009) and verified through the survey, the environmental practice most valued from suppliers is the one aimed at the reduction of chemicals. Therefore, environmental practices in suppliers are only requested to ensure that the supplies provided do not have negative impacts on product safety or quality.

The concern for controlled chemical use scored an 81% importance (Figure 11). This is consistent with the fact that livestock, dairy and produce are all meant for human consumption, and must be produced safely. Both traceability and chemical use prove that in the environmental supplier dimension, product safety is imperative. Moreover, it can be linked back to the main reason cooperatives implement sustainable practices which is the well-being of the community. Having products that are safe for consumption is more important than the preservation of the environment because it more directly affects the community. Nonetheless, the low importance given to environmental audits (55%) is concerning, not only because of the impact the suppliers might have on the environment, but on the assurance that the supplies provided are truly safe.

The participating cooperatives may differ in sectors and sizes which may affect the practices they deem most important. This was exemplified with the variance in traceability, which is more prevalent in livestock and dairy. These differences affect the reliability of some of the Cronbach scores. However, the blocks which evaluated suppliers all presented high Cronbach results, which suggests that with regards to supplier sustainability there is high internal consistency of results, these consistent themes could help drive improvements in sustainability across the supply chain.

Despite the promising results for internal sustainability, the results for supplier sustainability in Uruguayan agricultural cooperatives needs improvement in several areas. Conservation of the environment, the performance of environmental audits and supplier involvement in social actions all received results below 55%. Cooperatives can't ignore suppliers' impact on the environment and must collaborate with suppliers to create *value and development*. It is not enough to be concerned solely with the practices that directly affect their

own product's sustainability but they must think about achieving collaborative value for shareholders and future generations.

6.5. Chapter Summary

In this chapter, qualitative and quantitative study results and analysis of the findings have been presented. Findings from the empirical data have been found to support the results of the literature review in some extent and to diverge in others with regards to the sustainability of Uruguayan agricultural cooperatives and their supply chains. In addition, the impact of various agricultural sectors on the data has been explored. The data results were presented as tabulations and the reliability of the results were tested.

The next chapter will discuss the implications of the research analysis within the context of the research objectives, and the limitations of the study will be presented.

7. Discussion

7.1. Introduction

The literature revealed that agricultural supply chains have undergone changes due to a string of environmental issues, such as the recent Brazilian meat scandal, or social issues, related to fair work conditions (*refer to ch. 4*). Despite the importance of agriculture to Uruguay's economy, these issues also pose challenges to the sustainable development of the sector. Overall, Uruguay's small farming communities are struggling to survive in a competitive sector where intensive production methods have negative environmental impacts and farmers' finances are dire (*refer to ch. 2*).

Given the high contribution of agricultural cooperatives to Uruguay's economy (Sabourin et al., 2015) cooperatives have been suggested as a suitable model for the inclusion of sustainable supply chains in Uruguay. With this in mind, the research sought to fill a gap in the literature with regards to the evaluation of the use of sustainable practices in the supply chains of agricultural cooperatives. As a result, a literature review was conducted to discuss the suitability of cooperatives towards sustainability, drawing comparisons between cooperative and non-cooperative farms. Best practices were identified and discussed in terms of barriers and interrelations between dimensions. These practices were later used to create a framework to evaluate the sustainability of cooperatives and the criteria it uses towards its suppliers.

This present chapter discusses the research problem introduced in the first chapter of this dissertation:

To what extent do Uruguayan agricultural cooperatives employ sustainable practices in their supply chains?

Through this discussion, the researcher expects to gain an understanding of the suitability of Uruguayan agricultural cooperatives towards sustainability. Additionally, the discussion reveals insight into the sustainable practices Uruguayan cooperatives apply in their supply chains. This chapter reflects on the analysis from the former chapter, to ponder its contribution to the field of research. Limitations of the study will also be presented.

Figure 13, below presents the structure of this chapter:

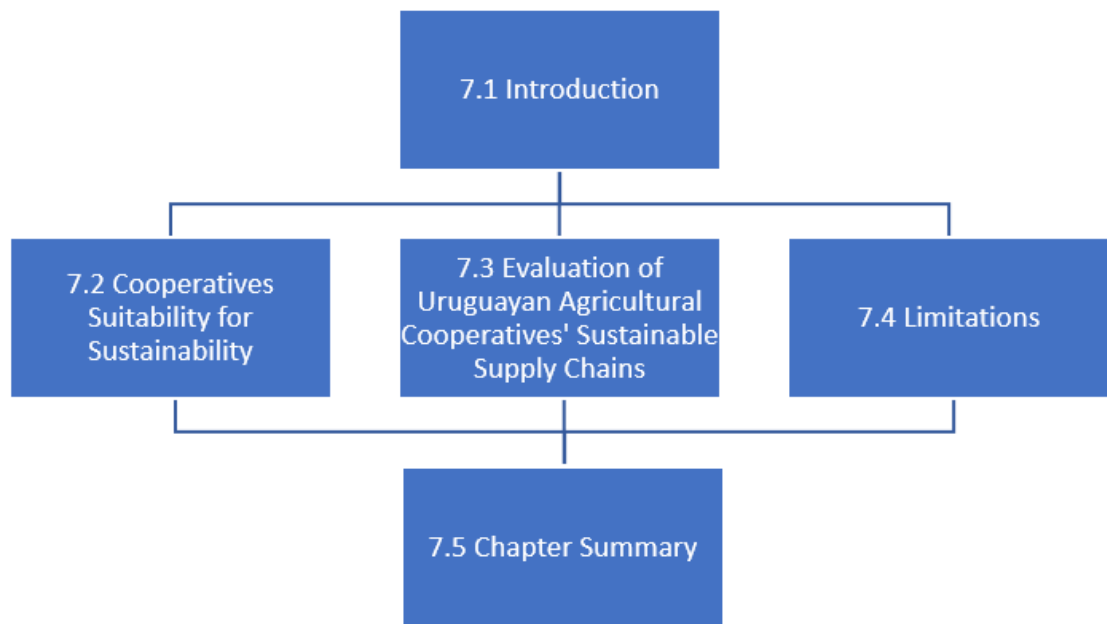


Figure 13 - Chapter 7 Structure. Elaborated by author.

7.2. Cooperatives Suitability for Sustainability

The below points are some of the main outcomes from the research with regards to Uruguayan agricultural cooperatives' suitability towards sustainability. The sections of this discussion will explain their relevance of these outcomes and their implications towards the research field. The sections not only promote cooperatives as a model for sustainability but further evidence how the Triple-Bottom-Line dimensions affect each other. When it comes to cooperative sustainability:

- Social Goals: The Foundation of Cooperative Sustainability.
- Environmental Concern: The Unrecognised 8th Cooperative Principle.
- Economic Viability: Positive but Uncertain.

7.2.1. Social Drive: The Foundation of Cooperative Sustainability.

Scholars suggested that there is a predominance in the literature on environmental criteria over an integrated framework (*refer to ch. 2*), which reaffirms the importance of having organisations and research address *social concerns*. The analysis presented that the practices in the social dimension of sustainability were by far the most valued within the organisation, which is in line with the main principles of cooperativism (*refer ch. 4*) and is in stark contrast

with the limited involvement in social practices within smallholder farms (Collins et al., 2015) and in Sustainable Supply Chain Management research in general (Crum et al., 2011; Klassen et al., 2014).

Among the findings of the literature, it was concluded that promoting the growth of employees through *education initiatives* is conducive to higher levels of Sustainability. This is because it enables the implementation of other practices by providing the necessary skills for their implementation. The cooperative's principles on educating employees would suggest this is something which would come easily to the organisations (*refer to ch. 3*). The results of the survey showed that, beyond the economic costs involved in applying sustainable practices, the cooperatives' intrinsic drive to benefit and develop the community is what makes sustainably move forward.

Within this context, cooperatives may be a suitable platform for an integrated Triple Bottom Line, since their principles are aligned towards social goals (*refer to ch. 3*). Given how social practices are the most important to cooperatives, these can influence and enable the successful application of other sustainable practices. In the context of this research, it is important to highlight cooperatives as a model that *naturally gravitates towards social issues*, contrasting with other organisations.

7.2.2. *Environmental Concern: The Unrecognised 8th Cooperative Principle*

According to the literature, agricultural cooperatives present a special significance to sustainable development, particularly for the environmental dimension. This is determined, on the one hand, by the intensive use of limited natural resources for production. On the other hand, the use of chemical products for the control of pests, and the generation of different wastes, all which impact the environment and its inhabitants. Adding to the above, insufficient education and environmental training in non-cooperatives is a detriment to the application of environmental sustainability. This lack of training does not allow anticipating, evaluating, or adopting measures in time to eliminate or mitigate the negative impacts of the practices carried out.

It is clear by the literature that only economic and social prerogatives drive the principles of cooperatives. It is this fact which planted the doubt of whether cooperatives would be driven

to implement environmental practices. Through a qualitative evaluation of the literature, paired with an analysis of the primary survey data, it was established that, despite not being driven to environmental sustainability by principle, cooperatives implemented sustainable practices due to environmental concerns.

It is in this regard, that it can be said that agricultural cooperatives in Uruguay support the application of sustainability on *environmental grounds*. In this context, an important distinction can be made against the environmental drive from non-cooperatives (refer to ch. 3) who's main concern for sustainability is the economic benefits that can be derived from the activity. While cooperatives appear to have a more positive economic position, economic drivers for sustainability fall to the background while social and environmental may rise to the forefront. This further supports the interrelations between the dimensions and how they support and affect each other in different degrees.

Furthermore, this may suggest that while economic conditions are positive, more concern is given to social and environmental issues. The literature had pointed out that non-cooperative farmers have different attitudes towards environmental preservation and, even though some may be concerned with the environment, their beliefs are seldom transferred into action due to dire financial situations (*refer to ch.3*). This may suggest that cooperatives are able to act upon environmental concerns due to not being held back as much by their finances. Nonetheless, it also brings out further debate on whether cooperatives would still be driven to implement environmental sustainability if they were not financially stable. Therefore, it may be appropriate to suggest, were the International Cooperative Organisation truly committed to sustainable development, the adaptation of cooperatives' 7 principles to include an 8th. This would establish the importance to follow environmental goals if not for the environment's well-being, then for that of its inhabitants which would aptly link back to its social prerogatives.

7.2.3. *Economic Viability: Positive but Uncertain*

Cooperatives are guided by *economic* as well as social principles. Because they are organisations that aim to sustain the livelihoods of its members, they naturally pursue economic growth and development. The literature, although stating that cooperatives can present a better economic situation than smallholder farms (Ravensburg, 2009), presented

doubts regarding the limitations of their finances (Vo, 2016). The survey results reflected on this, illustrating that economic viability in cooperatives is favourable, especially with regards to long-term planning and cash flow; both essential for short and long-term sustainability. Nonetheless, as expressed in chapter 3, Uruguayan cooperatives face limitations due to reliance on debts, which although results of the survey on loan dependence were varied, still showed some reliance on external funds. Therefore, although positive, the economic sustainability in Uruguayan cooperatives is divided.

The results also show that cooperatives that are involved in international markets, as had been highlighted in the literature (*refer to ch. 2*), have a more positive financial situation than non-cooperatives, especially reflecting in their ability to invest in improving processes and technology. However, the decision to enter international markets, although beneficial for economic sustainability, has negative effects on the supply chain's impacts on the environment (UNCTD, 2014). This further illustrates the links and trade-offs between sustainable practices.

The economic situation of cooperatives suggested they had overall positive results, nonetheless variance on loan dependence makes their sustainability uncertain. However, it is important to point out that this is a cross-sectional study, therefore the economic situation of the cooperatives is only evaluated in a given moment. Periodical and consistent evaluations might help to tackle this issue in future work.

7.3. Evaluation of Uruguayan Agricultural Cooperatives' Sustainable Supply Chains

The below points are some of the main outcomes from the analysis regarding the evaluation of Uruguayan agricultural cooperatives' sustainability practices and those requested on their suppliers. Despite variance among respondents in some blocks, positive results emerged on all dimensions throughout the internal sustainability practices. Nonetheless, issues emerged in supplier sustainability. The sections of this discussion will explain their relevance and their implications towards the research field.

- Cooperative Internal Sustainability: An Integrated Triple-Bottom-Line.
- Supplier Sustainability: More Collaboration Needed.
- Moving forward: Challenges of Sustainable Supply Chains in Uruguayan Cooperatives.

7.3.1. *Cooperative Internal Sustainability: An Integrated Triple-Bottom-Line*

As discussed in the previous section, being guided by social goals can be regarded as an important condition to attain sustainability in all three dimensions. From the results, it can be said that all cooperatives follow a Triple-Bottom-Line approach that addresses all three pillars of sustainability, with varying degrees of importance to each practice. This contrasts with the findings of the literature, which suggested that the dimensions are hardly ever approached in an integrated way (Crum et al., 2011).

Despite the positive results, there is room for improvement in some blocks of the dimensions. Results on applying environmental management, for example, still need improvement. The literature suggested that companies are mostly driven to implement *environmental management systems* because of economic benefits (Carruthers & Vanclay, 2012). Considering the low implementation of environmental management systems in Uruguayan cooperatives this suggests that the benefits of implementing these systems are not high enough to justify their implementation. This is reinforced by the low monitoring done on environmental practices, which was considered an important part of environmental management to measure and improve on sustainability goals (*refer to ch. 4*).

Overall, the results confirm that agricultural cooperatives in Uruguay are internally concerned with their sustainability, as had been discussed in the literature (*refer to ch.4*). Although there had been doubts on the environmental stewardship of cooperatives, survey results showed that there was a drive to conserve resources and the environment, although environmental management systems and transport pollution were mostly undervalued. This puts into question whether cooperatives can move towards greater sustainability if environmental systems or monitoring procedures are not being followed.

Despite the positive economic results, albeit with variations among sectors on dependence on loans and international commercialisation, it is in its performance of the social dimension where agricultural cooperatives truly reveal their value towards sustainability. Social practices received the highest overall score for all three dimensions and the least variation among results. The drive to benefit, not only the company's workers but the community is a feature which the literature suggested would enable greater implementation of sustainability (*refer to ch. 4*). This is supported by the survey results, which showed that education within the cooperative and in

the community level is highly valuable. It is commendable how cooperatives have the determination to encourage the development of benefits not only for the organisation but for the rural communities, essentially ensuring that farmers can survive in a highly competitive environment. This suggests that sustainability is not just about preserving and not harming, but about improving and flourishing alongside communities and the environment.

Uruguayan cooperatives mostly present a close integration between the economic, environmental, and social dimensions. Nonetheless, realising the goal of incorporating an integrated sustainable supply chain will depend on the cooperatives' ability to collaboratively work towards mutually beneficial goals. Therefore, it is essential that cooperatives introduce and extend sustainable practices towards their suppliers. The next sub-section will discuss the implications of the evaluation of the sustainable practices of Uruguayan cooperatives' suppliers.

7.3.2. Supplier Sustainability: More Collaboration Needed.

The results observed in the survey on Uruguayan cooperatives suggested that although internally cooperatives proved sustainable in all accounts, findings go against what studies had mentioned on the collaborative approach to managing sustainability in suppliers (Carter & Rogers, 2008; Seuring & Müller, 2008). Higher commitment to sustainability with regards to suppliers is needed if Uruguayan cooperatives want to achieve higher sustainability rates across their supply chain. A look at the sustainability practices with regards to suppliers suggests that cooperatives are not truly committed to developing a sustainable and collaborative supply chain. This is in line with the findings from Ilbery and Maye (2005), who claimed that generally agricultural organisations do not extend their sustainability efforts beyond their own operations. Although it cannot be said that the results for all blocks on supplier sustainability are critical, the current formation of the supply chain is not sustainable and more needs to be done to improve in suppliers' sustainability.

A closer look at the criteria used on the suppliers of these cooperatives did not reveal differences among agricultural sectors. As much as social, environmental, and economic practices were part of the selection criteria for sustainable suppliers, cooperatives were not concerned with suppliers' practices if they did not bring any *negative* impact on the community

or their products. Safe and fair work conditions were important, as going against this would harm communities, nonetheless, any social actions that *added* any growth to the community was ranked low. This also proved true with the environmental practices. Uruguayan cooperatives' actions towards environmental sustainability in suppliers match claims that the sustainable practices valued the most in their suppliers are the ones aimed at the safety of products (Faustini & Alves, 2009).

The literature about emphasised the importance of collaborating with suppliers in order to develop a more inclusive sustainable approach (Seuring & Gold, 2013). However, the results of this research do not support this statement entirely within Uruguayan cooperatives, especially with regards to suppliers. While sustainability standards were applied to suppliers, no effort was given to monitoring whether the practices were being conducted. This had also been identified within the cooperative's own activities, where environmental goals were not being controlled. This is an issue in developing sustainability, since there is no way to move towards improving sustainability measures are not being monitored. Given the results on supplier sustainability, a shift to a more collaborative strategy may appear to be the solution to improving supplier sustainability.

In the face of these results, it can be said that changes are necessary in the relationship between cooperatives and their suppliers. As these changes require deeper environmental stewardship and involvement in communities, cooperatives must share their principles with their suppliers. The need arises to disseminate not only the importance of an integrated Triple-Bottom-Line sustainability, but the need for pushing forward improvement in search of creating socio-economic and environmental value through sustainable supply chains.

7.3.3. Moving Forward: Challenges of Sustainable Supply Chains in Uruguayan Cooperatives.

Despite the internal sustainability of cooperatives, some challenges emerged from the results which need addressing. These challenges should be viewed as suggestions for improvement in Uruguayan agricultural cooperatives.

The **first challenge**, is of a technical nature, and is attributable to the organisations' use of environmental management systems. In the results, many cooperatives have implemented

sustainable practices, nonetheless, an organisation must monitor its sustainability goals to continuously improve. Not measuring the results of the practices is not conducive to continuous improvement of sustainability.

A **second challenge**, closely linked to the previous one, involves the tendency of the cooperatives to focus mainly on the internal sustainability, and its efforts on its own operations, with little attention paid to the supplier's impact on the socio-environmental dimensions as far as it does not negatively affect the community or the safety of the products supplied. Additionally, there is a lack of evaluation of these suppliers, which is crucial to the success of economic, social, and environmental sustainability and serves as a guarantee that the supplies are in line with the organisation's sustainable requirements.

The **third challenge** involves the incertitude of the cooperative's economic sustainability. As pointed out in the literature, cooperative's finances face limitations and, especially in the case of Uruguay, indebtedness was suggested as an inhibiting factor of cooperatives' development (*refer to ch. 2.5*). Although the results of the survey did not show critical economic results, indeed even presenting various strongpoints, there is still incertitude towards cooperatives' economic development.

The **fourth** and final challenge, is with regards to the results of transport pollution reduction. This was the lowest among environmental practices, showing negative results. The results suggest that cooperatives are not concerned with reducing the transport pollution derived from their activities. This decision would have a more negative impact on those cooperatives that commercialise in international markets. Therefore, this is a factor that requires improvement in all sectors, although more efforts should be made to reduce the carbon footprint by those cooperatives that commercialise internationally. This reaffirms the importance of considering trade-offs between the dimensions, such as international commerce and CO2 emissions, and develop procedures to mitigate impacts while not affecting economic growth.

7.4. Limitations

This research, although based on evaluating the economic, social, and environmental sustainability in the supply chains of Uruguayan agricultural cooperatives, shows some limitations.

The **first limitation** consists of the geographical scope, as the research was applied only within the context of Uruguay. Focusing the research on a single country faces limitation because the results and conclusions of the research may not be applicable in other countries (Van de Vivjer, & Tanzer, 2004). This eliminates the possibility of making enriching comparisons with the sustainable experiences of other countries, from where features not presented in this study could emerge. As there is a lack in the literature with regards to sustainable supply chain evaluation in agricultural cooperatives, examples from other countries could not be used. Therefore, to overcome this limitation, comparisons with sustainability in the supply chains of agricultural cooperatives from other countries might be valuable and emerge as a suggestion for future research.

The **second limitation** is that although the sample used for this research was broad (83% response from the population of Uruguayan agricultural cooperatives), carrying out case studies on cooperatives in Uruguay may serve to validate the findings of this research. Thus, to increase the reliability of the results, surveys to cooperatives could be supported by surveys to suppliers of agricultural cooperatives, where the researcher could evaluate how and if suppliers respond to cooperatives' sustainability requests.

The **third limitation** is about the variance in results which may be attributed to the differences among sectors. The results of the survey provided insight into the sustainability of cooperatives in Uruguay. Yet, within this context, not all agricultural sectors have the same approach to sustainability in their practices. The results of the survey demonstrated the contrast between sectors. Although the cooperatives all pursue SSCM practices, the analysis showed differences in the sustainability performance between sectors on subthemes, for example the differences in traceability implementation (e.g., present in livestock/absent in fruit and vegetables). The the use sector-specific evaluation methods could be applied to gain more insight into the differences between sectors and to possibly obtain higher reliability values. A sector-specific comparison would, however, restrict a comparison between the performances

of the entire population, which was the objective of this research. Therefore, although important data may emerge from sector comparisons, differences between sectors should be the object of future investigations.

The **fourth limitation** is concerning the reliability of some of the results. Some of the block results of the Cronbach alpha are unsatisfactory. The difference in the Cronbach results, is probably due to the difference among sectors, which is supported by the variation on the results of some practices. This further supports the need for future research to evaluate sector specific practices, focusing on comparing, not just evaluating the overall population. This would help give more insight into the sustainability of agricultural cooperatives, what works and what doesn't. This may present valuable learning points for the improvement of agricultural cooperatives.

7.5. Chapter Summary

The cooperative model offers organisations the possibility to pursue sustainability goals, guided by economic, social, and environmental principles for communities and members. Therefore, cooperatives would be better equipped than non-cooperatives to address issues of social sustainability. The evaluation has proven useful in closing the gap for sustainability in cooperative agricultural supply chains and reinforced their suitability towards sustainability. While smallholder farms struggle with sustainable practices in their operations, cooperatives can provide an alternative to the recovery of farming communities and environment.

Leading the way in creating a better world for current and future generations, cooperatives should encourage other supply chain members to act sustainably. It is argued that collaboration in the supply chain is crucial for sustainability, and collaboration should be equated with the belief that partnerships can create stronger results. After reflecting on the differences between cooperative and non-cooperative sustainability, this study suggests that the collaborative nature of a cooperative, especially between its members, could serve to benefit the survival and growth of small farms and promote sustainability in communities and other organisations.

8. Conclusion

8.1. Introduction

This chapter discusses the work conducted in this research by highlighting how the objectives were completed, as well as discussing its contributions to knowledge and by detailing the limitations of the project. Finally, directions for future research are stated, followed by some final remarks.

8.2. Review of Research Objective Completion

The main objective of the research was to evaluate the supply chain sustainability of Uruguayan agricultural cooperatives. The four objectives of this dissertation were outlined in chapter 1. The completion of these objectives is presented in Table 19, below.

Table 19 - Review of Research objectives. Elaborated by author.

Research Objective	Completion
1 Understand the importance of sustainably managing agricultural supply chains in Uruguay.	The conceptual framework developed through the review of literature in Chapter 2 , provided the basis of this research. Sustainable development was conceptualised and its implications on the field of Supply Chain explained. The importance of facing the challenge of creating sustainable supply chains in Uruguay was described, and cooperatives were proposed as an object of study for the development of sustainable supply chains.
2 Examine the suitability for sustainability between agricultural cooperatives and non-cooperative farms.	The combination of theoretical and empirical findings (from Chapters 3 and 6 , respectively) enabled the author to qualitatively analyse the literature and contrast it with the findings of the primary data to conclude whether cooperatives are more suitable for sustainability than non-cooperatives. This was later discussed in Chapter 7 .
3 Identify current best sustainable practices in agricultural organisations, considering potential barriers to their	In Chapter 4 , a thorough review of the sustainable practices available in the literature, enabled the researcher to identify a set of sustainable practices for agricultural organisations to apply in their supply chains. Moreover, the best practices identified would serve in the completion of the 4 th objective.
4 Evaluate the sustainable practices employed in the supply chains of Uruguayan agricultural cooperatives.	Based on the practices identified in Chapter 4 , the author could develop a framework, in Chapter 5 , to evaluate the sustainability of Uruguayan agricultural cooperatives' practices and those requested on their suppliers. The results of the survey were presented and analysed in Chapter 6 and later discussed in Chapter 7 .

The following section provides more details on the completion of this research.

8.3. Research Conclusion

Our society is currently facing a series of unprecedented crises of an economic and environmental nature. These problems have been brought on by organisations which have favoured profit over social and natural resources for far too long. The pressures that small farmers face nowadays are great. Agriculture supply chains are being pressured to shift and change the way they collaborate to eliminate their negative impact on the world they inhabit. In this context, agricultural cooperatives are proposed as important agents of sustainable development. This suggests that, if the cooperative model were a suitable vessel for sustainability, then supply chain research should aim to understand more about it.

Through joining cooperatives, farmers can be enabled to reach higher levels of sustainability and ensure their survival in a competitive global environment. Especially in the present global scenario of growing population and food needs, partnered with economic, social and environmental pressures. It is essential that in this scenario, that organisations in these chains implement practices that not only ensure the longevity and safeguard of the environment, but that create value for communities. Of particular importance, is integrating farmers into cooperative supply chains in order to increase their sustainability, however, despite the cooperative's internal sustainability, it faces challenges with regards to exerting pressure on suppliers to be more sustainable. Therefore, although cooperatives are an inherently more sustainable model than small farmer organisations, and have social benefits for the community, their outreach towards their supply chain is still lacking.

This research developed a framework to evaluate the sustainability in supply chains in the context of agricultural cooperatives in Uruguay. Its main contribution is that it identified, and ventured to fill, a gap in the literature on the lack of research on supply chain sustainability of agricultural cooperatives. It also highlights the key differences between non-cooperative and cooperative farms and, hence, it expands the current SSCM literature. Furthermore, the evaluative framework can serve to guide agricultural managers in pursuit of sustainability goals in their organisations. However, there may be potential to expand the framework further to offer more sector specific guidelines. In the cooperatives, it would be interesting to have further evaluations down the line.

The results of this research affirm the need for future study to investigate the subject of sustainability in the supply chains of agricultural cooperatives. In fact, as can be seen from the data presented in this paper, Uruguay's agricultural cooperatives, despite their internal sustainability, do not necessarily influence sustainable practices in their suppliers. Every day, companies become more aware of the voluntary application of sustainability, rather than viewing the issue as an imposition by governments or customers, and begin to view it as their moral obligation. Cooperatives embody many of the principles of sustainable development and can present valuable results guided by their social moral compass.

As for the involvement of suppliers in more sustainable practices, for the care of the environment above all, it seems that the strongest obstacle is the lack of interest in the environmental responsibility of others. However, cooperatives should take more care of the actions of their suppliers, collaboratively trying to create a better world for present and future generations.

8.4. Contribution of the research

This section will reflect on the contribution of this dissertation to the research field. Besides the contribution to the body of literature, this research contributes to the field in two ways. Firstly, it enables agricultural organisations to identify which practices will enhance their sustainability performance in the supply chain.

Considering the implications of sustainability on companies' activities, resulting from ever-expanding supply chains. Future supply chain managers and supply chain managers *of the future* cannot ignore and should pursue sustainable development practices. This dissertation's contribution responds to ILO's (2014) claims on cooperatives being a suitable model for sustainability. Despite the need for more collaboration with suppliers, agricultural cooperatives present the potential of developing sustainable supply chains.

It's contribution to the literature is significant since, until this moment, no studies had evaluated sustainable supply chain practices in agricultural cooperatives. Additionally, this has managerial implication towards companies to consider joining cooperatives, or creating a cooperative to develop more sustainable supply chains.

8.5. Future work

This study aimed to evaluate the supply chain sustainability of Uruguayan agricultural cooperatives with regards to their activities and those requested on suppliers. From this context, a question may arise promoting future research:

How successful are the sustainable practices employed across the supply chain of Uruguayan agricultural cooperatives?

It would be appropriate to verify the effects these activities have on the organisation with regards to sustainability. Numerically quantifying the sustainable practices, and utilising indicators, may contribute to further guide the initiatives towards a more sustainable supply chain. Future work would have to develop indicators, based on the best practices exposed in this research, to evaluate the degree of sustainable performance in cooperatives as well as the performance of their suppliers. Additionally, periodical, and consistent evaluations should be incorporated, in an attempt to monitor processes and improve upon sustainability.

The framework presented in the Research Methodology chapter constitutes a structured view of the best practices identified in chapter 4, it served the need to develop a survey to evaluate which practices were employed in cooperatives, which could be used as a tool to evaluate the use of sustainable practices in other organisations. By providing an understanding of these practices and their links, the researcher expects this framework could be used as a guide for supply chain sustainability in agriculture organisations. For example, an organisation may find it easier to understand where it stands within the dimensions and better plan towards closing the gap to sustainability.

Moreover, as derived from the research Limitations presented in Chapter 7, the following are also suggestions for future research:

- Sector-specific evaluations of the different agricultural sectors could provide empirical evidence to guide sustainability in agricultural cooperatives.
- Surveys on suppliers would bring insight on whether sustainable practices are transferred to actions.
- Evaluating sustainability in the supply chains of agricultural cooperatives from other countries would be valuable and enable to comparisons with the present research.

9. References

- Abaidoo, S. H. D. (2002). Alternative and conventional agricultural paradigms: Evidence from farming in Southwest Saskatchewan. *Journal of Planning Literature*, 17(1), 85-168.
- Ahi, P., & Searcy, C. (2013). A comparative literature analysis of definitions for green and sustainable supply chain management. *Journal of Clean Production*, 52, pp. 329-341.
- Aktar, Md. Wasim, Sengupta, Dwaipayan, & Chowdhury, Ashim. (2009). *Impact of pesticides use in agriculture: their benefits and hazards*. Slovak Toxicology Society SETOX.
- Alexandratos, N., & Bruinsma, J. (2012). *World agriculture towards 2030/2050: The 2012 revision*. Rome: FAO, Agricultural Development Economics Div.
- Anderson, K. (2010). Globalization's effects on world agricultural trade, 1960–2050. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1554), pp. 3007–3021.
- Arbeletche, P., & Carballo, C. (2006). Sojización y concentración de la agricultura uruguaya. *XXXIV Congreso de la Asociación Argentina de Economía Agrícola Córdoba*, Argentina.
- Arbeletche, P. & Gutierrez, G. (2010). Crecimiento de la agricultura en Uruguay: exclusión social o integración económica en redes. *Pampa*, 6, pp. 113-138.
- Bausch, J.C., Bojórquez-Tapia, L., & Eakin, H. (2014). Agro-environmental sustainability assessment using multicriteria decision analysis and system analysis. *Sustainable Science*, 1–17.
- Bennett, E. M., Cramer, W., Begossi, A., Cundill, G., Díaz, S., Egoh, B. N., Geijzendorffer, I. R., ... Woodward, G. (2015). Linking biodiversity, ecosystem services, and human well-being: three challenges for designing research for sustainability. *Current Opinion in Environmental Sustainability*, 14, pp. 76-85.
- Bertullo, J., Isola, G., Castro, D., & Silveira, M. (2014). *El cooperativismo en Uruguay*. Servicio Central de Extensión y Actividades en el Medio. Universidad de la Republica. Montevideo, Uruguay.
- BBC. (2004, June 11). India finds pesticides in colas. *BBC News*. Retrieved from: http://news.bbc.co.uk/1/hi/world/south_asia/3458365.stm [Accessed May 28, 2017]
- BBC. (2015, June 11). BSE: Suspected 'mad cow' disease case found on Republic of Ireland farm. *BBC News*. Retrieved from: <http://www.bbc.com/news/world-europe-33097186>
- BBC (2017, March 20). Brazil meat scandal: China and EU suspend imports. *BBC News*. Retrieved from: <http://www.bbc.com/news/world-latin-america-39334648>

- 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(2), 131-143.
- Bicudo, J.R., & Westerman, P.W. (2005) Management considerations for organic waste use in agriculture, *Bioresource Technology*, 96(2), 215-221.
- Birchall, J. (1994). *Cooperatives: The People's Business*. Manchester, UK: Manchester University Press.
- Bortoleto, F. C., & de Moura Costa, D. R. (2012). The importance of cooperatives' corporate social responsibility to the loyalty of members. *Journal of Rural Cooperation*, 40, 198–216.
- Bosona, T., & Gebresenbet, G. (2013). Food traceability as an integral part of logistics management in food and agricultural supply chain. *Food Control*, 33(1), 32-48.
- Bowersox, D. J., & Closs, D. J. (1996). *Logistical management: The integrated supply chain process*. New York: McGraw-Hill.
- Brundtland, G. H., & World Commission on Environment and Development. (1987). *Report of the World Commission on environment and development: "our common future."*. New York: United Nations.
- Brunori, G., Galli, F., Barjolle, D., Vanbroekhuizen, R., Colombo, L., Giampietro, M., Kirwan, J., Lang, T., Mathijs, E., Maye, D., Roest, K.D., Rougoor, C., Schwarz, J., Schmitt, E., Smith, J., Stojanovic, Z., Tisenkopfs, T. & Touzard, J., (2016). Are Local Food Chains More Sustainable than Global Food Chains? Considerations for Assessment. *Sustainability*, 8(5), 449-475.
- Bruwer, Johan De Wet, Tey, Yeong, Li, Elton, Abdullah, Amin, Brindal, Mark, Radam, Alias, Ismail, Mohd, ... Darham, Suryani. (2014). The relative importance of factors influencing the adoption of sustainable agricultural practices: a factor approach for Malaysian vegetable farmers. *Sustainability science*. 9(1), 17-29.
- Caporal, F. R., & Costabeber, J. A. (2007). *Agroecologia: Alguns conceitos e princípios*. Brasilia, Brazil.
- Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: Moving toward new theory. *International Journal of Physical Distribution and Logistics Management*, 38(5), 360-387.
- Carter, C. R., & Easton, P. L. (2011). Sustainable supply chain management: evolution and future directions. *International Journal of Physical Distribution & Logistics Management*, 41(1), 46-62.
- Cary, J., & Roberts, A. (2011). The limitations of environmental management systems in Australian agriculture. *Journal of Environmental Management*, 92(3), 878-885.

Carruthers, G., & Vanclay, F. (2012). The intrinsic features of Environmental Management Systems that facilitate adoption and encourage innovation in primary industries. *Journal of Environmental Management*, 110(2), 125-134.

Chiputwa, B., & Qaim, M. (2016). *Sustainability standards, gender, and nutrition among smallholder farmers in Uganda*, *The Journal of Development Studies*, 52(9).

Chouinard, H.H., T. Paterson, P. Wandschneider, and A. Ohler. (2008) Will Farmers Trade Profits for Stewardship? Heterogeneous Motivations for Farm Practice Selection. *Land Economics* 84(1), p.p. 66–82.

Ciruela, A. (2003). El perfil gerencial en las cooperativas agrarias. Análisis de la gerencia en las cooperativas agrarias de la provincia de Málaga. Universidad de Málaga.

Collins, C., Jerram, C., Metcalf, A., & Santiago-Brown, I. (2015). Sustainability Assessment in Wine-Grape Growing in the New World: Economic, Environmental, and Social Indicators for Agricultural Businesses. *Sustainability*, 7, 8179-8204.

Collis, J., & Hussey, R. (2009). *Business research: a practical guide for undergraduate & postgraduate students*. Basingstoke, UK, Palgrave Macmillan.

CAF (2014) Dinamica Competitiva Agropecuaria en Uruguay y los Principales Desafíos de Corto y Mediano Plazo: Reflexiones y aportes para la discusión. Cooperativa Agrarias Federadas, Montevideo, Uruguay.

CAF (2014). *30 años produciendo futuro: 1984 - 2014*. Cooperativa Agrarias Federadas, Montevideo, Uruguay.

CAF. Cooperativas Agrarias Federadas. (2016). Fortalecimiento de las capacidades competitivas de las Cooperativas Agrarias Federadas. Accessed in March 2017. Retrieved from: <http://www.caf.org.uy/site/documentos/2016/2013-%20Publicaci%C3%B3n%20Fortalecimiento%20de%20las%20capacidades%20competitivas%20de%20las%20Cooperativas-%28alta%29.pdf>

CAF. Cooperativas Agrarias Federadas. (2017). *Presentes en el desarrollo competitivo del agro uruguayo*. Accessed on 14 March 2017. Retrieved from: http://www.caf.org.uy/site/?page_id=43

Couper M.P. (2011). The future of modes of data collection. *Public Opinion Quarterly*. 75, 889-908.

Crum, M., Carter, C. R., & Liane, E. P. (2011). Sustainable supply chain management: evolution and future directions. *International Journal of Physical Distribution & Logistics Management*, 41(1), 46-62.

Derpsch, R. and Friedrich, T. (2009). Global Overview of Conservation Agriculture Adoption. FAO, Rome.

De Schutter, O. (2010) 'Report submitted by the Special Rapporteur on the right to food'. United Nations Human Rights Council.

Di Iacovo, F., & O'Connor, D. (2009). Supporting Policies for Social Farming in Europe: Progressing Multifunctionality in Responsive Rural Areas. Progressing Multifunctionality in Responsive Rural Areas. SoFar project: Supporting EU Agricultural Policies, Firenze, Italy.

Di Iacovo, F., Moruzzo, R., Rossignoli, C.M., & Scarpellini, P. (2016) Measuring the effects of transdisciplinary research: the case of a social farming project, *Futures*, 75, 24-35.

Dogliotti, S. (2012). Desarrollo sostenible de sistemas de producción hortícolas y hortícola-ganaderos familiares: una experiencia de co-innovación. Proyecto FPTA-209 Diseño, implementación y evaluación de sistemas de producción intensivos sostenibles en la zona sur del Uruguay. Instituto Nacional de Investigación Agropecuaria, Montevideo, Uruguay.

Dorward, A. (2013). Agricultural labour productivity, food prices and sustainable development impacts and indicators. *Food Policy*, 39, 40-50.

Elkington, J. (2002). *Cannibals with forks: The triple bottom line of 21st century business*. Oxford: Capstone.

Engles, E., & Gliessman, S. R. (2015). *Agroecology: The ecology of sustainable food systems*. Boca Raton, Florida.

Engestrom, Y., Sannino, A., Bal, A., Lotz-Sisitka, H., Pesanayi, T., Chikunda, C., Lesama, M. F., ... 12th International Conference of the Learning Sciences: Transforming Learning, Empowering Learners, ICLS 2016. (2016). Agentive learning for sustainability and equity: Communities, cooperatives and social movements as emerging foci of the learning sciences. *Proceedings of International Conference of the Learning Sciences, Icls*, 2, 1048-1054.

Fairbairn, B. (1994). *The meaning of Rochdale: The Rochdale Pioneers and the co-operative principles*. Saskatoon, Sask., Canada: Centre for the Study of Co-operatives, University of Saskatchewan.

Fairweather, J. R. (1999). Understanding how farmers choose between organic and conventional production: Results from New Zealand and policy implications. *Agriculture and Human Values*, 16(1), 51-63.

Fan, L., Niu, H., Yang, X., Qin, W., Bento, C. P. M., Ritsema, C. J., & Geissen, V. (2015). Factors affecting farmers' behaviour in pesticide use: Insights from a field study in northern China. *Science of the Total Environment*, 537, 360-368.

Faustini, S.; & Alves, S. M. (2009). Sustainable Supply Chain Management - Processes, Actions and Essential Criteria. In *Simpósio De Engenharia De Produção*, 16, Bauru.

- 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, 118-130.
- Food and Agriculture Organization of the United Nations. (2014). *SAFA guidelines: Sustainability Assessment of Food and Agriculture Systems, version 3.0*. Available at <http://www.fao.org/3/a-i3957e.pdf>
- Garcia-Llorente, M., Rossignoli, C. M., Di, I. F., & Moruzzo, R. (2016). Social farming in the promotion of social-ecological sustainability in rural and periurban areas. *Sustainability*, 8, 12,
- Gerdessen, J.C., and Pascucci, S. (2013). Data Envelopment Analysis of sustainability indicators of European agricultural systems at regional level, *Agricultural Systems*, 118, 78-90.
- Gertler, M. E. (2001). *Rural co-operatives and sustainable development*. Saskatoon: Centre for the Study of Co-operatives, University of Saskatchewan.
- Gliem, J.A., & Gliem, R.R. (2003). Calculating, Interpreting, And Reporting Cronbach's Alpha Reliability Coefficient for Likert-Type Scales. *Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education*, 82-88.
- Gomiero T, Pimentel D, & Paoletti, M.G. (2011). Is There a Need for a More Sustainable Agriculture? *Critical Review Plant Science*. 30, 6-23.
- Grolleau, G., Mzoughi, N., & Thomas, A. (2007). What drives agrifood firms to register for an Environmental Management System? *European Review of Agricultural Economics*, 34(2), 233-255.
- Hagel, L., Pahwa, P., Dosman, J.A., and Pickett, W. (2013) Economic worry and the presence of safety hazards on farms, *Accident Analysis & Prevention*, 53, 156-160
- Hall, A. (2007) Restructuring, environmentalism, and the problem of farm safety. *Sociology Ruralis*, 47 (4), 343.
- Hall, T.J., 2011. The triple bottom line: what is it and how does it work? *Indiana business review*, 86(1), 4.
- Matos, S., & Hall, J. (2007). Integrating sustainable development in the supply chain: The case of life cycle assessment in oil and gas and agricultural biotechnology. *Journal of Operations Management*, 25(6), 1083-1102.
- Hall, J. & Matos, S. (2010). Incorporating impoverished communities in sustainable supply chains. *International Journal of Physical Distribution & Logistics Management*, 40(1), 124-147.
- Hart, S.L., 1995. A natural-resource-based view of the firm. *Academy of management review*, 20(4), pp.986-1014.
- Haughton, G. (1999). Environmental Justice and the Sustainable City. *Journal of Planning Education and Research*, 18(3), 233-243.

Heizer, J., & Render, B. (2008). Principles of operations management. Upper Saddle River, N.J: Pearson Prentice Hall.

Hennebry, J.L., Preibisch, K., & McLaughlin, J. (2010). *Health across Borders -Health Status, Risks and Care among Transnational Migrant Farm Workers in Ontario*. Toronto, ON: CERIS, Ontario Metropolis Centre.

Hill, T., Nel, E., & Illgner, P. (2007). Partnership for successful community-based economic development: a case study of Ngolowindo Cooperative, Malawi.

Hjorth, K., Johansen, K., Holen, B., Andersson, A., Christensen, H. B., Siivinen, K., & Toome, M. (2011). Pesticide residues in fruits and vegetables from South America - A Nordic project. *Food Control*, 22(11), 1701-1706.

Hobbs, P. R., Sayre, K., & Gupta, R. (2008). The role of conservation agriculture in sustainable agriculture. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 363, 1491, 543-555.

Hopkins, K. D., & Gullickson, A. R. (1989). Monetary Gratuities in Survey Research: A Meta-Analysis of Their Effectson Response Rates. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Horne, J. E., & McDermott, M. (2001). *The next green revolution: Essential steps to a healthy, sustainable agriculture*. New York: Food Products Press.

Hove, H. (2004). Critiquing sustainable development: a meaningful way of mediating the development impasse? *Undercurrent*, 1(1), 48-54.

Hult, G.T.M. (2011). Market-focused sustainability: market orientation plus, *Journal of the Academy of Marketing Science*, 39(1), 1-6.

IFAD. (2011). Rural Poverty Report 2011. International Fund for Agricultural Development, Rome

IICA. (2009). *La Experiencia de Uruguay en Trazabilidad Bovina*. Instituto Interamericano de Cooperación para la Agricultura, Montevideo, Uruguay.

Ikerd, J. E. (2008). *Crisis & opportunity: Sustainability in American agriculture*. Lincoln: University of Nebraska Press.

Ikerd, J.E., Osburn, D., and J.C. Owsley. (1997). Some Missouri farmers' perspectives of sustainable agriculture. University of Missouri.

INE, (2011) *Síntesis del Marco Conceptual del censo de viviendas, hogares y población 2011*. Accessed on 28 April 2017. Retrieved from: <http://www.ine.gub.uy/censos2011/documentos/S%C3%ADntesis%20del%20marco%20conceptual%20del%20censo%20de%20viviendas,%20hogares%20y%20poblaci%C3%B3n%202011.pdf>

- INE. (2016). Anuario Estadístico del Uruguay 2016. Instituto Nacional de Estadística. Accessed on 09 April 2017. Retrieved from: <http://www.ine.gub.uy/documents/10181/439637/Anuario+2016.pdf/ae828721-d334-4d27-a1eb-ab6e388b2e0c>
- Jaffee, S., & World Bank. (2003). *From challenge to opportunity: Transforming Kenya's fresh vegetable trade in the context of emerging food safety and other standards in Europe*. Washington, D.C: World Bank.
- Jennings, P.D., & Zandbergen, P.A. (2005). Ecologically Sustainable Organizations: An Institutional Approach, *Academy of Management Review*, 20(4), 1015-1052
- Johnston, P., Everard, M., Santillo, D. & Robèrt, K.-H. (2007). Reclaiming the Definition of Sustainability (7 pp). *Environmental Science and Pollution Research*, 14(1), 60-66.
- Kahuthu, A. (2006). Economic Growth and Environmental Degradation in a Global Context. *Environment, Development and Sustainability*, 8(1), 55-68.
- Kelder, J. (2005). Using Someone Else's Data: Problems, Pragmatics, and Provisions. *Forum: Qualitative Social Research*, 6(1), Art. 39.
- Klassen, R.; Sarkis, J.; Seuring, S.; & Walker, H. (2014). Sustainable operations management: Recent trends and future directions. *International Journal of Operations & Production Management*, 34, (5)
- Kleindorfer, P. R., Singhal, K., & Van, W. L. N. (2005). Sustainable Operations Management. *Production and Operations Management*, 14(4), 482-492.
- Koleda N., Lace N., & Ciemleja G. (2010). *Quantitative harmonious model of sustainability factors: Measuring Contribution of Financial Viability*. Business and Management, Vilnius Gediminas Technical University.
- Lancaster, G. (2005). *Research Methods in Management: a concise introduction to research in management and business consultancy*. 1st ed., Burlington: Elsevier Butterworth-Heinemann.
- Leite, A.E., Castro, R., Jabbour, C.J.C., Batalha, M.O., & Govindan, K. (2014). Agricultural production and sustainable development in a Brazilian region (Southwest, São Paulo State): motivations and barriers to adopting sustainable and ecologically friendly practices. *International Journal of Sustainable Development*, 2, 422-429.
- Leland J., (2006, September 04). Immigrants Stealing U.S. Social Security Numbers for Jobs, not Profits. *New York Times*. Retrieved from <http://www.nytimes.com/2006/09/04/world/americas/04iht-id.2688618.html>
- Leppelt, T. (2014). *Sustainability in supply chains: A study on the effects of sustainability on supplier-buyer relationships*. Wiesbaden: Springer Gabler.

- Lindgren, R., & Canadian Environmental Law Association. (2003). *In the wake of the Walkerton tragedy: The top 10 questions*. Toronto: CELA = ACDE.
- MacDonald, C., & Norman, W. (2007). Rescuing the Baby from the Triple-Bottom-Line Bathwater: A Reply to Pava. *Business Ethics Quarterly*, 17(1), 111-114.
- MacPherson, I. (1995). *Co-operative principles for the 21st century*. Geneva, Switzerland: International Co-operative Alliance.
- Maldonado-siman, E., Godinez-gonzalez, C., Cadena-meneses, J., Ruíz-flores, A. & Aranda-osorio, G. (2012). Traceability in the Mexican dairy processing industry. *Journal of Food Processing and Preservation*, 2.
- Malviya, R.K., & Kant, R. (2016). Hybrid decision making approach to predict and measure the success possibility of green supply chain management implementation. *Journal of Clean Production*, 135, 387-409.
- Matopoulos, A., Salampasis, M., Tektonidis, D., & Kalogianni, E. P. (2012). TraceALL: a semantic web framework for food traceability systems. *Journal of Systems and Information Technology*, 14(4) 302-317.
- Mcguire, J., Morton, L.W., & Cast, A.D. (2013) Reconstructing the good farmer identity: shifts in farmer identities and farm management practices to improve water quality. *Agric. Human Values*, 30: 57-69.
- Menguzzato, M. (1992). *La cooperación empresarial: análisis de su proceso*. Valencia: IMPIVA.
- Mentzer, J., DeWitt, W., Keebler, J., Min, S., Nix, N., Smith, C., & Zacharia, Z. (2001). Defining supply chain management. *Journal of Business Logistics*, 22(2), 1–25.
- Mondelli, M., & Montes, F. (2012). Estrategias y obstáculos para la diversificación de las exportaciones cítricas uruguayas. *Anuario OPYPA 2012*. Ministerio de Ganadería, Agricultura y Pesca (MGAP), Montevideo, Uruguay.
- Morali, O., & Searcy, C. (2013). A Review of Sustainable Supply Chain Management Practices in Canada. *Journal of Business Ethics*, 117(3), 635-658.
- Mouton, J. (1996). *Understanding social research*. Pretoria, Van Schaik Publishers.
- Münkner, H.H. (2015). *Co-operative principles and co-operative law*. LIT, Second edition, Wien.
- Nash, M.A., & Hoffmann, A.A. (2012) Effective invertebrate pest management in dryland cropping in southern Australia: The challenge of marginality. *Crop Protec.* 42: 289-304.
- Olde, E., De, Oudshoorn, F., Bokkers, E.A.M., Stubsgaard, A., Sørensen, C., & Boer, I., (2016.). *Assessing the Sustainability Performance of Organic Farms in Denmark*. *Sustainability* 8, 957.

Onwuegbuzie, A., & Leech, N. (2005). Taking the "Q" Out of Research: Teaching Research Methodology Courses Without the Divide Between Quantitative and Qualitative Paradigms. *Quality and Quantity*, 39, 267-295.

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.

Pagell, M. and Wu, Z. (2011) Balancing priorities: decision-making in sustainable supply chain management. *Journal of Operations Management*, 29(6), 577-590

Pannell, D. J., Llewellyn, R. S., & Corbeels, M. (2014). The farm-level economics of conservation agriculture for resource-poor farmers. *Agriculture, Ecosystems & Environment*, 187(3), 52-64.

Paulson, D.D. (1995). Minnesota extension agents' knowledge and views of alternative agriculture. *American Journal of Alternative Agriculture*. 10(3): 122-128.

Pinto, A.C. (2009) Agricultural Cooperatives and Farmers Organizations - role in rural development and poverty reduction. United Nations Archive. Retrieved from: <http://www.un.org/esa/socdev/egms/docs/2009/cooperatives/Pinto.pdf>

Pittelkow, C. M. (2015). Productivity limits and potentials of the principles of conservation agriculture. *Nature London*-, 517, 7534, 365-368.

Pretty, J, & R. Hine. (2001). Reducing food poverty with sustainable agriculture: A summary of new evidence. SAFE- World Research Project.

Pretty, J. (2003) Social Capital and the Collective Management of Resources. *Science*, 302: 1912-1914.

Pretty, J., Smith, G., Goulding, K. W. T., Groves, S. J., Henderson, I., Hine, R. E., King, V., ... Vis, J. K. (2008). Multi-year assessment of Unilever's progress towards agricultural sustainability I: indicators, methodology and pilot farm results. *International Journal of Agricultural Sustainability*, 6(1), 37-62.

Pretty, J., Smith, G., Goulding, K. W. T., Groves, S. J., Henderson, I., Hine, R. E., King, V., ... Walter, C. (2008). Multi-year assessment of Unilever's progress towards agricultural sustainability II: outcomes for peas (UK), spinach (Germany, Italy), tomatoes (Australia, Brazil, Greece, USA), tea (Kenya, Tanzania, India) and oil palm (Ghana). *International Journal of Agricultural Sustainability*, 6(1), 63-88.

Pretty, Jules, & Bharucha, Zareen Pervez. (2014). *Sustainable intensification in agricultural systems*. Oxford University Press.

O'Brien, K.L., & Leichenko, R.M. (2000). *Double Exposure: Assessing the Impacts of Climate Change within the Context of Economic Globalization*. *Global Environmental Change*, 10(3), 221–232.

Osburn H. G. (2000). Coefficient alpha and related internal consistency reliability coefficients. *Psychological Methods*, 5, 343-335.

PFMC. Programa Fida Mercosur Claeh. (2014) Contribución del cooperativismo al desarrollo de la agricultura familiar en el Uruguay. Seminario Internacional sobre Cooperativismo en la Agricultura Familiar. Montevideo, Uruguay.

Quarshie, A.M., Salmi, A., Leuschner, R., 2016. Sustainability and corporate social responsibility in supply chains: the state of research in supply chain management and business ethics journals. *Journal Purchasing Supply Management*. 22, 2, 82-97.

Ratner, C. (2012). Subjectivity and Objectivity in Qualitative Methodology. *Forum: Qualitative Social Research*, 3(3), Art. 16.

Ravensburg, N. G. V. (2009). Enterprises Future lies in Cooperative Entrepreneur cooperative in Africa. *International Labour Organisation*, 1-22.

Robinson, J. (2004) Squaring the circle? Some thoughts on the idea of sustainable development. *Ecological Economics*, 48, 369–384

Romero, R., Muriel, J.L., García, I., Muñoz de la Peña, D. (2012) Research on automatic irrigation control: State of the art and recent results. *Agricultural Water Management*. 114: 59-66.

Roome, N. (1992). Developing environmental management strategies. *Business Strategy and the Environment*, 1(1), 11-24.

Ruane, J. M. (2005). *Essentials of research methods: a guide to social science research*. Malden, MA, Blackwell Pub.

Sabourin, E., Samper, M., and Sotomayor, O. (2015). *Políticas públicas y agriculturas familiares en América Latina y el Caribe: nuevas perspectivas*. IICA.

Sachs, I. (2004). *Desenvolvimento: Includente, sustentável, sustentado*. Rio de Janeiro: Garamond.

Salles Filho, S., Bin, A., Gianoni, C., Mendes, P.J., and Rio, C. (2010) GCARD 2009 Regional Review for Latin America and Caribbean. FAO Archive. Retrieved from: <http://www.fao.org/docs/eims/upload/267904/GCARD%20LAC%20Nov%2009%20English%20FINAL.pdf>

Samuelle, J. (2016). Un Uruguay con más vacas y menos ovejas. *El Observador*. 28 December 2016. Accessed on 02 May 2017. Retrieved from: <http://www.elobservador.com.uy/un-uruguay-mas-vacas-y-menos-ovejas-n1014320>

Santa-Eulalia, L.A. (2009). An essay on green supply chain design and dynamic alignment. Centre interuniversitaire de recherche sur les réseaux d'entreprise, la logistique et le transport. Montréal.

Sapsford, R. (2007). Survey research. SAGE, London.

SAI. (2015). Principles & Practices for the Sustainable Dairy Farming. SAI Platform Dairy Working Group. Retrieved from:
<http://www.saiplatform.org/uploads/Modules/Library/principles-and-practices-of-sustainable-dairy-farming-2015.pdf>

SARE. Sustainable Agriculture Research and Education (2002). Exploring Sustainability in Agriculture. USDA: Sustainable Agriculture Network. Retrieved from:
www.sare.org/bulletin/explore/

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research methods for business students*. Harlow, Pearson Education.

Seuring, S. (2013). A review of modelling approaches for sustainable supply chain management. *Decision Support Systems*, 54, 1513-1520.

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.

Seuring, S., & Gold, S. (2013). Sustainability management beyond corporate boundaries: From stakeholders to performance. *Journal of Cleaner Production*, 56, 1-6.

Shahbaz, M., Hye, Q.M.A., Tiwari, A.K., & Leitão, N.C. (2013) Economic growth, energy consumption, financial development, international trade and CO emissions in Indonesia, *Renewable and Sustainable Energy Reviews*, 25, p.p. 109-121

Sierra, M., & Zurbriggen, C. (2015). *Redes, Innovacion y Trazabilidad en el Sector Carnico Uruguayo*. CIEPLAN, Santiago, Chile.

Sikdar, S. K. (2003). Sustainable Development and Sustainability Metrics. *Aiche Journal*, 49, 1928-1932.

Sims, R. E. H., FAO, & Food and Agriculture Organization of the United Nations. (2011). "Energy-smart" food for people and climate: Issue paper. Rome: FAO.

Skurnik, S. (2002). The role of cooperative entrepreneurship and firms in organizing economic activities. *Finnish Journal of Business Economics*, 1, 103–214.

Slavickiene, A., & Savickiene, J. (2014). Comparative Analysis of Farm Economic Viability Assessment Methodologies. *European Scientific Journal*, 10(7), 130-150

Smith, S., & International Labour Office. (2014). *Promoting cooperatives: An information guide to ILO Recommendation No. 193*. Geneva: ILO.

Stagl, S. (2002). Local Organic Food Markets: Potentials and Limitations for Contributing to Sustainable Development. *Empirical: Journal of Applied Economics and Economic Policy - Sponsored by the Austrian Economic Association and the Austrian Institute of Economic Research*, 29(2), 145-162.

Sumner, J., Mair, H., & Nelson, E. (2010). Putting the culture back into agriculture: Civic engagement, community, and the celebration of local food. *International Journal of Agricultural Sustainability*, 8, 54-61.

Suvedi, M., Jeong, E., & Coombs, J. (2010). Education needs of Michigan farmers. *Journal of Extension*, 48(3), 1-11.

Thurow, L. C. (2009). *Building wealth: The new rules for individuals, companies, and nations in a knowledge-based economy*. Pymble, NSW: HarperCollins e-books.

Tilman, D., Befort, B. L., Balzer, C., & Hill, J. (2011). Global food demand and the sustainable intensification of agriculture. *Proceedings of the National Academy of Sciences of the United States of America*, 108(50), 20260-20264.

Tiscornia, G., Achkar, M., and Brazeiro, A. (2014). Efectos de la intensificación agrícola sobre la estructura y diversidad del paisaje en la región sojera de Uruguay. *Ecología Austral*, 24, 212-219.

Treviño, L. K., & Nelson, K. A. (2014). *Managing business ethics: Straight talk about how to do it right*. John Wiley & Sons, Hoboken, NJ.

UNCTD. United Nations Conference on Trade and Development. (2014). *The role of international trade in the post-2015 development agenda: Note*.

UNCTD. United Nations Conference on Trade and Development. (2015). *The role of smallholder farmers in sustainable commodities production and trade: Report*. Accessed on 14/06/2017. Retrieved from http://unctad.org/meetings/en/SessionalDocuments/tdb62d9_en.pdf

Vachon, S., & Klassen, R. D. (July 01, 2006). Extending green practices across the supply chain. *International Journal of Operations & Production Management*, 26(7), 795-821.

Van der Walt, L. (2008). Collective Entrepreneurship as a Means for Sustainable Community Development: A Cooperative Case Study in South Africa. *Forum Empresarial*, 13, 2, 3-20

Van de Vivjer & Tanzer, N. K. (2004). Bias and equivalence in cross-cultural assessment: An overview. *European Review of Applied Psychology - Revue Européenne De Psychologie Appliquée*, 54(2), 119-135.

Van Hoof, B., Monroy, N. & Saer, A. (2008). *Producción más limpia: paradigma de gestión ambiental*. México: Universidad de los Andes, Alfaomega, México.

Vo, C.S., 2016. Cooperatives' Community Practices in Costa Rica: Financial Support Mechanisms. *Social Development Issues*, 38(2), 17-33.

Von, R. N. G. (2009). *Enterprise future lies in cooperation: Entrepreneur cooperatives in Africa*. International Labour Office, Dar es Salaam: ILO.

Voss, D., & Whipple, J. (2009). Food Supply Chain Security: Issues and Implications. In Zsidisin, G. A., & Ritchie, B (Eds.). *Supply Chain Risk - A Handbook of Assessment, Management, and Performance*. New York: Springer.

Vyas, R., (2012). Mitigation of musculoskeletal problems and body discomfort of agricultural workers through educational intervention. *Work*, 41, 2401.

Wales Rural Observatory (2011). *Report on Farmers' Decision Making*. Wales Rural Observatory Database. Accessed 6 May 2017. Retrieved from: <http://www.walesruralobservatory.org.uk/sites/default/files/Farmers%27%20Decision%20Making%20Final%20Report.pdf>

Wandel, J., & Smithers, J. (2000). Factors affecting the adoption of conservation tillage on clay soils in southwestern Ontario, Canada. *American Journal of Alternative Agriculture*, 15(4), 181-188.

Wassenaar, T., Doelsch, E., Feder, F., Guerrin, F., Paillat, J.M., Thuriès, L., & Saint Macary, H. (2014). Returning Organic Residues to Agricultural Land (RORAL) – Fuelling the Follow-the-Technology approach, *Agricultural Systems*, 124, 60-69

Williams, B. R., & Wilmshurst, T. (2009). The achievability of sustainable reporting practices in agriculture. *Corporate Social Responsibility and Environmental Management*, 16(3), 155-166.

Zeuli, K., and Cropp, R. (2004). *Cooperatives: Principles and practices in the 21st century*. Madison, WI: University of Wisconsin Center for Cooperatives.

Zhang, X., Wu, M., Yao, H., Yang, Y., Cui, M., Tu, Z., Stallones, L., & Xiang, H. (2016). Pesticide poisoning and neurobehavioral function among farm workers in Jiangsu, People's Republic of China. *Cortex; a Journal Devoted to the Study of the Nervous System and Behavior*, 74, 396-404.

Zhu, Q., Sarkis, J., and Lai, K.H. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International Journal of Production Economics*, 111(2).

10. Appendices

10.1. Appendix A: Ethical approval from the University of Warwick

Ethical Approval confirmation

wmgcourseoffice@warwick.ac.uk

Fri 02/06/2017 11:24

To: Duarte Ventos, Sofia <S.Duarte-Ventos@warwick.ac.uk>;

Cc: Perry, Nevgun <Nevgun.Perry@warwick.ac.uk>;

Dear Miss Duarte Ventos,
Warwick University ID Number: 1651647

Thank you for submitting your Supervisor's Delegated Approval form to the FT Course Office for the project: Creating Sustainable Supply Chains by adopting the cooperative model: Evaluating sustainability in the supply chains of Uruguayan agricultural cooperatives.

Your reference number is REGO-2017-WMG-0242.

You now have the appropriate approval in place to begin your study.

Please ensure you insert a copy of this email into the appendices of your project.

Best Wishes

Alexandra Jackson
WMG Full-Time MSc Course Office
wmgcourseoffice@warwick.ac.uk
go.warwick.ac.uk/wmgftmsc
+44(0)24 7657 4206

10.2. Appendix B: Information Leaflet for survey respondents



This sheet seeks to provide information and advice regarding participation in support of the research project specified below:

1. The project is entitled "Sustainability Assessment in the Supply Chains of Uruguayan Agricultural Cooperatives", and will consider sustainability concepts related to the supply chain management field applied to the cooperative business model;
2. This research is being carried out by Sofia Duarte Ventos in support of her studies for a master's degree at the University of Warwick, and this research is self-financed by the student;
3. The research is being overseen by Nevgun Perry, Nevgun.Perry@warwick.ac.uk, who is an external supervisor appointed by the University.
4. Participation in this research is voluntary and assurances are given that there will be no consequences for the refusal to participate, or limited participation in the research project;
5. It is recommended that each individual fully consider before participating, any disadvantages, side effects, risks and / or discomforts that may arise from participation in this research;
6. All information collected will be carefully maintained in anonymity, and all data on such original sources will be considered confidential and will not be distributed to third parties;
7. The resulting dissertation, with its respective anonymous data, will be reviewed by a university professor and/or by an external evaluator appointed by the University;
8. Although a master's dissertation does not pass into the public domain, it is possible that the thesis (with its data) can be used as a source of future research, including research work for publication;

This research has been favourably reviewed by the University's Biomedical and Scientific Research Ethics Committee, Approval Reference: REGO-2017-WMG-0242., Closed on June 2, 2017. Dissatisfaction with how this research was conducted may be referred to the Director of Delivery Assurance, Registrar's Office, University House, University of Warwick, Coventry, CV4 8UW; Or email: Complaints@Warwick.ac.uk

*** The fine print:**

- **Surveys - The conclusion of all or part of a survey conducted by a participant will be considered as permission to use the data provided within the dissertation.**

10.3. Appendix C: Survey Questionnaire Questions

Part 1 - Background Information

The following section includes 4 multiple-choice questions with the intent of gaining background information on the cooperative. The first two questions are related to the size and sector of the cooperative, and the following questions are specific to the use of sustainability practices.

- 1. From the below, which option represents the size of your cooperative?**
 - a. More than 1000 members
 - b. Between 200 and 1000 members
 - c. Less than 200 members

- 2. Which of the below agricultural sectors does your cooperative operate in? Mark all that apply.**
 - a. Livestock
 - b. Production of fruits and vegetables.
 - c. Dairy
 - d. Products for animal feed.
 - e. Seed.
 - f. Wool.
 - g. Other. Specify

- 3. Does your organisation implement sustainable initiatives?**
 - a. Yes
 - b. No

- 4. In case the former is yes: Why does your cooperative implement sustainable practices? Mark all that apply.**
 - a. Building long-term relationships.
 - b. Environmental concern.
 - c. Community well-being.
 - d. Better reputation.
 - e. Due to the increase in social and environmental regulations.
 - f. Customer loyalty.
 - g. Increase process efficiency.
 - h. Cost reduction.
 - i. Access to new markets.
 - j. External stakeholder pressures
 - k. Other. Please specify _____

Part 2 – Evaluation of the Social Dimension

Part 2 is an evaluation of the Social Dimension, one of the three areas of sustainability (social, environmental, and economic). It includes two sections, with answers measured on a scale of 1 to 5. The first section is related to worker conditions, where 1 represents strongly disagree and 5 represents strongly agree. Section 2 is about involvement in the community, where 1 represents Not at all important and 5 represents Very important. Respondents are asked to rank social actions by level of importance to the cooperative.

1. On a scale of 1 to 5, how much do you agree that the following statements represent your cooperative, with regards to worker health, safety, and livelihood?

Measures	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The cooperative has an updated plan for the <i>prevention of occupational hazards</i> .					
The cooperative has an updated <i>health and safety management system</i>					
The cooperative has <i>contingency plans</i> to respond quickly to occupational hazards.					
The cooperative applies measures to establish that members receive <i>fair salaries</i> .					
The cooperative ensures that contracts with members are <i>fair</i> .					
The cooperative provides <i>training</i> to its members.					
The cooperative provides <i>special support</i> to vulnerable workers.					

2. How important for your cooperative is promoting the following social actions in the community

Measures	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The cooperative <i>is involved in social actions (access to education, culture, nutrition, etc.)</i>					
The cooperative ensures <i>transparency</i> with all stakeholders and community.					

Part 3 – Evaluation of the Environmental Dimension

The present section is an evaluation of the environmental dimension of sustainability. The questions are related to environmental management and practices in the cooperative, with answers measured on a scale of 1 to 5.

On a scale of 1 to 5, how important are these measures involving environmental practices to your cooperative? 1 being not important and 5 being very important.

Measures	Not at all important	Unimportant	Neutral	Important	Very important
Promotion of adequate management of <i>soil</i> .					
Promotion of adequate management of <i>biodiversity</i> .					
The assurance of product <i>traceability</i> .					
Implementation of an <i>environmental management system</i> .					
Performance of <i>environmental audits</i> .					
Establishing specific goals for <i>water efficiency</i> .					
Establishing specific goals for the reduction of <i>chemicals</i> in processes.					
Establishing specific goals for <i>energy efficiency</i> .					
Establishing specific goals for <i>waste management</i> .					
Establishing specific goals for minimising <i>freight transportation pollution</i> .					

Part 4 – Evaluation of the Economic Dimension.

The following section is an evaluation of the Economic dimension of sustainability. The answers are to be measured on a scale of 1 to 5, where 1 represents strongly disagree and 5 represents strongly agree.

On a scale of 1 to 5, how much do you agree that the following statements represent your cooperative?

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The cooperative has a long-term business plan for decision-making.					
The cooperative has a positive net cash flow.					
The cooperative has not taken out a loan recently.					
The cooperative has capital to make investments in improving processes.					
The cooperative is involved in international trade.					

Part 5 – Evaluation of Supplier Sustainability

The fifth and final part of this survey evaluates whether the cooperative is concerned with sustainability practices of suppliers during the supplier selection process. Answers are measured on a scale of 1 to 5, where 1 represents strongly disagree and 5 represents strongly agree.

On a scale of 1 to 5, how well do the following statements describe the cooperative's supplier selection process?

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Local suppliers are prioritised during the selection process.					
Worker safety and fairness is essential for supplier selection.					
Involvement of suppliers in social actions is essential for supplier selection.					
Waste management is essential for supplier selection.					
Efficient use of resources (water and/or energy) is essential for supplier selection					
Controlled and safe use of chemicals is essential for supplier selection.					
Traceability of products is essential in supplier selection.					
Audits are conducted on Suppliers					
Positive economic situation of suppliers is essential for supplier selection.					