# Opportunity Development Process in Sustainability Entrepreneurship

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# Abstract

The concept of sustainability has become of major relevance in management literature and business education. It has crossed the boundaries of corporate social responsibility towards new perspectives that stress the necessity of a more holistic approach to entrepreneurial value creation. Although the field of sustainability entrepreneurship has advanced in proving a definition and description of its phenomenon, current literature has so far been unable to capture and explain, both conceptually and empirically, how and why particular individuals decide to pursue opportunities with social and environmental components concurrent with pursuing economic viability. This study tackles this challenge by examining the complex set of conditions that produce the different components of this particular opportunity development process, comprising the development of venture ideas, the organization of entrepreneurial actions and the formation of exchange relationships. Based on an inductive Fuzzy-set Qualitative Comparative Analysis of the opportunity process of 45 sustainable ventures, this study explores 13 different potential conditions for the above outcomes, upon which it identifies necessary conditions and sufficient configurations of conditions that lead to the integration of sustainability in the different stages of the opportunity process. The study provides refined knowledge and theoretical language on complex causation that facilitate the explanation of how this process unfolds based on the logic of necessity and sufficiency. It makes a broader contribution to both theorizing and research design in the study of entrepreneurial processes and outcomes by presenting a systematic and configurational view of entrepreneurial efforts and offering a basis for understanding the integration of sustainability in the development of venture opportunities.

*To Carolina, Emilia and Colomba*

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This journey just ended. I thank you all for having helped me make the most of it.

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Sustainability is a new idea to many people, and many find it hard to understand. But all over the world there are people who have entered into the exercise of imagining and bringing into being a sustainable world. They see it as a world to move towards not reluctantly, but joyfully, not with a sense of sacrifice, but a sense of adventure. A sustainable world could be very much better than the one we live in today.

Donella H. Meadows, The Limits to Growth: The 30-Year Update

# Chapter 1. Introduction

Arthur Potts Dawson is an eco-chef, known for the Acorn and Waterhouse, London's first sustainable restaurants that also provide sustainable catering training to young, disadvantaged people. Kate Bull is a former senior commercial executive at Marks & Spencer, known as an expert retailer disenchanted with the way the top end of the industry was functioning and treating its staff, customers and suppliers.

They are passionate about food, and share several concerns regarding the development of some societal structures and the dangers involved in the way we treat the environment. Arthur and Kate blame the big UK supermarkets chains as being key actors in shaping our wasteful, unjust and ultimately unsustainable society. Economically, the supermarkets are too unfair with the nation's producers, ruining traditional industries and thereby damaging the UK's skills base. Socially, because they make profit at any cost they do not worry about the life of their customers, staff and suppliers, which severely affects employment and the logic of provision: they supply not what the customer wants but what it is actually cheaper for them to buy. Environmentally, they sell produce that is damaging every part of the ecosystem. They believe that supermarkets should be doing something radically different. Instead of throwing food away, they should collect everything. If they are unable to sell it, retailers should distribute it to people who have not enough resources to buy good quality fruit and vegetables.

They were convinced that the only way of solving these problems was by fostering social change. The solution was to create stores to be owned by local communities with the aim of supporting other small businesses and solving local environmental problems. They believed that in a new playing ground where there is a growing demand for more ethical and sustainable models they could do it better, and actually make a significant difference.

In March 2009, Arthur and Kate joined efforts to elaborate the idea for a new business: *The People's Supermarket*. Inspired by the Park Slope Food Coop in Brooklyn NY, they wanted to develop a food buying and retail network that connects an urban community in central London with local farmers. The idea was to engineer social change while promoting values they considered ecological and fair. *The People's Supermarket* would be a hybrid new venture, a convenience supermarket store run as a cooperative that achieves its growth and profitability targets whilst operating within values based on equity and cohesion, and advances the cause of community development and healthy

living. With this idea in mind, Arthur and Kate crafted an alternative to supermarkets, one that provides good-quality food at affordable prices and restores the link between the shopper and the producer.

The logic was simple: people would pay £25 a year for one share in the supermarket and commit to work four hours in the shop each month. In return, they get 10 per cent off all their purchases, a share of the ownership of the store and a vote in deciding how the whole enterprise should be run. This is the fundamental core of the business model. By doing so, they wanted to deconstruct the way mass food retailers do business and reshape it along what they feel are more ethically and environmentally sustainable pathways.

Arthur and Kate were committed to integrating environmental best practices into all business activities. In developing the venture, they accepted their environmental responsibilities and recognized their obligation to reduce the impact of the venture's operations on the environment. Every operational unit was created with a clear definition of its social, commercial and environmental goals, how they were to be pursued, and how each of these units were to contribute to the business in achieving its sustainability ambitions.

They created *The People's Kitchen* that cooks ready-meals from the supermarket's out-of-date fruit and vegetables. By doing so, they reduced their monthly food waste by 500 kilograms, increased the sales of ready-meals and gave the possibility of full-time employment to four community members, previously unemployed. They also created *The People's Florist*, which is a business idea that emerged when a local family was forced out of business when they lost their store. The Supermarket needed to increase their produce range and flowers were a profitable alternative. Instead of developing a new business unit, Kate and Arthur offered the family a place to sell their flowers for a small fee. The logic is that the emergence of any new local supermarket should not affect negatively, but rather boost the local economy. With the aim of extending their service they created *The People's Delivery*. Instead of charging themselves for delivering produce, they decided to offer young, unemployed people from the community the chance to deliver produce to customers and earn the charge from the service. By offering a space within the supermarket and opening up job opportunities for members of the community, Arthur and Kate also managed to improve the life of their social environment.

After 2 years of operation, Arthur and Kate have the impression that what they have achieved along with members, supporters and customers is the start of something significant: a commercially viable business that advances the cause of healthy food, zero waste, social cohesion, and community development at affordable prices.

The story of *The People's Supermarket* shows us that entrepreneurial action can do many things, from creating economic gains for investors, entrepreneurs and economies, to preserving ecosystems (Meek et al. 2010) and improving the well-being of communities (Shepherd and Patzelt, 2011) and future generations (Tilley and Young, 2009). It has therefore the potential to cover wide, emerging aspects of reality (Wiklund et al. 2011). By overcoming barriers to the efficient functioning of markets for social and environmental resources (Dean and McMullen, 2007), entrepreneurship can indeed resolve sustainability challenges (York and Venkataraman, 2010) and, furthermore, operate as a central force in the development of an ecologically and socially sustainable economy (Pacheco et al. 2010).

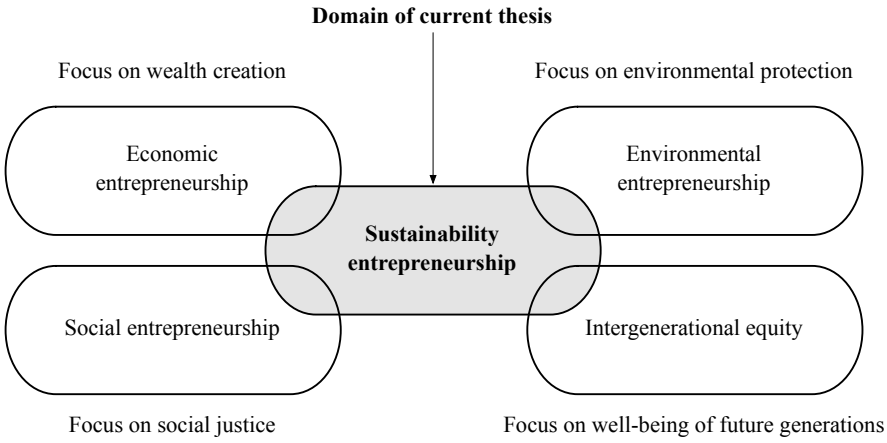
The conditions under which these venture develop have captured scholarly attention and imagination (Hall et al. 2010), because cases like The People's Supermarket extend the traditional view of entrepreneurial action, which understands action as the behaviour in response to a judgmental decision under uncertainty about a possible opportunity for profit (Hebert and Link, 1988). As illustrated above, it is not only about pursuing opportunities for profit, but also about discovering or creating and pursuing opportunities for protecting, and further, improving natural and social environments. Shepherd and Patzelt (2011) reinforce this idea in discussing the emergence of sustainable entrepreneurship as a new field of research:

> Sustainable entrepreneurship research is needed to explore the role of entrepreneurial action as a mechanism for sustaining nature and ecosystems while providing economic and non-economic gains for investors, entrepreneurs and societies (138)

Despite the emergent interest in the field, the combination of factors that move this kind entrepreneurial activity forward are yet to be explored. The effect of elements such as orientation, motivation, intention and social norms on sustainability-oriented entrepreneurial action have been independently examined, however, the complexity of the phenomenon calls for a more comprehensive analytical approach. It is within this conceptual domain that I have undertaken the research effort for this thesis. Figure 1.1 shows a conceptual illustration of this idea. The conceptual illustration of the thesis

domain is in line with the delineation of the field. Since early, foundational works (Young and Tilley 2006; Dean and McMullen 2007; Cohen and Winn 2007) to more recent developments (Hall et al. 2010; Shepherd and Patzelt 2011; Shepherd et al. In Press), the study of sustainability entrepreneurship has focused on understanding the mechanisms and processes involved in the pursuit of perceived venture opportunities with social, environmental, economic and intergenerational components (Tilley and Young, 2009; Hockerts and Wüstenhagen 2010; Krueger et al. 2011).

**Figure 1.1 Illustration of the thesis domain**




## 1.1 Thesis overview

### 1.1.1 Literature gap

The growing recognition of social and environmental issues has provided entrepreneurs with new types of opportunities, resulting in the emergence of environmental entrepreneurs and social entrepreneurs. More recently, due to the emergence of new ventures capable of combining social, environmental and economic aspects, as the case introduced above, there has even been reference to a different type of entrepreneurship; this is sustainability entrepreneurship (Young and Tilley, 2006; Dean and McMullen 2007; Tilley and Parrish 2009; Hall et al. 2010; Lumpkin and Katz 2011; Shepherd and Patzelt 2011). In Patzelt and Shepherd's (2010) view, this emergent form of entrepreneurship seems to possess distinct features and the process through which sustainability opportunities are pursued appears to be more complex than its traditional counterpart.

In facing the challenges of reducing detrimental environmental and societal impacts created by current unsustainable business practices (Grin et al. 2010), this form of entrepreneurship has gained special attention because it might bring about necessary transformations to current products, processes and behavioural patterns (Hall et al. 2010; Shepherd and Patzelt 2011). Sustainability entrepreneurs have been recognized as the engine in this process of change (Dean and McMullen 2007; Hall et al. 2010) and key actors in creating sustainable growth and wealth (Tilley and Young 2009).

According to Parrish (2007a), these entrepreneurs bring into being a new, more complex approach that resolves the dualistic divide between business ventures and altruistic endeavours in favour of a new logic based on the creation of present value for the economy, society and the environment, while contributing to the well-being of future generations. Apart from providing a definition and description of the phenomenon (Hall et al. 2010; Shepherd and Patzelt, 2011), current literature has so far been unable to explain, both at conceptual and empirical levels, how and why particular individuals decide to pursue opportunities with social, environmental and intergenerational components concurrent with pursuing economic viability, nor capture the complexity and configurational nature of the sustainability entrepreneurship.

Even though traditional conceptions of entrepreneurship (e.g. Venkataraman 1997; Shane and Venkataraman, 2000) do consider the impact of the entrepreneurial activity, sustainability entrepreneurship refers to a new logic in the process of opportunity development, through which, in line with the principles of sustainability, four different outcomes are simultaneously pursued. These are social justice, environmental protection, economic feasibility and intergenerational equity (Dresner 2008). Hall et al. (2010) illustrate this point when discussing the emergence of sustainable entrepreneurship. The authors indicate that, notwithstanding the promise entrepreneurship holds for fostering sustainable development, there remains considerable uncertainty regarding the nature and the role that entrepreneurship should play in the area of sustainability. Consequently, this uncertainty impacts our understanding of how this form of entrepreneurship may unfold. The following quote illustrates this point:

> While entrepreneurship has long been recognized as a vehicle for societal transformation, especially as an economy moves from one technological epoch to another, we have little understanding of how entrepreneurs will discover and develop those opportunities that lie beyond the pull of existing markets (Hall et al. 2010:440)

This gap in the literature is supported by three elements. First, while the notion of sustainability entrepreneurship has strong theoretical appeal, and interest in the field has spiked in recent years, its empirical application is not yet clear. Descriptions of sustainability entrepreneurship activities have involved various factors such as motivation (Schlange, 2006), knowledge (Patzelt and Shepherd, 2010), orientation (Kuckertz and Wagner, 2010), process (Larson, 2000; Choi and Gray, 2008), social norms (Meek et al. 2010), cultural context (O'Neill et al. 2009), cognition (Schlange, 2009), value creation (Cohen et al. 2008; Gibbs, 2009; Tilley and Young 2009), moral awareness (Walley and Taylor, 2002), ethics (Harris et al. 2009), sources of sustainability opportunities (Dean and McMullen, 2007; Cohen and Winn, 2007; Patzelt and Shepherd, 2010), and organizational logics (Parrish, 2010); yet none of these are by themselves distinguishing features of sustainability entrepreneurship. Despite their relevance, these studies assume sufficiency of individual factors disregarding the inherent complexity and configurational nature of the sustainability entrepreneurship phenomenon. A key research task in driving forward research in this area is therefore the organization and study of the complex constellation of characteristics and conditions that collectively distinguish the process of sustainability entrepreneurship.

Second, despite the advances in the field of entrepreneurship research, current explanations, based on entrepreneurial knowledge, alertness and economic motivation (e.g. Dean and McMullen, 2007; Cohen and Winn, 2007; Patzelt and Shepherd, 2010) have proven insufficient for modelling the development process of sustainability-oriented venture opportunities (Hall et al. 2010). In this sense, Patzelt and Shepherd (2010) emphasize that the development of opportunities for sustainable development is indeed more complex than the development of opportunities motivated solely by economic gain for the entrepreneur. Finally, although some authors have provided useful insights into the entrepreneurial process driven by sustainability issues (Choi and Gray, 2008), we still lack empirical examination and evidence of how the opportunity process actually unfolds (Doyle and Ho, 2010; Hall et al. 2010). Hall et al. (2010) stress that, in fact, relatively few studies in mainstream entrepreneurship journals have explored the relationship between sustainable development and entrepreneurship. Pacheco et al. (2010) reaffirm this point in their examination of sustainability entrepreneurial action:

> To date, little research on entrepreneurship and sustainable development has appeared in the academic literature and we are only just beginning to understand their relationship, let alone the complexities of the phenomenon (465)

### 1.1.2 Research questions

As evidenced in the descriptions of sustainability entrepreneurship activities, the gap in literature deals with complexity and configurational logic, i.e. the simultaneous presence of a multitude of interacting factors throughout the development of sustainability opportunities. In order to get closer understanding of how this process unfolds and the effect of those factors, we need to examine milestones or central components of the process, and then the conditions and combinations of conditions that explain their occurrence.

In discussing the empirical elusiveness of entrepreneurial opportunities, Dimov (2011) indicates that we can actually observe and analyse opportunities by focusing on the substantive conception of entrepreneurial behaviour (i.e. what entrepreneurs actually do in reality[1]). This perspective allows for elaborating three empirical units: venture ideas, entrepreneurial actions and exchange relationships. I take these three units as milestones snapshots. I argue that, by doing so, we can get closer understanding of the opportunity process and the complex set of conditions that underlie the central components of the process.

Accordingly, I derive three questions from the three milestones snapshots:

(Q1) *Under what conditions or configurations of conditions does an entrepreneur develop sustainability-oriented venture ideas?*

(Q2) *Under what conditions or configurations of conditions does an entrepreneur organize sustainability-oriented entrepreneurial actions?*

(Q3) *Under what conditions or configurations of conditions does an entrepreneur establish sustainability-driven exchange relationships?*

Establishing the distinctive nature of sustainability-driven entrepreneurship allows for understanding the main differences in how this process unfolds in sustainability entrepreneurship compared to our current understanding of traditional or commercial entrepreneurship. This is relevant because it permits drawing a line between that entrepreneurial action driven solely by economic considerations (i.e. pursuit of economic

[1] Polanyi (2001) sees substantive meaning as an instituted process of interaction between people and their environment, which results in a continuous supply of want satisfying material means (34)

goals), and that entrepreneurial action driven also by social and environmental factors (i.e. concurrent pursuit of economic, social and environmental goals).

These research questions are timely and interesting (Bartunek et al. 2006). They address a central issue posed by Hall, Daneke and Lenox in the Editorial of the Special Issue on Sustainable Development and Entrepreneurship (25:5) of the Journal of Business Venturing in 2010. In envisioning further research at the intersection of entrepreneurship and sustainability, the authors emphasize the relevance of elucidating under what conditions do we expect to see entrepreneurs pursue sustainable ventures. They indicate that this has been, and will remain, one of the dominant questions in the field.

### 1.1.3 Methodology

In order to understand the complexity and conjunctural nature of the relationships revealed by the research questions, we need to go beyond traditional linear methods. In doing so, I conduct an inductive Fuzzy-set Qualitative Comparative Analysis (fsQCA) (Ragin, 1987) of the opportunity development process of 45 sustainability entrepreneurs. FsQCA is a set-theoretic method that uses Boolean algebra, counterfactual analysis and systematic comparison of combination of causal and outcome conditions to visualize and analyse complex causality (Schneider and Wagemann, 2012).

> This method is well suited for addressing questions about outcomes resulting from multiple and conjunctural causes—where different conditions combine in different and sometimes contradictory ways to produce the same or similar outcomes (Ragin, 1987)

Using fsQCA, I evaluate the degree of membership of these 45 cases in 16 conceptual categories: 13 potential conditions and 3 outcomes. In order to compare and contrast conditions and combinations of conditions, these 16 measures are calibrated using a simple estimation technique that transforms variable raw scores into set measures (Ragin, 2008c). Based on this procedure one can specify the score that would qualify a case for full membership in the set of interest, as well as the score that would exclude it from the set.

With the aim of selecting the most relevant causal conditions for the subsequent configurational analysis, I conduct an exploratory analysis of necessity that tests the subset relationships between the 13 causal factors under consideration and the three outcomes. The analysis looks at which individual factors may be necessary or mostly

necessary for the outcome to occur (Kent, 2008). Based on this analysis, I select the six most relevant conditions for each outcome and then estimate the degree of joint membership of the cases in all six conditions in relation to instances with both presence and absence of the outcomes. Given the number of cases, six conditions allows for balancing parsimony and explanatory (Marx and Dusa, 2011; Ragin, 2006).

In a subsequent stage, I construct truth tables for each of the outcome. These tables use a set-theoretic approach to list all logically possible combinations of conditions in relation to the outcome of interest (Fiss, 2007). Given the limited diversity of social phenomena (Ragin and Sonnett, 2005), some of these combinations, organized in truth table rows, exhibit empirical instances while some other do not. Based on theoretical and substantive knowledge, I define frequency and consistency thresholds and conduct a configurational analysis using fsQCA protocols. The analysis applies a Boolean algorithm based on a counterfactual analysis of causal conditions to logically reduce the truth table rows to a solution table comprising simplified combinations of conditions (Ragin, 2008a; et al. 2006), which can be understood as different solution paths or causal recipes for the outcomes of interest.

Using configurational analysis and allowing for the possibility that the same outcome can follow from different combination of conditions, I identify several combinations of causal conditions, or solutions paths, for each of the outcomes under examination. They collectively explain why entrepreneurs develop sustainability-oriented venture ideas, organize sustainability-oriented entrepreneurial actions and establish sustainability-driven exchange relationships.

Using parameters of fit, these solution paths are evaluated in terms of their consistency and coverage. They are oriented towards the evaluation of set relations reflecting explicit relationships. Once established their consistency and empirical relevance, fuzzy subset causal relations are evaluated in terms of the necessity and sufficiency of conditions and combinations of conditions for the different outcomes to occur.

### 1.1.4 Results and contribution

By means of a systematic comparison of causal and outcome conditions, the configurational analysis facilitated the identification of mostly necessary conditions and

the elaboration of a number of sufficient relevant causal paths that collectively explain the conditions under which an entrepreneur develop sustainability-oriented venture ideas, organize sustainability-oriented entrepreneurial actions and establish sustainability-driven exchange relationships. The analysis also distinguishes additional, less relevant causal paths. These solution paths lack empirical importance, yet enable visualizing how the outcomes are produced under odd conditions. By identifying necessary conditions and sufficient combinations of conditions, this study presents a configurational view of entrepreneurial efforts that offers a basis for understanding the integration of sustainability in the development of venture opportunities.

This study contributes to literature in a number of ways. First, it identifies which individual factors are necessary or mostly necessary for the integration of sustainability in the central components of the opportunity process, as well as those conditions that are unnecessary or trivial in the production of the outcomes. This permits deriving new theoretical insight on the role of sustainability orientation and the search for holistic value creation, and consequently conceptualizing the complex nature of the phenomenon.

Second, this study unravels the conjunctural and equifinal nature of the causal relationships in the development process of sustainability-oriented venture opportunities. Consistent with the idea that none of the examined elements are by themselves distinguishing features of sustainability entrepreneurship, this study shows that the development of sustainability opportunities can follow various sufficient combinations of conditions, which establish different causal relationship with the outcomes of interest in respect to configurational logic, consistency and empirical importance. Among all causal paths, the analysis highlights three combinations of conditions relevant to the production of the outcomes: (1) the combination of sustainability orientation, moral intensity and entrepreneurial self-efficacy in the development of venture ideas; (2) the combination of sustainability contribution belief, sustainability orientation and moral intensity in the formation of exchange relationship; and (3) the reinforcing role of the combination of sustainability understanding and sustainability intention throughout the opportunity process. The identification and explanation of these combinations of conditions enables the drawing of a more explicit distinction between entrepreneurs driven solely by economic considerations and those driven by a more complex set of considerations, including economic returns, social justice, environmental protection and intergenerational equity. Furthermore, this permits answering to the lack of understanding of the conditions under which entrepreneurship simultaneously creates economic growth, while advancing

environmental objectives and improving social conditions (Hall et al. 2010; Shepherd and Patzelt, 2011).

Finally, this study provides refined knowledge and theoretical language on complex causation that facilitate the construction of arguments based on the logic of necessary and sufficient conditions. In this context, it offers a way of dealing with the conjunctural nature of causal relationship within entrepreneurship research, therefore contributing to both theorizing and research design in the study of entrepreneurial processes and outcomes.

## 1.2 Structure of the thesis

The thesis is organized as follows. In chapter 2, I provide a detailed review of the literature on entrepreneurial opportunities and the emergence of sustainability entrepreneurship. The chapter focuses on the opportunity development process and on current explanations that account for the integration of sustainability in the pursuit of venture opportunities. Drawing upon Dimov's (2011) conceptual framework, the chapter finishes with a discussion of the empirical examination of opportunities in sustainability entrepreneurship and explores ways of tackling the causal complexity involved in the associated relationships.

In chapter 3, I provide details of the research design for the study. The first part of the chapter introduces and explains the logic and nature of diversity-oriented research and then it describes how case selection, definition of measures, data collection and analysis is conducted in Fuzzy-Set Qualitative Comparative Analysis.

Chapter 4 presents the different configurational analyses and results for each stage of the opportunity process. Necessary conditions and sufficient combinations of conditions are supported by means of using qualitative evidence.

Finally, in Chapter 5 I discuss the contributions of the thesis based on the derived insights into the necessity and sufficiency of conditions and combinations of conditions for the development of sustainability-oriented venture ideas, the organization of sustainability-oriented entrepreneurial actions and the formation sustainability-driven exchange relationships. In the final part of this chapter I discuss the contributions to entrepreneurship research and the limitations of the thesis. Also, I outline directions for future research and the implications of this study for practice, policy and education.

# Chapter 2. Literature review

## 2.1 Introduction

This section reviews literatures that inform our current understanding of the phenomenon of sustainability entrepreneurship. The literature review is divided in four sections. The first part introduces the notion of entrepreneurial opportunities as the core of entrepreneurship research. It comprises a review of the nature of opportunities, the opportunity process and the empirical challenges involved in studying entrepreneurial opportunities. The second section introduces sustainability in the context of business and the emergence of sustainability entrepreneurship. The third part presents a detailed review of literature on the development of sustainability opportunities, which entails the nature of such of opportunities and potential causes. The last section discusses and proposes a broader definition of sustainability entrepreneurship, as well as offers a way of studying the development process of sustainability-driven opportunities and addressing its complexity.

## 2.2 Entrepreneurial opportunities as a central focus of entrepreneurship research

As a field of research, entrepreneurship seeks to understand how opportunities to bring into existence future goods and services are discovered, created and exploited, by whom and with what consequences (Venkataraman, 1997; Shane and Venkataraman, 2000). This follows earlier conceptual developments in the field, which understand entrepreneurship in the context of a search for explanation of the role of new enterprise in furthering economic progress (Low and MacMillan, 1998). The initial efforts of Venkataraman (1997), Low and MacMillan (1998), and Shane and Venkataraman (2000) were based on the need to provide a unifying definition of entrepreneurship, upon which the field can build a path towards more theory driven research.

As Venkataraman (1997) and Shane and Venkataraman (2000) argue, to that date, instead of explaining and predicting a unique set of empirical phenomena, entrepreneurship research was focused on understanding different aspects of the setting where entrepreneurship takes place. By emphasizing the need of approaching entrepreneurship theoretically and empirically in terms of the phenomenon (Sorenson and Stuart, 2008), rather than in terms of the research context, the field started focusing on

exploring and understanding the notions of discovery, creation and exploitation of opportunities (Shane and Venkataraman, 2000), and the individual and environmental factors that are involved and affect the entrepreneurial opportunity development (Davidsson and Wiklund, 2001).

Early perspectives (e.g. Gartner, 1989), derived from social psychology, take a different approach and seek to explain the phenomenon of entrepreneurship by referring exclusively to the creation of new businesses, i.e. that entrepreneurship can be better understood by studying new venture creation (Gartner, 2001). The theoretical perspective mentioned above that focuses on opportunities does not contradict those perspectives derived from social psychology. This view complements research on firm formation (Katz and Gartner, 1988), in that it offers a way of examining the development of opportunities, which precedes firm creation (Shane and Venkataraman, 2000; Davidsson and Wiklund, 2001).

The primary focus of entrepreneurship as a field of research is therefore understanding how new ventures are conceived, funded, and executed to exploit created or recognized opportunities (Short et al. 2010). In their seminal work, which triggered intense debate regarding how to define the domain of entrepreneurship research (Landström et al. 2012), Shane and Venkataraman (2000) define entrepreneurship as:

> The scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited (218)

This view of the entrepreneurship phenomenon draws on Gartner (1988) and emerged as a response to the traditional person-centric approach (e.g. Cole, 1969) that pursues understanding by studying the individual alone. Shane and Venkataraman (2000) identify and build upon some inherent problems of this perspective. They indicate that this definition lacks of consideration of the variation in the quality of opportunities that different individuals identify. It is indeed unlikely that entrepreneurship as a phenomenon can be explained solely by reference to a set of features of certain individuals (i.e. traits and personality characteristics) independent of their context, and thus the opportunities under consideration (Shane and Venkataraman, 2000).

Departing from the person-centric approach, Shane and Venkataraman (2000) draw upon a disequilibrium perspective to distinguish three main areas of inquiry, these are: the study of (1) sources of opportunities; (2) the processes of discovery, evaluation, and

exploitation of opportunities; and (3) the set of individuals who discover, evaluate, and exploit them. By doing so, they developed a nexus approach (see also Venkataraman, 1997), wherein entrepreneurship is seen as the nexus of two phenomena: the presence of opportunities for profit and the presence of entrepreneurial individuals. This change of emphasis has moved entrepreneurship research to focus more on the role of opportunities - and how they develop - and less on the characteristics of individual entrepreneurs. Entrepreneurship, in this sense, should be seen as a process and not as the embodiment of a type of person (Shane, 2011). In fact, if one is capable of providing in-depth explanations of such processes it is possible to understand how entrepreneurship actually unfolds (Shane, 2011).

### 2.2.1 The nature of opportunities

At the heart of entrepreneurship, be it social, environmental or commercial, is the notion of opportunity (Doyle and Ho, 2010). Entrepreneurial opportunities are situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships (Eckhardt and Shane, 2003).

This conceptualization reflects the dominant view, one that is fairly instrumental and rational in its orientation (Short et al. 2009). These opportunities differ from the larger set of opportunities for profit, particularly those opportunities aimed at enhancing the efficiency of existing products and organizing methods. In this sense, Kirzner (1997) argues that this is because entrepreneurial opportunities require the discovery of new means-ends relationships, whereas opportunities for profit involve only the optimization within existing means-ends frameworks.

Two approaches to studying opportunities have emerged and shaped entrepreneurship research (Alvarez and Barney, 2010). First, a critical realist approach that focuses on understanding how alert individuals discover objective opportunities formed by external shocks in an existing market (Kirzner, 1979; 1999). Here, opportunities are viewed as a function of a concrete reality, meaning that opportunities exist in the objective world and are waiting to be found.

As Shane and Venkataraman (2000) point out:

> Although recognition of entrepreneurial opportunities is a subjective process, the opportunities themselves are objective phenomena that are not known to all parties at all times (220)

Second, an evolutionary realist perspective that focuses on understanding how individuals create opportunities, which are enacted by their actions and do not exist independent of these actions. Here, opportunities are viewed as a function of enacted actions that occur during entrepreneurial processes. Entrepreneurs identify business opportunities to produce and deliver value for stakeholders in prospective ventures. As claimed by Ardichvili et al. (2003), while components of opportunities may be recognized, opportunities are made, not found.

Recent developments stress that a reasonable middle ground position is that some opportunities are discovered whereas others are created (Alvarez and Barney, 2007; 2010). Zahra (2008) builds on Alvarez and Barney (2007), and suggests that creation and discovery are not irreconcilable positions rather exist in different contexts. In the author's view, some contexts are more conducive for discovery, while others promote the creation of opportunities. Further, Zahra (2008) points out that sometimes discovery and creation form a virtuous and dynamic cycle, where entrepreneurial opportunities that have been discovered enrich the creation of new opportunities which, in turn, foster the discovery of additional opportunities. Far from being spontaneous, the development of the cycle is shaped by contextual forces.

Contrary to evolutionary perspectives, some authors argue that opportunities are enacted (Gartner, 1989, Gartner et al. 2003) and that their development is relationally and communally constituted (Fletcher, 2006). This constructivist approach to opportunities emerges from the inability of predominant frameworks to account for why people enact opportunities in the way they do in relation to broader processes. As Wood and McKinley emphasize:

> The discovery perspective does not fully acknowledge the social nature of economic structures and the role entrepreneurs play in the generation of opportunities within those structures (67)

Constructivists argue that instead of stimulating the understanding of how things are in the world, these deterministic, realist perspectives attribute too much agency to aspiring entrepreneurs and pay little attention to the broader societal, economic or cultural

structures (Fletcher, 2006). Constructivists therefore call for more consideration of the interrelationship between entrepreneurial agency and the opportunity environment. A constructivist perspective, in Wood and McKinley's (2010) view, allows us to observe opportunities as subjective phenomena that begin unformed and develop over time through a process of conceptualization, objectification and enactment.

This follows Gartner et al.'s (2003) view, in that it understands opportunities as part of the circumstances of entrepreneurship, which means that the main characteristics of an opportunity become evident only through the ways that entrepreneurs make sense of their experiences. By paying more attention to the interrelationship between entrepreneurial agency and the opportunity environment, this view permits focusing on relationality rather than a division between objectivity and subjectivity (Fletcher, 2006).

> With a focus on relationality, social constructionist ideas move us beyond determinist understandings of social behaviour/ practice. They also move us from over-privileging agency and its singular role in social construction processes (436)

Reflecting on the main issues regarding the nature of opportunities, another stream of research draw on social and cognitive psychology to propose instead that an opportunity is an idea or dream that is recognized or created by an aspiring entrepreneur and that unfolds through analysis over time to be potentially profitable (Short et al. 2009). In this sense, opportunities emerge from subjective perceptions, which are what move entrepreneurs into action (Edelman and Yli-Renko, 2010). Accordingly, entrepreneurs enact these images and create opportunities through cognitive processes, social interaction, and the mobilization of resources.

This follows a central idea introduced by Davidsson in 2003. The author indicates that when discussing the notion of opportunity, one should focus on the behaviours undertaken in the processes of recognition and exploitation of new venture ideas, which the author defines as the creations of individuals' minds, and are specific entities that are acted upon. Whether these represent opportunity or not can only be known afterwards, only when the outcome was successful (Davidsson 2003) or until profits are realized (Klein, 2008).

Dimov (2007a) complements this view by emphasizing the evolutionary nature of venture ideas. He indicates that venture ideas emerge in an iterative process of shaping and development; therefore the ideas we 'admire' today do not have the same shape and

form as they were originally conceived. Dimov refers to this process of shaping, discussion, and interpretation, whereby initial ideas are elaborated, refined, changed, or even discarded, as opportunity development. In this vein, the author points out:

> This term represents both a dynamic, iterative, and a socially embedded view of how entrepreneurial opportunities reach their final form. The dynamic, iterative aspect of this pertains to the gradual "polishing" of what is initially an unpolished idea. The socially embedded aspect pertains to the fact that potential entrepreneurs, rather than thinking and acting alone, are actively engaged in information and value exchange with a surrounding community (714)

In developing this approach, Dimov (2007b; 2011) reconciles positivist and constructivist interpretations of the nature of opportunities. The conceptualization of opportunity development is able to integrate the gradual progress of venture opportunities, whereby fragile venture ideas are transformed into business possibilities through a continuous dialogue and value exchange between the entrepreneur and the opportunity context. In this regard, Dimov (2007b) points out:

> Rather than being the deed of a single person, entrepreneurial opportunities encompass a social, learning process whereby new knowledge continuously emerges to resolve the uncertainty inherent to each stage of opportunity development (714)

### 2.2.2 The opportunity development process

Regardless of one's epistemological position, the concept of opportunity is generally accompanied by a number of associated processes (Short et al. 2009). Researching this phenomenon implies necessarily observing a process through which entrepreneurial opportunities are recognized, developed and exploited (Ardichvili et al. 2003), which is central in analysing causal relationships regarding what actually occurs when entrepreneurs face opportunities (Steyaert, 2007).

In unpacking this argument, Shane and Venkataraman (2000) explain that all three stages are necessary conditions for entrepreneurship and only are sufficient when acting together. Nevertheless, this notion that identification, evaluation and exploitation are sub-processes of the entrepreneurial process does not mean that this process follows a planned sequence where identification always precedes evaluation, which always precedes

exploitation. Shane (2011) in this sense emphasizes that the entrepreneurial process does not necessarily involve temporal order nor occurs in a strategic way.

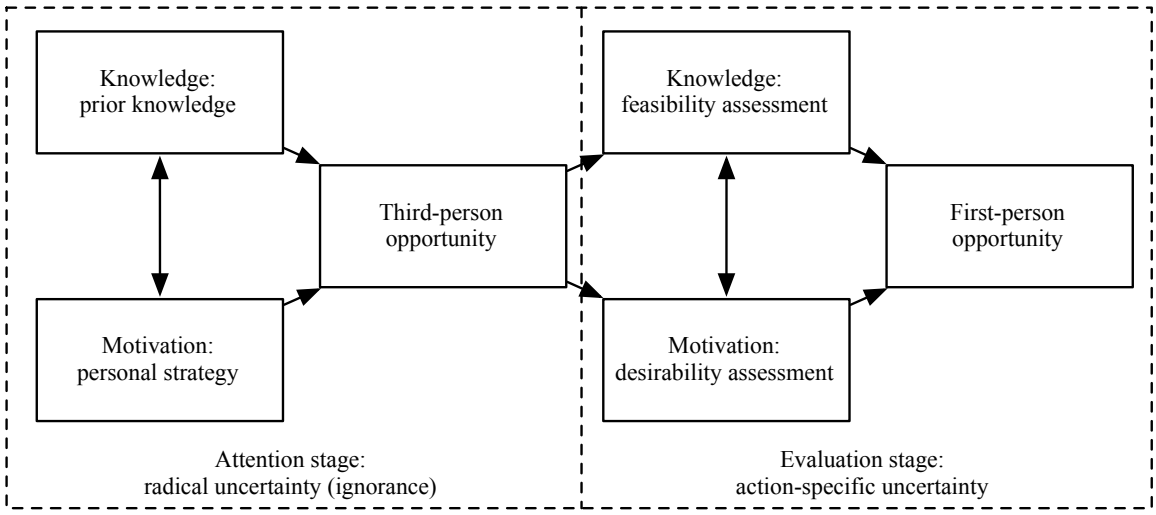
According to Ardichvili et al. (2003), the development process begins when the alertness of the prospective entrepreneur exceeds a certain level. The entrepreneur's alertness is likely to be increased when a number of factors meet at a certain point in time: personality traits (e.g. optimism, self-efficacy, and creativity), specific prior knowledge (i.e. about market needs and how to attend these needs), experience and social networks.

McMullen and Shepherd's (2006) extend this view by highlighting the relevance of entrepreneurial action in the face of uncertainty. They emphasize that prior knowledge and motivation do play a role in the development of opportunities, however only as part of an attention stage that is characterized by the entrepreneur's believe that a third-person opportunity exists (i.e. a potential opportunity for someone in the marketplace).

> Third-person opportunity may not reflect an opportunity for everyone, but, for those individuals with the right qualities, market potential exists. The distance between the means signifies the ability to discern the market potential of this third-person opportunity (137)

Entrepreneurship requires action (McMullen and Shepherd, 2006); it therefore occurs when the prospective entrepreneur decides that a possible third-person opportunity is an opportunity for him or her. McMullen and Shepherd (2006) define this as a first-person opportunity.

**Figure 2.1 Two-stage conceptual model of entrepreneurial action**




Source: McMullen and Shepherd, 2006:140

As depicted in Figure 2.1, the formation of first-person opportunities occurs in an evaluative stage, when the entrepreneur exhibits more willingness to bear uncertainty, and has formed the belief that the third-person opportunity at hand (i.e. an opportunity for someone) is valuable and feasible, and is achievable by him or her, and not just by others (Shepherd et al. 2007).

Despite the cyclical and iterative nature of the opportunity development process (Ardichvili et al. 2003) there are a number of events that necessary occur in sequence, which means that time plays a critical role (Short et al. 2009). As explained by the two-stage conceptual model of entrepreneurial action proposed by McMullen and Shepherd (2006), a possibility becomes (first-person) an opportunity after a prospective entrepreneur has evaluated its potential and made a judgment about its feasibility (Dimov, 2007a). Ideas, dreams and aspirations necessarily precede entrepreneurial actions, which in turn necessarily precedes the movement of entrepreneurial solutions into the market.

Sarasvathy (2001) understands this process as effectuation. Unlike explanations based on causation processes, which take a particular effect as given and focus on selecting between means to create that effect, the author suggests that entrepreneurship can be better explained by using effectual reasoning, or effectuation processes, which take a set of means as given and focus on selecting between possible effects that can be created with that set of means (245). In entrepreneurship the outcome is uncertain, hence the entrepreneur has to imagine possible alternatives, select one, and then combine resources available to elaborate a particular set of means in the face of this uncertainty. Baker and Nelson (2005) also support this view in their work on entrepreneurial bricolage. The authors indicate that entrepreneurship creates things from nothing by recombining elements at hand for new purposes that challenge extant arrangements.

Following these ideas, it has been argued that the central features of opportunities can be fully understood only after the passage of some length of time has occurred (Short et al. 2009). Opportunities simply are creative ideas that have been scrutinized through an evaluative process (Dimov, 2007b).

### 2.2.3 The empirical challenge: ideas, actions and exchange relationships

Opportunities, so far, are understood as situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation

of new means, ends, or means-ends relationships (Shane and Venkataraman 2000; Eckhardt and Shane 2003). Despite the conceptual appealing of this definition, the fact that opportunities cannot be foreseen and discussed beyond speculation makes them difficult to grasp when it comes to observing opportunities in more tangible terms. Thus, while it is conceptually attractive to emphasize the objective nature of opportunities (Shane and Venkataraman 2000; Eckhardt and Shane 2003), an entrepreneurial opportunity is something that prospectively can only be discussed as a abstract concept and that can be fully verbalized and explained only retrospectively (Dimov 2011). In this sense, the author points out:

> Without an operable convention about how an entrepreneurial opportunity can be known or observed, one is limited to the realm of pure theorizing, where one can comfortably assume an opportunity to be known (59)

Dimov's observations emerge from a critique to the formal conception of entrepreneurial behaviour. This formal view understands what entrepreneurs do through the lens of a logical framework of rational means-ends choice and has provided support to a great deal of work in the field of entrepreneurship, e.g. Hebert and Link's (1988) equilibrium perspective**,** Shane and Venkataraman's (2000) nexus approach, and Eckhardt and Shane's (2003) notion of prices imperfections in relation to perceptions of value.

Dimov (2011) argues that the formal conception of entrepreneurial behaviour, which is rooted in economic theory and analysis, is a generic view of the entrepreneur that fails to explain particular cases and the specific drivers of their actions. If one wishes to cement the empirical examination of entrepreneurial phenomena in a logical framework of rational means-ends choice, the puzzle of opportunity development becomes simply one of logic, limiting the study of opportunity to pure theorizing. The author proposes instead to move the focus towards a substantive conception of entrepreneurial behaviour. In this sense, he indicates:

> Distinguishing formal and substantive conceptions of what entrepreneurs do holds important implications for understanding the nature and role of opportunities in the theorizing offered by different scholars and for outlining the premises under which the opportunity itself can be the focus of scholarly attention (2011:61)

In his account, studying the 'pursuit of opportunities' from this perspective offers a richer ground for identifying meaningful patterns emerging from the entrepreneurs'

stories, and for making sense of how they do act. In reflecting on the development of the field, Venkataraman et al. (2011) emphasize that this approach is an important way to move entrepreneurship research forward.

Understanding entrepreneurial opportunities as, for example, venture ideas that can be modified by the entrepreneurs' actions or enacted possibilities (Gartner, 1989) for gain allows for providing better explanations of how entrepreneurial action and its outcomes actually occur. By doing so, we can avoid the empirical elusiveness of entrepreneurial opportunities derived from using realist perspectives.

To make entrepreneurial opportunities empirically tractable, Dimov (2011) elaborates three substantive premises for studying entrepreneurial opportunities: opportunity as happening, opportunity as expressed in actions and opportunity as instituted in market structures. This substantive view of opportunities opens up the scope to develop concrete units of observation that not only permit to empirically grasp the abstract notion of entrepreneurial opportunity, but also allow for observing, analysing and understanding the complexity of the opportunity process.

In substantive terms, *opportunity as happening* refers to the antecedents for a venture idea. This entails the actions, events and circumstances surrounding the prospective entrepreneur and its environment that explain the emergence of a particular venture idea. From sensemaking to pragmatism, Dimov (2011) offers an array of theoretical lenses through which such events can be observed. Depending on a chosen filter, the emergence of venture ideas can be seen as an organized vision of the world, as a process of meaning building, as an expression of the being, as a response to perceived anomalies, as a collective construction (Fletcher, 2006), as a verbal account of sequences of events (Gartner, 2007), or simply as a result of the availability of specific knowledge and resources. These conceptions offer different views of the process through which venture ideas are developed. In this regard, Dimov (2011) indicates:

> (These conceptions) are complementary in nature and, collectively, can contribute to the development of an extensive and elaborate theoretical vocabulary for our understanding of opportunities as initiated by venture ideas (71)

*Opportunity as expressed in actions* refers to the initial actions that aspiring entrepreneurs articulate towards formalizing the ideas they think are feasible options (McMullen and Shepherd, 2006). Actions, in Dimov's (2011) account, represent the

expression of venture ideas and the 'empirical footprints of opportunities'. Simply stated, an idea cannot be defined as 'opportunity' unless acted upon (Dimov, 2007b). Given that actions can be considered opportunities only when they have already occurred, the focus of causal examination should be the shape and the components of such action.

In elaborating on this proposition, Dimov (2011) suggests extending our focus to include additional sources of causal explanation. This means adding to traditional explanations based on immediate triggers, sources like, for example, the enabling resources under the entrepreneur's control, the momentary aspirations of the entrepreneur or the nature of venture that an entrepreneur is trying to create. As such, the author indicates:

> An opportunity can be conceived as a momentary, symbolic blueprint for the entrepreneur's actions, interweaving the entrepreneur's resources, aspirations, and business templates. The blueprint pertains to the entrepreneur's immediate action possibilities and, once a particular action is undertaken, evolves iteratively into a new blueprint for further action that incorporates the new knowledge afforded by the previously undertaken action (67)

Finally, *opportunity as instituted in market structures* refers to the formation and maintenance of exchange relationships with other market actors; most likely in the case of aspiring entrepreneurs these are their first clients and investors. The central argument supporting this substantive view is that no one may be aware of the venture idea until the entrepreneur takes first steps towards its realization, therefore an opportunity exists as such when the entrepreneur engages in market interactions through an operating business. Drawing upon a sociological approach to markets, an opportunity can be understood as a discourse whereby the entrepreneur positions products, risks and benefits, and expresses its intention to interact, compete and be part of a new market order.

In this regard, the author points out:

> An opportunity can be seen as a vision of a future in which the aspiring entrepreneur occupies a market niche, engaged in a set of market relationships that collectively constitute the business the entrepreneur intends to create. (68)

## 2.3 Sustainability in business and entrepreneurial contexts

### 2.3.1 Business sustainability

The terms sustainability and sustainable development came to prominence in 1987 with the publication of the report *Our Common Future,* know as the Brundtland Report (WCED, 1987). This approach was developed with the aim of squaring the circle of competing demands for environmental protection and economic development (Dresner, 2008). The World Commission on Environment and Development (1987), responsible for the Brundtland Report, defines this approach as:

> The kind of development that meets the needs of the present without compromising the ability of the future generations to meet their own needs (8)

The central idea is to find a balance between economic, ecological and social goals so that none of them will be sacrificed for any of the others (Sharma and Ruud, 2003). This definition contains within it two key components: (1) the concept of needs, in particular the essential needs of the world's poor, to which overriding priority should be give; and (2) the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

In the WCED's vision, sustainability should not be understood as a fixed state of equilibrium, where nature, society and the economy coexist in perfect balance. Rather, as a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations (WCED, 1987).

This is the most widely accepted and referred definition of sustainability. It has guided most of the research that involves securing the prosperity of social, ecological and economic environments (Franklin and Blyton, 2011), and the business community has been most active in advocating its interpretation (Ketola, 2007). Indeed, the ideas promoted by The World Business Council on Sustainable Development (WBCSD, 2010) are largely based on the principles proposed by the Brundtland Report (WCED, 1987). Following these ideas, for example, Slawinski and Bansal (2009) define business sustainability as the ability of firms to respond to short-term financial, social and environmental demands, without compromising their long-term financial, social and environmental performance.

Despite the agreement, the concepts of sustainability and sustainable development remain contestable. Most people support the goals of prosperity, environmental protection and social justice (normative goals), but disagree about what exactly constitute sustainability and sustainable development (Dresner, 2008). Some streams emphasize sustainability through protection and justice and others emphasize development through economic growth. Economists tend to emphasize the need to maintain living standards; ecologists are more concerned with biodiversity and resilience, and sociologists prioritize the need to maintain sociological bonds and interrelationships within communities (Cole, 2007). The conceptual vagueness of the sustainability concept opens up the field to multiple interpretations, in some sense everyone seems to be able to interpret the concepts to suit their objectives (Blackburn, 2007).

The continuing debate between development and conservation (Dresner, 2008), the competing interests and political agendas underlying the operationalization of sustainability (Jacobs, 1999; Sharma and Ruud, 2003), and the misunderstanding regarding the nature of sustainability, i.e. fixed state of equilibrium versus process of change (WCED, 1987), are to a great extent responsible for the impossibility of closing the meaning of sustainability.

Despite the accusations of conceptual vagueness discussed above, there is an agreement that at its core is an approach to development that seeks to balance different, and often competing, needs against an awareness of the environmental, social and economic limitations we face as a society (Dresner, 2008). As such, sustainability has been successful in moving the debate forward to recognize the relevance of pursuing development without diminishing society and environment, and therefore the capacity of future generations to meet their own needs.

According to the WCED (1987), two areas are relevant for securing the future. First, living within environmental limits: respecting the limits of the planet's environment, resources and biodiversity in order to improve our environment and ensure that the natural resources needed for life are unimpaired and remain so for future generations. Second, ensuring a strong, healthy and just society: meeting the diverse needs of all people in existing and future communities, promoting personal well-being, social cohesion and inclusion, and creating equal opportunity.

Ultimately, from this perspective sustainability is about maintaining a balanced tension between four central, conflicting aims: environmental protection, social justice, economic development, and intergenerational equity (Dresner, 2008).

*Environmental protection* refers to preservation and restoration of natural capital. It entails the protection of the natural environment on individual, organizational or governmental levels, for the benefit of human and non-human species. In other words, it connotes the preservation of the status and function of ecological ecosystems (Toman, 1992). In this vein, the Brundtland commission (WCED, 1987) points out:

> Economic growth and development obviously involve changes in the physical ecosystem. Every ecosystem everywhere cannot be preserved intact. A forest may be depleted in one part of a watershed and extended elsewhere, which is not a bad thing if the exploitation has been planned and the effects on soil erosion rates, water regimes, and genetic losses have been taken into account. In general, renewable resources like forests and fish stocks need not be depleted provided the rate of use is within the limits of regeneration and natural growth. But most renewable resources are part of a complex and interlinked ecosystem, and maximum sustainable yield must be defined after taking into account system-wide effects of exploitation (45)

The focus of sustainable development is broader than just the environment. It is also about ensuring a strong, healthy and just society. This means meeting the diverse needs of all people in existing and future communities, promoting personal well-being, social cohesion and inclusion, and creating equal opportunity. This notion of needs leads to Brundtland's (1987) concern for *social justice* and intragenerational equity, in the sense that many problems of resource depletion and environmental stress arise from disparities in economic and political power:

> An industry may get away with unacceptable levels or air and water pollution because the people who bear the brunt of it are poor and unable to complain effectively. A forest may be destroyed by excessive felling because the people living there have no alternatives, or because timber contractors generally have more influence then forest dwellers (46)

The notion of *social justice* refers to the distribution of rights, opportunities and resources among human beings. It comprises principles to regulate the legal system, the structure of the economy and welfare policy, looking at these in terms of distribution of benefits and problems to individual people that finally results (Miller, 1999).

From an economistic perspective, the aim of *economic development* in the context of sustainability is to maintain and improve human living standards (Toman, 1992).

Given the limits to growth (Meadows et al. 2005), this form of economic development demands a new era of economic growth, one that must be based on policies that sustain and expand the social and resource base (Toman, 1992). In this regard, the Brundtland commission (1987) points out that meeting essential needs depends in part on achieving full growth potential, and sustainable development requires economic growth in places where such needs are not being met. But growth by itself is not enough:

> High levels of productive activity and widespread poverty can coexist, and can endanger the environment. Hence sustainable development requires that societies meet human needs both by increasing productive potential and by ensuring equitable opportunities for all (44)

The notion of limits inspires the commission's concern for *intergenerational equity*. This concept refers to social contract between generations, a moral obligation (Rawls, 1971), which states that each generation holds the planet on trust for the next (Weiss, 1984). This means that we inherit the natural environment from previous generations and have an obligation to pass it on in reasonable condition to future generations. Unless people in the future can be held responsible for the situation that they find themselves in, they should not be worse off than what we are today (Barry, 1999). As the author explains:

> No generation can be held responsible for the state the planet it inherits. This suggests that we should at any rate leave people in the future with possibility of falling below our level (…) The potential for sustaining the same level of X as we enjoy depends on each successive generation playing its part (106)

The concept of sustainability hence balances social and environmental concerns with validation of economic growth, with eyes in the present as well as in the future. Rather than challenging the notion of growth directly, it seeks to alter the kind of growth strategies that are pursued (Dresner 2008). In doing so, the notion of sustainability proposes a reinterpretation of the ideas and principles that have inspired western culture's optimism about science and progress (Barry 1999). Some argue that, instead of looking at sustainability as an alternative strategy for development, it must be treated as an ethical code for human survival and progress (Lafferty and Langhelle 1999), and that it is on a par with other moral concepts such as democracy, freedom and human rights (Sharma and Ruud 2003).

The conceptual debate outlined above also applies to business sustainability, with some scholars focused on environmental issues in the form of eco-efficiency and

environmental management (DeSimone, 2000), and others focused on social and ethical issues in the form of socio-efficiency and corporate social responsibility (Holmes and Watts 2000).

Eco-efficiency is a management philosophy that encourages business to search for environmental improvements, which yield parallel economic benefits (WBCSD, 2000). Therefore, it derives from the potential cost savings in the environmental management practices, which became dominated by the search for efficiency and competitive advantage, i.e. solutions that minimized resource consumption and wastes (Holliday et al. 2002). In this sense, Young and Tilley (2006) indicate:

> The idea of doing more with less appealed to the mindset of business leaders. Eco-efficiency was perceived as a win–win solution, enabling the twin goals of economic growth and environmental protection to be maintained; ergo, sustainable development could be achieved by business (403)

Socio-efficiency follows a similar logic in that it refers to the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce, local community and society at large (Holmes and Watts 2000).

These two approaches are based on the values of environmental-industrial capitalism (Gray and Bebbington, 2000) and the logic of ecological modernization (Mol 2001), which is basically a business-centred approach to sustainability that postulates that it is possible to promote economic growth by giving a higher priority to the environment (Hajer 1995). Following this line of reasoning, business sustainability is in the end about taking a more responsible approach to the use and disposal of scarce and potentially ecologically damaging resources (WBCSD 2010) and to the management of social and societal capital (Dyllick and Hockerts 2002).

In bridging the gap between the different streams and as a response to the inherent flaws of efficiency-based models (discussed above), new integrated approaches to business sustainability came into prominence.

From the sustainability side, I will revise the three central approaches that provide conceptual support to sustainability entrepreneurship. They represent a new way of thinking about business sustainability, which basically rejects efficiency-based models. Authors argue that allowing businesses to continue using socio- and eco-efficiency, as a way of protecting the environment, is not a long-term solution to the environmental and

social problems that challenge humankind. Reducing environmental and social impact by being more efficient creates the illusion of short-term relative improvements (Dyllick and Hockerts 2002). In supporting this argument, some critics argue that the current linear, one-way, cradle-to-grave manufacturing system in which products are made and discarded is not only wasteful; it can be poisonous. In this regard, Young and Tilley (2006) indicate:

> Neither waste nor poisons are particularly efficient, productive or good for the environment (…) Making a destructive system less destructive only serves to let industry continue to destroy ecosystems and to contaminate and deplete nature more slowly (404)

The triple bottom line (3BL) concept (Elkington, 1997) promotes a new, responsible approach to business that should take into consideration environmental, social and economic dimensions of sustainability. Alongside developing the notion of the *people, profit and planet* triangle, Elkington's approach emphasizes also the crucial role of transparency and stakeholder engagement. All this together constitutes the mechanism by which companies will be capable of harmonizing the traditional financial bottom line with environmental protection and social justice.

In the articulation of the argument for the 3BL, the author indicates that the debate is no longer about whether to establish a capitalistic system or not. There is a need of shift towards a debate on the limits and weaknesses of market mechanisms, which makes imperative to explore how to be sustainable in a political, economical, ecological and social context. This means that capitalism will have to restructure itself in a sustainable way, and businesses from their central position and influence are responsible for leading this search for balance. In Elkington's view, the 3BL principle can set the basis for this radical change needed.

Together with the 3BL approach, the Dyllick and Hockerts (2002) Model of Corporate Sustainability (Figure 2.2) and the McDonough and Braungart (2002) Triple Top Line Model (Figure 2.3) have been the most influential in constructing the concept of sustainability entrepreneurship.

**Figure 2.2 McDonough and Braungart (2002) Triple Top Line Model**

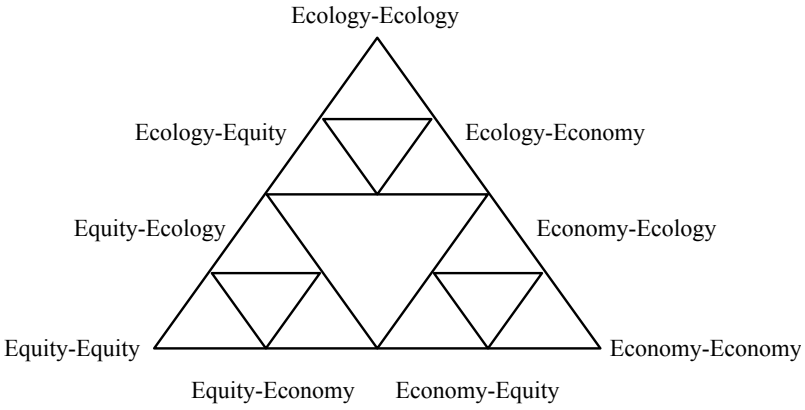
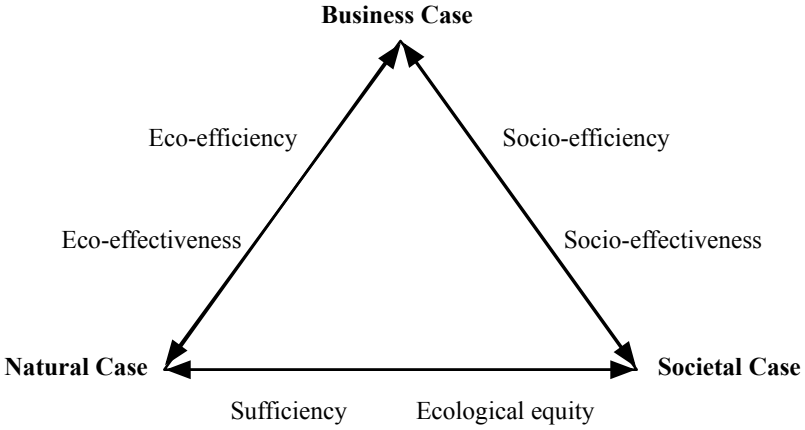



**Figure 2.3 Dyllick and Hockerts (2002) Model of Corporate Sustainability**




The authors draw upon the 3BL concept and emphasize the need to move beyond the business case for corporate sustainability (i.e. beyond eco- and socio-efficiency), to include additional criteria such as eco- and socio-effectiveness, sufficiency and ecological equity (Dyllick and Hockerts, 2002).

Eco-effectiveness enables business to operate in a manner that allows nature and business to be productive and succeed. Business practices, in this sense, should go beyond pollution control and eco-efficiency. The purpose is to seek a balance with the natural world in such a way as to remove negative impact and to develop systems to restore and enhance the natural environment (Dyllick and Hockerts, 2002). This approach requires industry to reinvent itself so that the new ways of doing business result in regenerative, not depletive, practices (Young and Tilley, 2006).

Socio-effectiveness goes beyond Corporate Social Responsibility (CSR) towards organizations having a social mission, which have a 'sustained positive impact' on society. Following this line of reasoning, long-term prosperity depends not on the efficiency of a fundamentally destructive system, but on the effectiveness of processes

designed to be healthy and renewable in the first place (Dyllick and Hockerts, 2002). Ultimately, this means that, instead of reducing the social and environmental impacts by increasing their efficiency, business solutions ought to be life sustaining, restorative and regenerative in addition to being efficient (Young and Tilley, 2006).

Sufficiency is concerned with the reduction of consumption and living well on less (Tilley and Young, 2009). Unlike efficiency-based approaches, sufficiency is considered a strong form of sustainability[2], and is seen as a solution to the moral, social and environmental problems of excessive consumption (Herring 2006). Sufficiency-based initiatives represent a major challenge to predominant business approaches based on profit-maximizing strategies. Both socio/eco-effectiveness and sufficiency are criteria looking at social and ecological sustainability as their main goal with business and society as the main drivers for producing greater social and environmental value (Dyllick and Hockerts, 2002).

### 2.3.2 Sustainability in an entrepreneurial context

Referring again to the discussion outlined in section 2.2 regarding the movement from being a context-based sub discipline to a phenomenon-based domain, there is a very important implication relevant to the case of sustainability entrepreneurship. This is that this movement (context-based sub discipline to a phenomenon-based domain) simultaneously makes entrepreneurship research narrower in scope but wider in context (Davidsson et al. 2001). As Wiklund et al. (2011) indicate in their discussion of the future of entrepreneurship research:

> Not all aspects related to small and new business amount to entrepreneurship, but several phenomena in other arenas are entrepreneurial and can be understood best by entrepreneurship scholars (6)

This statement does not mean that anything can be called entrepreneurship; it rather suggests that the phenomenon of entrepreneurship is present and emerges across a multitude of situations and events. The notion that the field of entrepreneurship is at the

[2] Strong sustainability suggests a greater emphasis on the conservation of natural assets within the broader goal of prudently managing a portfolio of assets over time. Some classes of natural assets have no substitutes and therefore cannot be replaced (Atkinson, 2000:7)

same time broadening and narrowing down (Davidsson and Wiklund, 2001) means that entrepreneurship research does not face the risk of being marginalized as the world develops and changes. Rather, it has the potential to cover wide, emerging aspects of reality (Wiklund et al. 2011), as shown by the example of *The People's Supermarket* presented in the introduction of this study.

In recent years, for example, entrepreneurial activity has played an important role in the reduction of detrimental environmental and societal impacts created by unsustainable business practices (Hall et al. 2010). The recognition of entrepreneurship as a solution to, rather than a cause of, environmental degradation and social inequality (York and Venkataraman, 2010) has moved the field to identify a new type of entrepreneur, this is the sustainability entrepreneur.

There is an emergent agreement in recent literature (Dean and McMullen, 2007; Tilley and Young, 2009; Hall et al. 2010; Patzelt and Shepherd, 2010) that, in prompting changes towards a more sustainable society, sustainability entrepreneurs are to be considered as the engine in this process of change and key actors in creating sustainable growth and wealth. Parrish (2010) suggests that this form of entrepreneurship resolves the dualistic divide between business ventures and altruistic endeavours in favour of a new approach based on the creation of economic value beyond corporate boundaries while improving the social and ecological environments.

In exploring the inception of business sustainability and the practical implications and experiences of the eco and socio-entrepreneurs, Young and Tilley (2006) draw upon the aforementioned integrated approaches (i.e. Elkington, 1997; McDonough and Braungart, 2002; Dyllick and Hockerts, 2002) to conceptualize the phenomenon of sustainability entrepreneurship. In a more recent work, Tilley and Young (2009) define the sustainability entrepreneur as:

> The individual who holistically integrates the goals of economic, social and environmental entrepreneurship into an organization that is sustainable in its goal and sustainable in its form of wealth generation (88)

It has been suggested that these entrepreneurs embody several sustainability values, such as freedom, equality, solidarity, tolerance, respect for nature, and shared responsibility, which direct their goals, frame their attitudes, and provide standards against which their behaviour can be judged (Leiserowitz et al. 2006).

In line with the Brundtland Report, Tilley and Young's (2009) and other definitions of sustainability entrepreneurship (Table 2.1) refer to the mutual need for environmental protection and development (Dresner, 2008) and at the same time the necessity of equity within and between generations (Beckerman, 2009).

**Table 2.1 Definitions of Sustainable Entrepreneurship**

| Authors | Definition |
|---|---|
| Crals and Vereeck (2004) | Sustainable entrepreneurship is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce, their families, local communities, the society and the world at large as well as future generations (1) |
| Cohen and Winn (2007) | Sustainable entrepreneurship as the examination of how opportunities to bring into existence future goods and services are discovered, created, and exploited, by whom, and with what economic, psychological, social, and environmental consequences (35) |
| Dean and McMullen (2007) | Sustainable entrepreneurship is the process of discovering, evaluating, and exploiting economic opportunities that are present in market failures, which detract from sustainability, including those that are environmentally relevant (58) |
| Katsikis and Kyrgidou (2007) | Sustainable entrepreneurship is the teleological process aiming at the achievement of sustainable development, by discovering, evaluating and exploiting opportunities and creating value that produces economic prosperity, social cohesion and environmental protection (2) |
| Parrish and Foxon (2009) | Sustainability-driven entrepreneurship describes those entrepreneurial activities in which the central guiding purpose is to make a substantial contribution to sustainable development. More specifically, sustainability entrepreneurs design ventures with the primary intention of contributing to improved environmental quality and social well-being in ways that are mutually supportive (48) |
| Tilley and Young (2009b) | Sustainability entrepreneur is the individual who holistically integrates the goals of economic, social and environmental entrepreneurship into an organization that is sustainable in its goal and sustainable in its form of wealth generation (88) |
| O'Neill, Hershauer and Golden (2009) | Sustainability entrepreneurship is a process of venture creation that links the activities of entrepreneurs to the emergence of value-creating enterprises that contribute to the sustainable development of the social–ecological system (34) |
| Hockerts and Wüstenhagen (2010) | Sustainable entrepreneurship is the discovery and exploitation of economic opportunities through the generation of market disequilibria that initiate the transformation of a sector towards an environmentally and socially more sustainable state (482) |
| Pacheco, Dean and Payne (2010) | Sustainable entrepreneurship is the discovery, creation, evaluation, and exploitation of opportunities to create future goods and services that is consistent with sustainable development goals (471) |
| Kuckertz and Wagner (2010) | Sustainable development-oriented entrepreneurs are those individuals with entrepreneurial intentions who aim to manage a triple bottom line (527) |
| Patzelt and Shepherd (2010) | Sustainable entrepreneurship is the discovery, creation, and exploitation of opportunities to create future goods and services that sustain the natural and/or communal environment and provide development gain for others (2) |
| Shepherd and Patzelt (2011) | Sustainable entrepreneurship is focused on the preservation of nature, life support, and community in the pursuit of perceived opportunities to bring into existence future products, processes, and services for gain, where gain is broadly construed to include economic and non-economic gains to individuals, the economy, and society (137) |

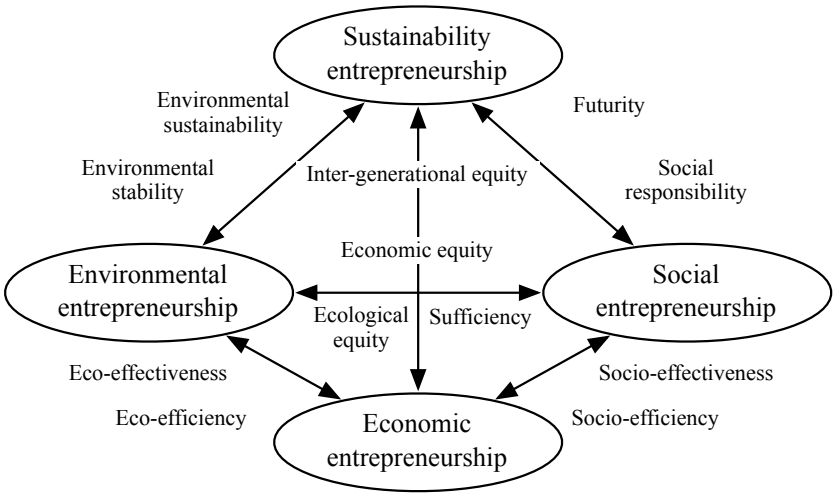
| | |
|---|---|
| Schaltegger and Wagner (2011) | Sustainable entrepreneurship can be described as an innovative, market-oriented and personality driven form of creating economic and societal value by means of break-through environmentally or socially beneficial market or institutional innovations (226) |

Sustainability-driven enterprises are not only about social and environmental entrepreneurship, whereby only social and environmental objectives are to be pursued; nor are only about economic entrepreneurship, although they strive for obtaining economic profit. This approach combines all components of sustainable development equally, holistically and integrally (Tilley and Young, 2009), which means that this kind of entrepreneurial activity is about simultaneously achieving the three objectives, while committing to securing the economic welfare and social well-being of future generations, and ensuring a long-term sustainability of the environment (Young and Tilley, 2006). In their delineation of the field, Shepherd and Patzelt (2011) provide support to this definition. In their account, the practice of sustainable entrepreneurship entails sustaining and developing six elements: three constructs informed by sustainable development literature, i.e. sustain nature, life support systems and communities; and three constructs informed by entrepreneurship literature, i.e. develop economic gains, non-economic gains to individuals and non-economic gains to society.

Although Tilley and Young (2009) and Shepherd and Patzelt (2011) draw on different theoretical perspectives (business sustainability and entrepreneurship research respectively), they agree on that this kind of entrepreneurial activity is not about pursuing social, economic or environmental objectives independently, rather it combines all components of sustainability in a systemic fashion. Despite the natural overlaps between eco, social and sustainable entrepreneurship, the latter represent the only category of entrepreneurs that focuses specifically on sustainable development, rather than on social or environmental needs (Young and Tilley, 2006; Hall et al. 2010). In other words, environmental entrepreneurship and social entrepreneurship are part, not synonymous of sustainable entrepreneurship (Shepherd and Patzelt, 2011). Lumpkin and Katz (2011) reinforce this point in discussing the concept of sustainable entrepreneurship. They emphasize that while social ventures consider the double bottom line of financial good and societal good, sustainable ventures define themselves by a triple bottom line of profit, social good and environmental protection.

Likewise, although it can be argued that entrepreneurial activities that consider the externalities - social and environmental - of pursuing economic outcomes is sustainable entrepreneurship, it is not the case. Shepherd and Patzelt (2011) stress that if such activity does not simultaneously consider sustainability outcomes - social and environmental and economic - cannot be deemed as sustainability entrepreneurship action. Hockerts and Wüstenhagen (2010), in this sense, argue that although the understanding of sustainability entrepreneurship has evolved through two separate streams, i.e. social and environmental entrepreneurship, ultimately it is about the combination of economic, social and environmental value creation, with an overall concern with the well-being of future generations.

**Figure 2.4 The Sustainability Entrepreneurship Model**




Source: Tilley and Young 2009

In developing the concept, Young and Tilley (2006) outline a model of sustainable entrepreneurship (Figure 2.4). This model is extended years later (Tilley and Young, 2009) by stressing that sustainability cannot be achieve by subscribing only to social or environmental entrepreneurship, neither represents a direct route from any of the economic, environmental or social entrepreneurship poles. Sustainable entrepreneurship, they argue, exists in the combination of 12 elements that operate in unison and emerge from combining the three dimensions of entrepreneurship with a higher plane of sustainability entrepreneurship in a two-way relationship.

Drawing on this line of reasoning, it has been suggested that sustainability entrepreneurs could potentially be the true wealth generators of the future, as it presents a

way to reconcile the dual goals of sustainable development and wealth accumulation (Tilley and Parrish, 2009; Tilley and Young, 2009; Parrish, 2010).

## 2.4 The opportunity process in sustainability entrepreneurship

As indicated in section 2.2, studying venture opportunities is central to understanding the phenomenon of entrepreneurship. Therefore, if one is to undertake the task of explaining the process of sustainability entrepreneurship, it becomes fundamental understanding how opportunities unfold in this context. This section focuses first on exploring the nature of sustainability opportunities, in particular on what makes these opportunities distinct from traditional entrepreneurial opportunities for profit. Then, it reviews and discusses, from various theoretical perspectives (i.e. economic, psychological, sociological and environmental research), current explanations of how and why particular individuals decide to pursue opportunities with social, environmental and intergenerational components concurrent with pursuing economic viability.

### 2.4.1 The nature of sustainability opportunities

The central idea behind the development of sustainable ventures is that the activities performed by entrepreneurs in the pursuit of gains must not undermine the ecological and social environments in which they operate; and when necessary, they must restore or nurture such environments towards recovering the balance between nature, society and economic activity (Parrish, 2010; Shepherd and Patzelt, 2011).

In line with the integrated approaches to business sustainability, this perspective transcends the business case for sustainable development (Dyllick and Hockerts, 2002; Young and Tilley, 2006; Tilley and Young, 2009), which aims primarily at improving the efficiency of businesses by reducing their negative impact on nature and people. Rather, it seeks to generate social and environmental goods towards satisfying society's most pressing quality-of-life needs (Parrish, 2010), which in turn constitute an extensive source of venture opportunities (Cohen and Winn, 2007; Dean and McMullen, 2007; Doyle and Ho, 2010). In advancing the cause of environmental intrapreneurship, Hostaget et al. (1998) stress that (social and) environmental opportunities are becoming increasingly attractive as potential sources of new products, services, markets, profits and competitive advantage.

Patzelt and Shepherd (2010) identify these opportunities as sustainability opportunities. In the authors' view, these opportunities seek to sustain the natural and/or communal environment as well as provide development gain for the entrepreneur and others. In line with Elkington's (1997) triple bottom line concept, development gain for others comprises three relevant dimensions: economic gain, environmental gain and social gain for the society.

In exploring the nature of sustainability opportunities, Cohen and Winn (2007) indicate that market imperfections constitute a rich source of these entrepreneurial opportunities. They recognize four market imperfections leading to environmental degradation, which provide at the same time relevant entrepreneurial opportunities for the development of sustainable, innovative business solutions. In their view, inefficient firms, externalities, flawed pricing mechanisms and information asymmetries enable entrepreneurs obtain rents while simultaneously improving social and environmental conditions. In other words, the existence of pervasive natural-environment-related market imperfections generates various entrepreneurial opportunities in the marketplace, which, when exploited through the process of opportunity development, have the potential to create financial profits for the entrepreneur. Furthermore, alongside creating gains for investors, entrepreneurs and economies, the pursuit of such opportunities can enhance education, productivity, socioeconomic status, physical health, and self-reliance of individuals and societies (Wheeler et al. 2005).

Similarly, Dean and McMullen (2007) draw on environmental economics to suggest that environmentally relevant market failures represent opportunities for achieving profitability while simultaneously reducing environmentally degrading behaviours. When social and environmental problems arise, new venture opportunities become available. Sustainable entrepreneurs see in the reduction or elimination of such problems the exploitation of potentially profitable opportunities. In this vein, the authors emphasize:

> The growing desire of many individuals in the marketplace for the cessation of environmentally degrading activities, combined with a willingness to pay for reduction of these activities, represents opportunity for entrepreneurial action that can lead to the enhancement of ecological sustainability (51)

Dean and McMullen (2007) revise five categories of market failure (i.e. public goods, externalities, monopoly power, inappropriate government intervention, and imperfect information) and conclude that the key to achieving sustainable

entrepreneurship lies in 'overcoming barriers to the efficient functioning of markets' for environmental resources.

The idea that sustainable entrepreneurs create and improve markets for such resources through entrepreneurial action suggests that not only the nature of such opportunities is different, but also the process through which entrepreneurs seize the opportunities that are inherent in socially and environmentally relevant market imperfections (Shepherd and Patzelt, 2011).

### 2.4.2 Explaining the development of sustainability opportunities: potential causes

Different streams of research - from economic, psychological, sociological and environmental arenas - have tried to tackle the issue of how and why particular individuals decide to pursue opportunities with social, environmental and intergenerational components concurrent with pursuing economic viability (Tilley and Young, 2009; Hall et al. 2010; Shepherd and Patzelt, 2011). I examine eight key sources of explanation that present a clear relationship with the outcome of interest (Feldman, 2004). These are: (1) prior knowledge and self-efficacy, (2) moral cognition and moral intensity, (3) motivation and entrepreneurial intention, (4) entrepreneurial alertness and dispositional mindfulness, (5) sustainability orientation, (6) value creation and impact, (7) sustainability contribution and strategic returns, and (8) institutional conditions.

#### 2.4.2.1 Prior knowledge and self-efficacy

Prior knowledge and self-efficacy are central explanatory variables in entrepreneurship research (Ardichvili et al. 2003). Despite their predominance, their nature and role in the development of sustainability opportunities are different.

Extant models suggest that entrepreneurs vary in their ability to recognize opportunities for sustainable development based on their *prior knowledge* of ecological and social environments and the perceived threats to such environments (Patzelt and Shepherd, 2010). This argument is based on insights from studying 'traditional' entrepreneurs, whereby opportunities arise from changes in the environment and their recognition is a function of the distribution of information in society and related to the information that entrepreneurs already possess (Shane, 2000).

In this vein, Patzelt and Shepherd (2010) argue that individuals who attend to the ecological environment are more likely to recognize changes in that environment and eventually the opportunities that arise from environmentally relevant market imperfections. Likewise, individuals that attend to the social environment are more likely to recognize changes in that environment and eventually the opportunities that arise from socially relevant market imperfections. Therefore, compared to individuals whose attention is more focused on the business environment, those individuals focused on ecological and social environments are more likely to form beliefs about opportunities for sustainable development even if they show no intention to personally pursue such opportunities (Shepherd and Patzelt, 2011). Relevant prior knowledge, as Dimov (2010b) explains, stems from either overall education and life experience, or education and experience specific to a particular activity or context.

Together with prior knowledge, *entrepreneurial self-efficacy* also emerges as an essential element of entrepreneurial intention and action (Drnovaek et al. 2010). Entrepreneurial self-efficacy has been defined as the entrepreneur's confidence in its knowledge and abilities to successfully establish a successful business (Boyd and Vozikis, 1994). This concept has its roots in social learning theory (Bandura, 1982), which defines self-efficacy as the person's belief in his or her capability to perform a task (Gist, 1987). In Bandura's (1982) view, self-efficacy develops from the gradual acquisition of cognitive, social, linguistic, and/or physical skills through experience (Gist, 1987). In the context of entrepreneurship research, self-efficacy has been portrayed as a distinct characteristic of entrepreneurs (Chen et al. 1998), as a central factor in the decision to become an entrepreneur (Zhao et al. 2005), as an important predictor of start-up intention (Krueger et al. 2000) and as a key determinant of new venture growth (Markman et al. 2002).

Shepherd and Patzelt (2011) build on this line of thought to suggest that although self-efficacy plays a central role in entrepreneurial action, the evaluation of one's knowledge, and skills to exploit a sustainability opportunity could be different than the evaluation involving those opportunities that are simply for personal economic gain. The authors support this suggestion on the idea that the knowledge structure of sustainability entrepreneurs, which gives support to entrepreneurial self-efficacy, may be more complex than of traditional entrepreneurs, in the sense that the former may require not only knowledge of markets but also of natural and/or social environments.

#### 2.4.2.2 Moral cognition and moral intensity

Understanding the factors affecting the development of sustainability opportunities beyond the traditional notions of market failure (Cohen et al. 2008) and prior knowledge (Patzelt and Shepherd, 2010), requires attending the moral nature of individual decisions concerning sustainability (Dresner, 2008).

Biodiversity loss, climate change, land use changes, water scarcity (Jerneck et al. 2010) and other wicked sustainability problems[3] represent serious threats to humans and other forms of life over the next decades (Bruntland, 1987). Any endeavour aimed at solving these problems entails making decisions that involve two sometimes-conflicting dimensions: scientific facts and moral principles (Garvey, 2008). Drawing on the philosophy of sustainability, it can be argued that committing to sustainability is therefore not only about applying the right formulas and strategies to help improving our current wealth, but also about taking responsibility for equally distributing well-being, sacrifice and risks between rich and poor, humans and non-humans and present and future generations (Dresner, 2008). Incorporating the ideas of fairness, distributive justice and intergenerational equity in the equation of prosperity entails considering the possible consequences of our actions, and what we ought to do to foster our development without compromising the development of others; and this falls within the scope of morality (Barry, 1999).

Following prior efforts aimed at delineating the principles of sustainability, it has been argued that in facing sustainability problems, individuals are compelled to judge what course of action is morally right and which one is morally wrong, choose one and accept responsibility for its impacts (Dresner, 2008). This means choosing the course of action, of all possible courses of action in a given situation, which does not harm others but rather brings equal benefits to all social, economic and environmental actors.

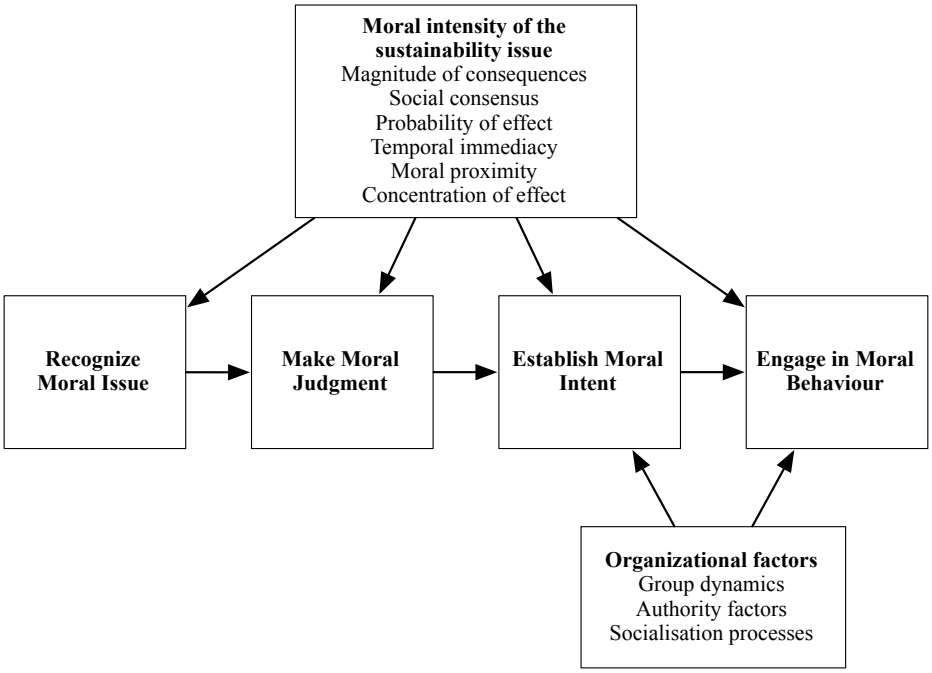
In discussing the notion of intergenerational equity, Beckerman (1999) points out that this has become a moral obligation, and that trying to bring equal benefits to all actors requires using specific cognitive processes or decision-making patterns, which differ from traditional protocols driven by utility and optimization (Dresner, 2008). Entrepreneurial responses to social or environmental issues would be therefore influenced

[3] Sustainability problems are persistent because solutions are difficult to identify owing to complex interdependencies. And once solutions are identified, they may have incomplete, contradictory and changing requirements (Jerneck et al. 2010:71).

to a great extent by moral reasoning patterns (Trevino, 1992). This involves, in its first stages, the recognition of moral or ethical issues linked to these problems, and the evaluation of the potential positive or negative consequences that the new venture – emerging as a solution to such problems - has for the well-being of others (Rest, 1986; Trevino, 1992).

Moral cognition is sensitive to the nature and severity of the sustainability problem at stake (Morris, 1995). This is the moral intensity of the sustainability issue. Moral intensity (Jones, 1991) is a construct that captures the extent of issue-related moral imperative in a situation; it is contingent upon and defined by the specific characteristics of the issue. Jones draws on previous models of moral cognition (Rest, 1986; Trevino, 1986; Dubinsky and Loken, 1989; Ferrell and Gresham, 1985; Hunt and Bitell, 1986) and argues that moral intensity affects all stages of the ethical-decision making process, i.e. recognition of the moral issue, moral judgment, moral intent and moral behaviour (Figure 2.5).

**Figure 2.5 The role of moral intensity in ethical decision-making**




Source: Jones, 1991

The basic idea is that, when it comes to ethical decision-making, the process should not follow the same course for a dilemma involving the existence of issues of major importance as it does for other dilemma of lesser importance (McMahon and Harvey, 2007).

Moral Intensity is thus an exogenous factor that focuses on the moral issue, not on the moral agent or the organizational context. Moral intensity is likely to vary substantially from issue to issue, with a few sustainability issues achieving high levels and many sustainability issues achieving low levels (Jones, 1991). Consequently, issues of high moral intensity will be recognized as ethical issues more often than those of low moral intensity (Singhapakdi et al. 1996).

This is a multidimensional construct and its component parts are characteristics of the moral issue at hand. Jones (1991) indicates that moral intensity comprises six components. *Magnitude of consequences* (MC) is the sum of the harms - or benefits - done to victims - or beneficiaries - of the moral act in question. *Social consensus* (SC) is the degree of social agreement that a proposed act is evil (or good). *Probability of effect* (PE) is a joint function of the probability that the act in question will actually take place and the act in question will actually cause the harm (or benefit predicted). *Temporal immediacy* (TI) is the length of time between the present and the onset of consequences of the moral act in question - shorter length of time implies greater immediacy. *Moral proximity* (MP) is the feeling of nearness - social, cultural, psychological, or physical - that the moral agent has for victims - beneficiaries - of the evil - beneficial - act in question. *Concentration of effect* (CE) is an inverse function of the number of people affected by an act of a given magnitude.

Bhal and Dadhich (2011) recognize moral intensity as a force that compels an individual to make a moral or ethical decision. In this vein, sustainability issues of high intensity are likely to be perceived as requiring higher levels of ethical interpretation as compared to issues of low intensity. As previously stated, moral intensity affects all stages of the ethical decision making process (Jones, 1991), hence all cognitive processes involved in choosing a particular path of action or what we ought to do in a given situation.

Moral reasoning, which connects information with intention and subsequently with action, varies from one issue to the other in proportion to the level of moral intensity of the sustainability issue at stake (Jones, 1991). Alongside influencing the recognition of sustainability issues, moral intensity plays a role in the evaluation of possible courses of action, making moral reasoning issue dependent (Haines et al. 2007). Jaffe's (2006) examination of the relationship between moral intensity and corporate social responsibility provides support to this argument. In his analysis, the author demonstrates

that moral intensity, in particular magnitude, harm, proximity and consensus, indeed predicts socially responsible behaviours.

#### 2.4.2.3 Motivation and entrepreneurial intention

Drawing on cognitive phycology, some authors argue that the variance regarding the integration of sustainability in the formation of new ventures is explained to a great extent by the entrepreneur's motivation and intention.

This argumentative line is relevant because entrepreneurship theory requires consideration of the motivations of people making entrepreneurial decisions (Shane et al. 2003). However, given the variety of purposes behind the development of sustainable ventures (De Clercq and Voronov, 2011), understanding the phenomenon of sustainability entrepreneurship based on the motivational structure of the entrepreneur will require more than traditional explanatory factors such as self-realization, financial success, innovation, or independence (Carter et al. 2003), or the examination of the willingness of people to play the entrepreneurship game (Shane et al. 2003).

Linnanen (2002) for example explains this variance based on the fact that these entrepreneurs follow a predominant desire to change the world, which is operationalized by prioritizing environmental business goals (Schaltegger, 2002). Walley and Taylor (2002) complement this view by emphasizing the role of the entrepreneurial mind-set in guiding actions towards sustainability. The authors stress the relevance of the transformative, sustainability mind-set of these entrepreneurs as the mechanism through which they elaborate vision of a sustainable future that envisages hard structural change.

Along with motivation, intentions have proven the best predictor of any planned behaviour, including entrepreneurship (Krueger et al. 2000). Entrepreneurial intentions depend on the perception of desirability and feasibility of the venture opportunity and the interaction between these two kinds of perceptions (Fitzsimmons and Douglas, 2011). If the opportunity at hand is complex and its evaluation involves more factors than simply the potential of economic gain (Shepherd and Patzelt, 2011), the perceptions of desirability and feasibility of that opportunity, hence the entrepreneurial intention and the formation of a first-person sustainability opportunity belief (McMullen and Shepherd, 2006; Shepherd et al. 2007) are also likely to be more complex.

In this vein, Schlange (2006) proposes that the main driver of sustainability entrepreneurs is their willingness or intention to combine and balance their desire to change the world with their desire to make money. Gibbs (2009) builds on Schlange (2006) to widen the scope and proposes a model of agent-structure based on Giddens's (1984) structuration theory. He supports his argument on the notion that the agency emerges as a result of a combination of green, ethical and social motives. Schaltegger and Wagner (2011) draw upon this cognitive approach and highlight the relevance of sustainability-related core conditions. The authors indicate that, attached to the existence of sustainability entrepreneurship, there is a desire to contribute to solving societal and environmental problems through the pursuit of entrepreneurial opportunities. In other words, the main goal is creating sustainable development through the realization of a successful business.

#### 2.4.2.4 Entrepreneurial alertness and dispositional mindfulness

Alertness is a central element in entrepreneurship research (Tang et al. 2012). It pertains the individual's ability to identify opportunities that are overlooked by others (Kirzner, 1973; 1979). The relevance of this factor lies in the fact that the equilibrative role of the entrepreneur originates not from its autonomously introducing change into existing market interactions, but from its ability to notice, earlier than others, the changes that have already occurred, making extant relationships incompatible with the conditions for equilibrium (Kirzner, 2008)

Tang et al. (2012) indicate that an important component of alertness is the aspect of judgment, which focuses on evaluating changes, shifts, and new information, and on deciding if they would reflect a business opportunity with profit potentials. In the context of sustainability, this judgment would imply evaluating the opportunity that does not harm others but rather brings equal benefits to all social, economic and environmental actors (Beckerman, 1999).

Sustainability entrepreneurial action, including alertness and awareness of problems in social, environmental or economic environments, has therefore strong connections to moral cognition and ethical decision-making (Dresner, 2008). This means that in the process of perceiving and reacting to sustainability problems, aspiring entrepreneurs are compelled to evaluate the situation based on moral facts, judge what course of action is morally right and which one is morally wrong, choose one and accept responsibility for

its impacts. Following this line of reasoning, the mechanisms by which the entrepreneur is aware of what is happening in its social, economic and natural environments and with its own experience appears more complex that the mechanisms leading to the identification of opportunities for profit.

A way of capturing moral awareness in entrepreneurship (Bryant, 2009) is through the examination of dispositional mindfulness, which Brown and Ryan (2003) describe as a quality of consciousness that is characterized by clarity and vividness of current experience and functioning. Unlike entrepreneurial alertness, which primarily deals with cognitive processes in the development of profitable business opportunities (e.g. Tang et al. 2012), the dispositional mindfulness of the individual impacts ethical decision-making. Rueday and Schweitzer (2010) show that individuals high in mindfulness are more likely to act ethically, more likely to value upholding ethical standards, and more likely to use a principled approach to ethical decision-making. Therefore, dispositional mindfulness, as a particular state of awareness, is better equipped to deal with attentional aspects of sustainability-related behaviours. Therefore, it better explains attentional and evaluative aspects of the entrepreneur when changes, shifts, and new information relate to social and ecological environments.

#### 2.4.2.5 Orientation: sustainable values, attitude and conviction

In trying to understand individuals who are interested in supporting initiatives and forming businesses that support the idea of sustainability, Kuckertz and Wagner (2010) examine the relationship between sustainability orientation, understood as underlying sustainability attitudes and convictions, and entrepreneurial intention. The presence of a positive relationship between these two factors is only partially supported; nevertheless the empirical evidence is sufficiently strong to argue, in the authors' view, that sustainability orientation does indeed influence entrepreneurial intention in particular groups of individuals. Therefore, part of the explanation of why a given individual decides to start a sustainability-oriented new business relies on its attitude and conviction towards environmental protection and social responsibility (Kuckertz and Wagner, 2010).

Walley and Taylor (2002) also relate attitudes and convictions to the orientation of the entrepreneur, emphasizing that in the case of sustainability entrepreneurs the only

alternative orientation is one that combines all three principles: economic, ecological and social-ethical sustainability.

In the same vein, Parrish (2010) indicates that maintaining the balance between social, environmental and economic dimensions requires generative rules or a specific orientation capable of guiding the venture design process. This approach reveals essential values and beliefs of sustainability entrepreneurs, and gives support and guidance to their role as wealth generators (Tilley and Young, 2009), to the integration of sustainability into daily practices, and to the setting of boundary conditions in the formation of market interactions.

Based on a multiple case-study research, the author establishes five generative rules that, in his account, shape the venture development process. The central feature across the five principles is that resources need not be exploited, but be treated in a way that is mutually restorative, supportive, and enriching. The author defines this cognitive pattern as perpetual reasoning, which is fundamentally different than the traditional exploitative reasoning. Table 2.2 presents a comparison of the principles of perpetual and exploitative reasoning.

**Table 2.2 Comparison of perpetual and exploitative reasoning**

| Organization design requirement | Perpetual reasoning | Exploitative reasoning |
|---|---|---|
| Purpose, justifying existence | Resource perpetuation | Resource exploitation |
| Efficiency, achieving synergies | Benefit stacking | Least-cost economizing |
| Trade-offs, balancing competing objectives | Strategic satisficing | Single-objective maximizing |
| Criteria, prioritizing decision choices | Qualitative management | Quantitative management |
| Inducements, allocating benefits | Worthy contribution | Claims of power |

Source: Parrish, 2010

Based on this logic, Parrish (2010) suggests that the values and motives that give rise to sustainability entrepreneurship, based on equanimity between self, other people, and nature (511), result in specific organizing tensions that have the potential to challenge the viability of enterprises that embody these values. However, he indicates that the distinct competencies and cognitive patterns of sustainability entrepreneurs, derived from the same values and motives, enable these organizing tensions to be effectively overcome. Following this argument, he concludes that the use of perpetual reasoning is a key feature that ultimately distinguishes sustainability entrepreneurs.

#### 2.4.2.6 Value creation and impact

Sustainability entrepreneurs have also been characterized by the value they create at both organizational and societal levels. By means of articulating a holistic value proposition (O'Neill et al. 2009) they have proven capable of reconciling the dual goals of sustainable development and wealth accumulation (Tilley and Parrish, 2009), therefore of resolving the dualistic divide between opportunistic business and altruistic charity (Parrish, 2007b).

Drawing upon Dyllick and Hockerts (2002), Cohen et al. (2008) explore the idea of broadening the scope of entrepreneurship research by conceptualizing a framework for sustainable value creation comprising seven dependent variables. These are: economic performance, promise, perpetuity, socio-efficiency, stewardship, eco-efficiency and sustainability. In the authors' account, these variables combine all elements of sustainable development.

By using their ventures as a vehicle for contributing to environmental quality and social well-being, in addition to satisfying their own interests, they fulfil two central functions: together with creating economic value, sustainability entrepreneurship activities can have a major impact on larger-scale structural shifts towards a more sustainable society (Parrish et al. 2009). In doing so, this form of entrepreneurship extends the role of business beyond market success to initiating societal change and changing market conditions and regulations (Schaltegger and Wagner, 2011).

From this broader perspective, some authors point out that the most likely result of an escalation of this kind of endeavours is an equitable transition to a low carbon economy (Parrish et al. 2009) and a consequent shift to a new form of capitalism (Gibbs, 2009). Based on this notion, Young and Tilley (2006) argue that these entrepreneurs could potentially be the true wealth generators of the future.

It might be argued that due to its innovative nature any kind of entrepreneurial action have an effect on institutional arrangements playing thus a catalytic role. However, entrepreneurship in its traditional form unfolds based on extant economic structures and market incentives (Baumol, 1990), reproducing current institutional logic. They might create rearrangements in social, political and economic structures, but not necessarily towards a sustainable direction.

Although this approach has proven central in moving our economy towards more sustainable modes of production (Tilley and Parrish, 2009; Parrish and Foxon, 2009) and solving most of the problems that we are currently facing as a society (Hall et al. 2010; Shepherd and Patzelt, 2011), sustainable newcomers are generally seen as utopic alternatives (Hommels et al. 2007) lacking the credibility of those who present a more traditional approach to new venture formation (De Clercq and Voronov, 2011).

Nevertheless, it has been argued that sustainability entrepreneurs posses the agency to develop the necessary institutions that enable the exploitation of sustainability opportunities (Pacheco et al. 2010). In developing their ventures, they deploy new sets of rules, i.e. cognitive, normative and regulative (Scott, 2008), which contradict extant institutional arrangements, challenge field-imposed expectations (De Clercq and Voronov, 2011), and ultimately defy the logic behind the reward structure of the economy (Pacheco et al. 2010), upon which most of the entrepreneurial activity operates (Baumol, 1990). In other words, they have the agency to trigger transformations in extant institutional arrangements (Pacheco et al. 2010) and modify the dynamics and developmental trajectory of a competitive market (Parrish and Foxon, 2009).

#### 2.4.2.7 Sustainability contribution and strategic returns

Sustainability-driven entrepreneurial activities contribute not only to solving societal and environmental problems, but also to improving the business itself, in that these activities generate strategic returns and help improving its long-term prospect (DeSimmone and Popoff, 2000; Mitchell et al. 2010). The consistency of the results to the question *Does it pay to be green?* (Orlitzky et al. 2003) illustrates this point. For example, in a meta-analysis of 29 studies dealing with returns over sustainability, Dixon-Fowler et al. (2011) demonstrate a positive relationship between the development of proactive environmental initiatives and financial performance.

Consideration of social and ecological environments is usually associated with a cost increase for companies. However, sustainability practices have proven relevant to accessing markets, obtaining investment, recruiting employees, building acceptance, reducing cost of material, energy, and services and differentiating products (Ambec and Lanoie, 2008). In this vein, Orsato (2006) indicates that sustainability initiatives, such as ISO 14001 certification, fair-trade agreements or having eco-labelled products, can eventually be the best way of pursuing competitive advantage. Thus, visualizing

sustainability challenges through the appropriate business lens can help identifying strategies and practices that drive shareholder value while simultaneously contributing to a more sustainable world (Hart and Milstein, 2003).

The strategic returns of implementing socially responsible and sustainable strategies and initiatives have also started changing the perception of the value of such strategies (Ioannou and Serafeim, 2010), which has had an impact on both analysts' recommendations and investment decisions. Similarly in markets, consumers are increasingly expressing the value they attribute to environmental protection and social responsibility through shopping behaviour (Orsato, 2006). In his analysis of competitive environmental strategies, Orsato (2006) shows that clients favour sustainable organizations, independently on the quality or performance of products and services sold by them.

> As ecological and social responsibility become increasingly important issues for society, consumers value the way organizations manage their production processes and supporting activities (130)

From an entrepreneur's lens, sustainability may appear in itself as a business opportunity (Hart and Milstein, 2003) and as a central driver in the development and maintenance of competitive advantage (York, 2008), in that it offers new revenue streams and avenues for lowering cost and risk (Porter and Kramer, 2006). The idea of strategic returns of sustainability may therefore affect the perception of aspiring entrepreneurs regarding the feasibility and desirability of a third-person opportunity (McMullen and Shepherd, 2006) towards forming a first-person opportunity that both sustains and develops (Shepherd and Patzelt, 2011).

#### 2.4.2.8 Institutions and sustainability entrepreneurship

A growing stream of research in the field of entrepreneurship emphasizes that sustainability entrepreneurs require major changes in prevailing institutional arrangements to succeed (Hall et al. 2010). In other words, they need a cultural context and social norms capable of fostering or nurturing the creation of environmentally responsible economic activity (Pacheco et al. 2010).

Contrary to traditional literature on sustainability entrepreneurship, which primarily concentrates on economic theory and analysis (e.g. Dean and McMullen, 2007; Cohen

and Winn, 2007), some authors have used insights from institutional theory and sociology to study how social norms, i.e. unwritten rules of conduct, and centralized institutions (e.g. state-sponsored incentives) impact the creation of environmentally new ventures (Meek et al. 2010). These studies have demonstrated that decentralized, socially determined institutions, such as consumption patterns, norms of conformity and of family interdependence, not only impact the individual-level decision-making of entrepreneurs towards pursuing environmentally responsible opportunities, but also mediate the effect of government incentives on sustainable firm foundings.

O'Neill et al. (2009) on the other hand stress the relevance of cultural settings in generating entrepreneurial value beyond profit and market penetration. Similarly, Pacheco et al. (2010) point out that only appropriate conditions may lead to producing social, environmental and economic wealth; however, the extant market incentives compel entrepreneurs to environmentally degrading behaviours. If the appropriate conditions do not prevail, social, environmental and economic wealth will not be produced, and entrepreneurs could end up creating unproductive or destructive forms of entrepreneurship (Harbi and Anderson, 2010).

Formal institutions also play a role in nurturing sustainability-oriented entrepreneurial activity. Caniëls and Romijn (2008) indicate that policy intervention is conducive to climate for experimentation and learning with promising (sustainable) technologies and the emergence of sustainable businesses. The authors draw upon literature on sustainability and technological change (Kemp et al. 1998) and point out that incentive policies such as tax and reward systems can make emerging technologies (momentarily) more attractive by changing relative prices of different options. In this regard, Kemp et al. (1998) indicate:

> Centralized planning activities also have some role to play. Governments' role is to plan for the creation and building of a new socio-technical regime; but the key to policy effectiveness is that decentralized market incentive policies, central directives and direct network formation activities must be combined (251)

Geels and Kemp (2007) point out that due to the relative inefficiency of new sustainable business at the time they are first recognized as such, support from formal institutions ensures surviving the early stages of development. This usually entails protection and nurturing in form of incentives, tax exemptions or subsidies (Hoogma et al. 2002). Verbong et al. (2008) support this line of reasoning in their review of policies

in Dutch renewable energy innovation journeys. They demonstrate that policy interventions, through subsidies and regulatory adaptations, play a central role in the introduction of sustainable business solutions in that they help bridging the 'valley of death' between RandD and market introduction.

Schot and Geels (2008) complement this view by highlighting the relevance of policies aimed at nurturing sustainable innovation journeys. Alongside providing incentives for the development of green niches, sustainability-oriented policies allows for creating appropriate processes of network development, learning and visioning, which are instrumental for the development of more sustainable modes of production.

## 2.5 Conceptual development

### 2.5.1 Advancing the definition of sustainability entrepreneurship

Despite the contribution of current literature at the intersection of sustainability and entrepreneurship, three major problems prevail. First, due to the fact that the sustainability entrepreneur is not as prevalent or as easily identifiable as economic, social or environmental entrepreneurs who can be found throughout the world, studying the phenomenon presents particular difficulties in terms of defining sampling frames and selecting cases.

Second, despite the relevance of some of the definitions and conceptual models presented in the literature review (e.g. Crals and Vereeck, 2004; Young and Tilley, 2006; Tilley and Young, 2009), their final construction is based on corporate sustainability principles, which by nature pay attention to variables within extant enterprises. These models do reconcile the economic, social and environmental dimensions of entrepreneurship; yet they disregard a number of processes preceding enterprise formation, which are inherent to entrepreneurial action.

Shepherd and Patzelt (2011) illustrate this point when defining what sustainable entrepreneurship is not. They stress that we cannot consider as sustainable entrepreneurship the research that simultaneously considers social, environmental and economic dimensions but does not involve the recognition, evaluation and exploitation of opportunities. When the link between the opportunity process and the three dimensions of sustainability is absent we may be dealing with sustainable development research but not sustainability entrepreneurship research.

Finally, introducing sustainability entrepreneurship as a configuration of elements or conditions that must be present in some degree to validate its empirical existence has major implications for entrepreneurship research. In studying the phenomenon, current conceptualizations neither considers the complexity and conjunctural nature behind a configurational view of sustainability entrepreneurship nor reflects on the necessity and sufficiency of potential causes. Moreover, some elements seem to be missing in the definitions outlined in section 2.3.2, for example an overarching goal or logic whereby economic, social, and environmental sustainability can be put under one mantra. In tackling this issue, I propose a definition of the phenomenon that draws upon literatures on business sustainability and entrepreneurship:

> Sustainability entrepreneurship is focused on pursuing business opportunities to bring into existence future products, processes and services, while contributing to sustain the development of society, the economy and the environment and consequently to enhance the well-being of future generations.

Sustainability entrepreneurship hence embodies a new form of entrepreneurial value creation aimed at fostering social justice, environmental protection, economic prosperity and intra and intergenerational equity. That being the case, this definition establishes not only the different dimensions along which development is to be directed, but also an overarching concern with the fate of future generations.

Following this definition and drawing upon previous research on business sustainability (Elkington, 1997; McDonough and Braungart, 2002; Dyllick and Hockerts, 2002; Young and Tilley, 2006; Tilley and Young, 2009; Parrish, 2010) and the empirical examination of opportunities (Dimov, 2011), I argue that this form of entrepreneurship finds its place at the intersection of four key elements, these are: entrepreneurial reflective economic growth, entrepreneurial socio-effectiveness, entrepreneurial eco-effectiveness and entrepreneurial intergenerational equity.

*Entrepreneurial reflective economic growth* is an economically oriented mission that permeates and guides entrepreneurial action towards taking responsibility for making a sustainable use of economic capital. In *entrepreneurial reflective economic growth* responsibility entails being accountable for the generation of worthy contributions to the economy, while equitably distributing economic wealth amongst relevant stakeholders.

*Entrepreneurial socio-effectiveness* is a socially oriented mission that permeates and guides entrepreneurial action towards taking responsibility for making a sustainable

use of human capital. In *entrepreneurial socio-effectiveness* responsibility entails producing positive social impacts on local and global communities, and developing mechanisms to support and when possible enhance the well-being of its social environment.

*Entrepreneurial eco-effectiveness* is an environmentally oriented mission that permeates and guides entrepreneurial actions toward taking responsibility for making a sustainable use of natural capital. In *entrepreneurial eco-effectiveness* responsibility entails producing neutral effects on the natural environment, and developing systems to stabilize and where possible restore and enhance the various ecosystem functions.

*Entrepreneurial intergenerational equity* is a future oriented mission that permeates and guides entrepreneurial actions towards taking responsibility for making worthy contributions to the well-being of future generations. In *entrepreneurial intergenerational equity responsibility* entails protecting and when necessary regenerating the resources future generations need to meet their own needs.

These missions are not to be seen as separable aspects of the case, but rather as integral components in the pursuit of entrepreneurial opportunities. This means they are simultaneously present, yet not necessarily with the same emphasis, in the development of venture ideas, the organization of entrepreneurial actions, and the formation of exchange relations between entrepreneurs and market structures. Each of these units represents a fertile ground for empirical examination of the opportunity development process, in that they allow us to develop more refined and focused measures, which in turn can help gathering more substantive empirical evidence.

### 2.5.2 Complex causality in sustainability entrepreneurship

Although each of the potential causes described in section 2.4.2 can be useful for conceptually describing sustainability entrepreneurship activities, none of these are by themselves distinguishing features of sustainability entrepreneurship. Moreover, it is not clear how they can play out in substantive empirical terms. This follows a central idea in entrepreneurship research, emphasized by Venkataraman in 1997, that there is no single condition sufficient for entrepreneurship. In this sense, the author points out:

> The ability to make the connection between specific knowledge and a commercial opportunity requires a set of skills, aptitudes, insight, and

> circumstances that is not either uniformly or widely distributed (…) While these variables are usually treated as working independently, I suspect that they will have greater explanatory power if they are treated as interacting variables (…) These variables strongly influence the search for and exploitation of an opportunity, and they also influence the success of the exploitation process (124)

As the quote above reflects, entrepreneurship and sustainability entrepreneurship are complex phenomena. To be defined as sustainability entrepreneur, one needs to meet several concurrent conditions (e.g. Young and Tilley 2006; Parrish 2010). In addition, to explain how one becomes and acts as a sustainability entrepreneur invokes many relevant factors, of which I have highlighted eight. Linear modelling represents a powerful paradigm for dealing with such complexity: decomposing the phenomenon into tractable chunks. Each chunk represents the distinct operation of a particular predictor, which is treated as both necessary and sufficient cause of a specific partition of the outcome space. In this way, an outcome of interest is explained as the sum of the effects of the individual predictors. Complexity is equated simply with the number of operating factors. Focusing on one predictor at a time is a natural, manageable step within the premises of such analysis. The particular contexts in which the predictor operates across observations are treated as identical replications for analytical purposes.

As seen in the introduction and in the cases used to explain the solutions, the stories of particular sustainability entrepreneurs never hinge on a single factor; they highlight multiple factors at play. The complexity of any story is related not to the number of factors at play but to how they are enmeshed together. However, such configurations are untractable by conventional linear analysis. To the extent that current theoretical development in sustainability entrepreneurship is affected by the prospective application of linear models, there is a need to explore the conjunctural nature of causality, i.e. for outcomes to be represented as a configuration of causes, some necessary and others sufficient (Ragin, 1987).

This requires a different analytical approach; one capable of organizing and studying the complex constellation of characteristics and conditions that collectively distinguish the process of sustainability entrepreneurship. The theoretical and empirical definition of the phenomenon will depend on using an appropriate analytical technique capable of drawing a line between sustainability entrepreneurship and any other form of entrepreneurship. This entails not only identifying the combinations of conditions that

differentiate sustainability entrepreneurs from other entrepreneurs but also determining whether the conditions themselves can be differentiated in substantive terms.

### 2.5.3 Studying the opportunity process in sustainability entrepreneurship

As one can expect, the concept of opportunity in sustainability entrepreneurship suffers from the same inoperability and empirical elusiveness that Dimov (2011) indicates exist when we try to study what entrepreneurs do. In a context where the development of sustainability opportunities is understood more complex than the development of opportunities driven solely by economic gain for the entrepreneur (Hall et al. 2010), the empirical challenge is even more compelling. Current conceptualizations of the phenomenon (Cohen and Winn, 2007; Dean and McMullen, 2007; Choi and Gray, 2008; Patzelt and Shepherd, 2010; Shepherd and Patzelt, 2011) also lack operability and offer little in terms of understanding how entrepreneurs achieve environmental protection, social justice and intergenerational equity while pursuing venture opportunities.

Drawing on the discussion of the substantive nature of opportunities and the aforementioned dimensions of sustainability entrepreneurship (Dimov, 2011), I will elaborate on the kind of observations we can make of prospective sustainability entrepreneurs, in terms of what they do in the pursuit of sustainability opportunities and the conditions that may precede these actions.

In studying the development of *sustainability-oriented venture ideas* as an outcome we can focus on the substantive conception of venture ideas. This entails observing how sustainability problems are experienced in everyday life, in particular, how individuals sense and respond to social, environmental, economic and intergenerational anomalies. In terms of antecedent conditions we need to take into account the actions and events that precede the development of venture ideas as well as the complexity of circumstances in which venture ideas appear. This entails examining the array of individual characteristics, environmental conditions, and cognitive processes most conducive to the generation of sustainability-oriented venture ideas.

In examining the *organization of sustainability-oriented entrepreneurial actions* as an outcome we can focus on the kind of things entrepreneurs do after having come up with the sustainability venture idea. In formalizing venture ideas aspiring entrepreneurs transform business possibilities into concrete actions such as searching for information

and advice, seizing the attractive of the market, initial business planning, network building, etc. (Dimov, 2007b). In general, these actions are intended to clarify goals and guide internal decision-making (Kirsch et al. 2009), bear uncertainty (McMullen and Shepherd, 2006) and formalize a plan or other organized frame of reference for further actions (Dimov, 2011). These actions are goal-oriented and permit increasing validity and legitimacy (Kirsch et al. 2009), and consequently persuading and engaging other parties in relationships that further the development of the venture opportunity (Dimov, 2011).

> It is only in the context of these immediate goals that different actions can be compared and their drivers systematically understood (73)

With regards to antecedent conditions we can focus on the factors that explain how a venture idea gets elaborated in actionable terms, in other words the kind of conditions that explain the relationship between ideas and the emergence of immediate goals. This entails examining the distinct features of the acting individual such as human capital, cognitive abilities, intention or motivation. Following Dimov's (2011) suggestion to go beyond the traditional focus on the immediate trigger (i.e. efficient cause), we can also explain actions by focusing on the type of venture the entrepreneur is trying to create (i.e. formal cause) or the purpose the new venture serves (i.e. final cause). Substantively, in sustainability entrepreneurship, this entails examining the extent to which aspiring entrepreneurs consider sustainability-related elements in visualizing the nature of the business they are trying to create, or the extent to which they aspire to create sustainable value by means of developing a new business.

In studying the *formation of sustainability-driven exchange relationships* as an outcome we can focus on the way in which prospective entrepreneurs engage in interactions with market actors such as first customers, potential investors, initial suppliers and other relevant stakeholders (Dimov, 2011). In order to establish such relationships, entrepreneurs need to build stories whereby products, services, risks and benefits are positioned. These stories form an entrepreneurial discourse that can be differentiated in terms of its emphasis, delivery, or content. As Dimov (2011) emphasizes:

> The nature and presentation of opportunity features prominently in this process as an observable social and linguistic activity (…) an opportunity can be portrayed as a collection of statements and an underlying story that can attract or repel other market actors (74)

Substantively, in sustainability entrepreneurship, this entails observing the extent to which the aspiring entrepreneurs integrate sustainability-related elements in the way they sell their opportunities. These elements are symbolic categories of values, beliefs and ideologies (Dimov, 2011), which, expressed through narrative - words and images - create and present an entrepreneurial identity (Anderson and Warren, 2011) and set the basis for the selling of the sustainability opportunity. This discourse tells the story of the social, economic or environmental challenge the entrepreneur is trying to address, frames the business opportunity in the context of sustainability, and reveals how the venture, through its purpose, business solution and practices will contribute to solve the sustainability challenge at stake. Ultimately, it reflects the explicit intention of the entrepreneur to engage in an exchange relationship mediated by sustainability.

In terms of antecedent conditions, we can focus on the factors that trigger the integration of sustainability in the process by which the opportunity is instituted in market structures. As with the organization of entrepreneurial action, we can draw on the efficient, formal and final causes behind market interactions. Together with examining individual and contextual factors, the integration of sustainability in the formation of exchange relationships could be explained by exploring the extent to which aspiring entrepreneurs consider sustainability-related elements in visualizing the nature of the business they are trying to create, or the extent to which they aspire to create sustainable value by means of developing a new business.

The operational definitions outlined above constitute the empirical dimensions of the study and provide support to the research design and the development of theory.

# Chapter 3. Research Design

## 3.1 Introduction

The novelty and emergent character of sustainability entrepreneurship, the lack of empirical evidence and inadequacy of current perspectives in explaining the phenomenon open up interesting opportunities for advancing theory (Eisenhardt, 1989). Building on Eisenhardt (2007) and Locke (2007), there is a significant window of opportunity for inductive theory building.

In understanding the complex set of conditions that precede sustainability-driven entrepreneurial action this research faces three methodological challenges.

First, due to the fact that sustainability entrepreneurs are not as prevalent or as easily identifiable as economic, social or environmental entrepreneurs who can be found throughout the world (Tilley and Young, 2006), studying the phenomenon presents particular difficulties in terms of defining a sampling frame and selecting relevant cases. Neergaard (2007) provides support to this argument. In discussing sampling in entrepreneurial settings, she emphasizes that populations in entrepreneurship research are not easily identified and tend to be very small.

In defining the sample strategy and establishing the sample for the study, I therefore planned my work on the basis that there would be a limited availability of cases consistent with the definition provided in section 2.5.1. Even if a wider definition of sustainability entrepreneurship is used, the universe of relevant cases would still be a small subset of the universe of entrepreneurs.

Second, in examining the combinations of factors that potentially explain the integration of sustainability in the different components of the opportunity process, the research design needs to carefully attend to the complexity and conjunctural nature of the associated relationships. This entails using an appropriate methodological approach capable of seeing cases as configurations of aspects, and thus of analysing a great number of conditions, outcomes and causal relationships and elaborating rich and parsimonious solutions in the explanation of the phenomenon.

Finally, and once this issue is addressed, the resulting sufficient combinations of factors producing the different representations of an opportunity need to be explained. This requires using an analytical technique that permits a fruitful dialogue between ideas and evidence.

In tackling these issues, I use an inductive Fuzzy-Set Qualitative Comparative Analysis (Ragin, 2000, 2008b) to select and systemically compare cases as configurations of factors and explore relationships between causal and outcome conditions based on arguments of necessity and sufficiency. By doing so, it is possible to produce consistent simplified combinations of conditions that explain each component of the opportunity process.

The following sections present a detailed explanation of the logic underlying the methodological approach, and the description, rationale, procedures and criteria of the sampling strategy, measure development and validation, data collection and the configurational comparative analysis.

## 3.2 Diversity-oriented research

> A key goal of social research is to make sense of the diversity of empirical cases in ways that resonate with the researcher's theoretical ideas about social phenomena. Configurational methods are especially well suited for this task.
> Charles Ragin (1987)

### 3.2.1 The logic of diversity-oriented research

In explaining social phenomena there is a tension between the general and the particular. This tension is evident in two approaches that so far have dominated and delineated research in the social sciences. They offer different ways of constructing representations of social life, with one focusing on complexity and understanding particular behavioural systems and the other focusing on generality and understanding universal behavioural systems (Ragin, 2000; McGrath, 1982).

Strategies that focus on complexity are often typified as qualitative, case-oriented and intensive, and tend to focus on a small number of cases in an in-depth manner. Conversely, strategies that focus on generality are often typified as quantitative, variable-oriented and extensive, and tend to focus on many cases looking for broad patterns, which can be correlated and used to make inferences (Ragin, 2000). The divide between variable-oriented and case-oriented research can be explained by the simple fact that the two approaches use different analytical procedures to construct representations of social

phenomena. In practical terms the difference lies on contrasting orientations towards cases, outcomes and causes.

When a variable-oriented study examines a correlation between two variables, the cases become more or less invisible (Ragin, 1987). In general, correlational studies identify a dependent variable that represents an outcome that varies across observations. Cases are therefore evaluated relative to the average of all observations using some measure of central tendency as a statistical benchmark for evaluating each case. Finally, causation is inferred form a pattern of variation. If a variable thought to represent a cause is strongly correlated with the outcome variable, then one can make a causal inference and then assess the relative strength of several causes at the same time.

Conversely, in comparative case study of commonalities, cases have clear identities and are typically chosen specifically because of their importance or their theoretical significance. In general, the outcome does not vary substantially across cases because its goal is to identify common causal conditions linked to a specific outcome. This means that the focus is on cases with a specific outcome, not cases that vary widely in how much they have the outcome. Finally, causation is conjunctural, i.e. based on combinations of conditions. The purpose is to identify causal conditions shared by the cases. Because all the cases have a similar outcome, the causal conditions shared by cases provide hints on which factors must be combined to generate the outcome of interest (Ragin, 2000).

While the contrasts between these two types of social research are significant, in Ragin's view the dissimilarities between them have been exaggerated and caricaturized. Although the practical differences between variable-oriented and case-oriented research reinforce the division between them, they also provide important clues for how to build a bridge. By avoiding exaggerations (e.g. that small-Ns research is rich yet subjective and soft or that although large-Ns research offer generalizable results it is sterile and oppressive) and focusing on their distinct strengths, comparative social science has contrasted these different ways of connecting ideas and evidence founding a strong middle path capable of resolving the divide between the two methodological strategies. In doing so, the main challenge was how to preserve the integrity of cases as complex configurations while examining similarities and differences across many cases.

This middle ground focuses on the study of diversity and emphasizes the need of seeing cases as configurations of aspects and disaggregating populations into types. The concept of diversity bridges complexity and generality, and provides the basis for a more

sophisticated cross-case analysis (Ragin, 2000). In Ragin's account, the concept of diversity-oriented research seeks both generality and complexity in that it focuses on the delineation and systematization of types, forms, trajectories and paths.

On the one hand, diversity-oriented research deals with complexity, which is the traditional focus of case-based research. It understands every case as a unique whole and then compares similarities and differences. On the other hand, this methodological approach sees social phenomena in terms of 'types and kinds', allowing for middle range generalizations (Aus, 2009). Diversity-oriented research emphasizes similarities among cases in the formulation of types and sees the specification of types, subtypes and mixed types as a central mechanism for understanding and explaining differences (Ragin, 2000). Hence, like variable-oriented research, diversity-oriented research seeks to examine and comprehend many cases at once. In establishing this middle path, diversity-oriented approach permits avoiding the homogenizing bias of the variable-oriented research and the particularizing bias of the case-oriented research.

### 3.2.2 Comparative research and Qualitative Comparative Analysis

Most empirical social research involves comparison of some kind (Rihoux and Ragin, 2008). This provides foundation for making statements about empirical regularities and for evaluating and interpreting cases relative to substantive and theoretical criteria (Ragin, 1987). In this sense, any technique aimed at explaining variance could be considered a comparative method, and this includes almost all analytical tools used in the social sciences. However, it has been argued that there are important differences between comparative orientations (Ragin, 1987), which have important methodological consequences. The exaggeration of the distinctive aspects of comparative work has allowed for the emergence of configurational comparative methods, and particularly of Qualitative Comparative Analysis (QCA) (Ragin, 1987).

QCA is a set-theoretic approach and a family of analytical techniques developed by Charles Ragin (1987, 2000, 2008b). It draws on systematic comparison of causal and outcome conditions to visualize and analyse complexity and multiple-conjunctural causation. By using Boolean algebra, counterfactual analysis and logical minimization QCA allows for comparing cases as configurations of factors (Ragin, 2000), observing empirical information in a more parsimonious manner, and subsequently making causal

interpretations based on the logic of causal necessity and sufficiency (Schneider and Wagemann, 2012).

In essence, a set-theoretic method is an approach to analysing social phenomena in which (1) the data consist of set membership scores; (2) relations between social phenomena are modelled in terms of set relations; and (3) these set relations are interpreted in terms of sufficiency and necessity as well as forms of causes that can be derived from them (Schneider and Wagemann, 2012). As a set-theoretic method, QCA is thus capable of handling the increased complexity of multilevel analysis by incorporating it as a series of set memberships within the standard configurational comparative approach (Lacey and Fiss, 2009).

Given its roots in diversity-oriented research, one of the most salient aspects to QCA is its ability to bridge the split between qualitative and quantitative research. This method is often presented as a third way between quantitative statistical techniques and case study methodology (Schneider and Wagemann, 2012). As Lacey and Fiss (2009) point out, QCA represents a middle path between the intensive but limited reach of the case method and the extensive but cursory coverage of variable-based approaches. As such, it permits overcoming both the limited external validity of a case study and the limited internal validity of quantitative studies.

On the one hand, QCA embodies some key strengths of the qualitative approach, i.e. its holistic character, whereby each individual case is considered as a complex entity that needs to be comprehended and that should not be forgotten in the course of the analysis (Rihoux, 2003). Given the tendency of qualitative work to look at cases as wholes or configurations of aspects, QCA compares whole cases with each other, which necessary entails comparing configurations (Ragin, 1987). At the same time, this methodological approach embodies some key qualities of the quantitative approach: this is replicability and generalizability of the results. Given its roots in Boolean algebra, it requires that each case be reduced to sets of variables (i.e. conditions and an outcome), which permits to replicate the analysis and eventually corroborate or falsify the results. In addition, it allows for analysing more than just a reduced number of cases. QCA also works robustly with large-Ns, which enables to produce generalisations (Rihoux, 2003).

This approach can be used deductively or inductively; it permits testing configurational hypotheses as well as gaining insights from case knowledge to identify the key ingredients that in combination explain a given outcome (Rihoux and Ragin,

2008). This study draws upon the latter and uses QCA to explore and identify which conditions or configuration of conditions explain the integration of sustainability in the opportunity development process. By focusing on configurations, it aids in the development of a middle-range theory of causal mechanisms (Crilly, 2011). In doing so, QCA moves this study down from grand theoretical narratives with high generalizability of effects, but up from idiosyncratic case studies with low generalizability (Lacey and Fiss, 2009).

### 3.2.3 Complexity and multiple conjunctural causality

Unlike traditional approaches to causal explanations that focus on cases displaying a specific outcome and search for antecedent common conditions shared by all instances of the outcome, QCA focuses on and allows for the possibility that the same outcome can follow from different constellation of conditions (Ragin, 1999). QCA thus develops a conception of causality that leaves room for complexity, referred as multiple conjunctural causation or equifinality, which means that different causal paths, each being relevant in a distinct way, may produce the same outcome. The term equifinal causation refers to the multiplicity of paths, while the term conjunctural refers to the notion that each path consists of a configuration of conditions (Rihoux and Ragin, 2008). That being the case, as Rihoux and Lobe (2009) point out, multiple conjunctural causation implies that: (1) most often, it is a combination of conditions that eventually produces an outcome; (2) several different combinations of conditions may produce the same outcome; and (3) depending on the context, a given condition may have a different impact on the outcome.

QCA does not ignore specific, distinct patterns and outliers. If a particular configuration of condition explains only single case, it is not a priori considered as less relevant than other combination of conditions that explain for example 10 or 15 cases (Rihoux and Ragin, 2008). In this sense, QCA moves away from simplistic, probabilistic causal reasoning, embracing instead diversity (Ragin, 2000).

By using QCA, Ragin (1987) emphasizes, one is urged not to specify a single causal model that fits the data best, as one usually does in variable-oriented research (e.g. traditional statistical techniques), but instead to determine the number and character of the different causal models that exist among comparable cases.

### 3.2.4 Necessity and sufficiency

The assessment of necessary conditions is central in social research (Ragin, 1999). In the case of entrepreneurship research, it allows us, for example, to identify precedents of productive or unproductive entrepreneurial action, which can be fostered or prevented by promoting or removing necessary conditions.

In contrast to studying net effects of independent variables as in regression analysis, QCA methods work forward from causal conditions and seek to identify necessary and/or sufficient causal conditions or combinations of conditions that lead to an outcome (Ragin, 1999).

Given a set of plausible theoretical arguments, a condition X can be considered necessary if, whenever the outcome Y is present the condition is also present. In other words, Y cannot be achieved without X, no case with Y displays ~X (i.e. absence of X); on the presence of ~X, Y is impossible (Schneider and Wagemann, 2012). In set-theoretical terms, this means that Y is a subset of X. Given that the logic of necessity dictates that whenever the outcome is present the necessary condition is also present, only those cases where the outcome is present have to be analysed in the tests of necessity. Diagram A in Figure 3.1 shows a Venn diagram illustrating a set-theoretical relationship of necessity, where X represents the set of cases sharing a causal condition and Y is the set of cases with the outcome.

On the contrary, a condition can be considered sufficient if, whenever the condition Xi is present the outcome Yi is also present (Schneider and Wagemann, 2012). In order to support an argument of sufficiency there should not be a single case that shows the condition but not the outcome. In set-theoretical terms, this means that Xi is a subset of Yi. Diagram B in Figure 3.1 shows a Venn diagram illustrating a set-theoretical relationship of sufficiency, where Xi represents the set of cases sharing a causal condition and Yi is the set of cases with the outcome.

**Figure 3.1 Venn diagrams illustrating necessity and sufficiency**

Diagram A. Venn diagram - necessity

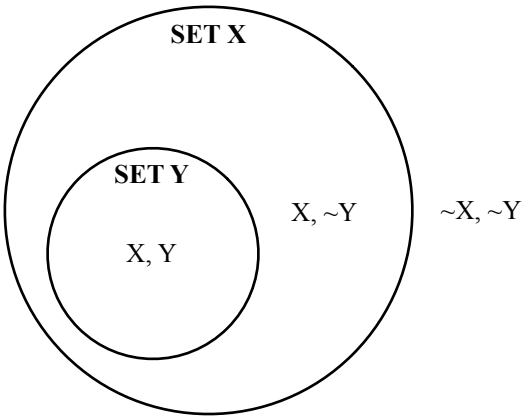
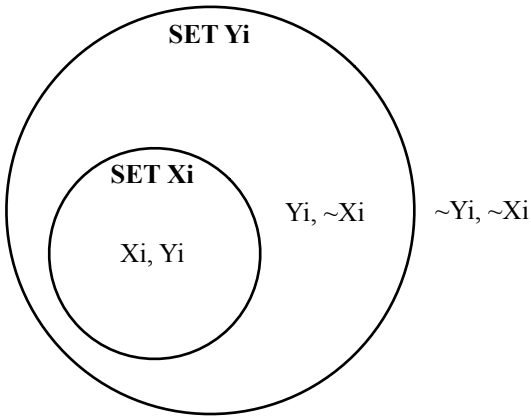



Diagram A. Venn diagram - sufficiency




Source: Ragin, 2008; Schneider and Wagemann, 2012

The statement 'if Xi then Yi' creates an over expectation respect to the set-theoretic relation between condition and outcome that needs to be addressed. First, the relationship of sufficiency between the condition Xi and the outcome Yi does not imply that whenever the outcome Yi is present the condition Xi will be also present, it is possible that a different condition (e.g. Zi) would be also sufficient for Yi. In Boolean language this equifinality is represented as Xi->Yi + Zi->Yi. Xi is simply sufficient but not necessary for Yi to occur. On the other hand, given that set relations are asymmetric, if one confirm the relationship of sufficiency between Xi and Yi (i.e. Xi then Yi), one cannot automatically deduce that the absence of Xi (~X) produces ~Yi (Schneider and Wagemann, 2012).

## 3.3 Fuzzy-Set Qualitative Comparative Analysis

The analytical method of the study is Fuzzy-Set Qualitative Comparative Analysis (fsQCA) (Ragin, 2000). As a member of the QCA family, fsQCA also draws upon Boolean algebra, counterfactual analysis and logical minimization to visualize and analyse complex causality (Schneider and Wagemann, 2012). Unlike dichotomous or multichotomous comparative methods, for example csCQA and mvQCA that use discrete values (Rihoux, 2006), fsQCA permits calibrating partial membership in sets using values in the interval between 0, i.e. non-membership and 1, i.e. full-membership (Rihoux and Ragin, 2008). In this sense, fsQCA expands the logic of QCA, allowing the researcher to

analyse not only crisp dichotomous or multiple variables, but also fuzzy variables (Rihoux, 2006).

FsQCA thus enables the evaluation of the degree of set membership of specific cases in a conceptual category and the estimation of joint membership in different combinations of categories. By comparing configurations of causal and outcome conditions and using the principles of logical minimization[4], fsQCA allows for making causal interpretations regarding relationships between different simplified configurations of conditions and a specific outcome, and then testing the necessity and sufficiency of conditions and combination of conditions (Ragin, 2000).

### 3.3.1 Fuzzy-Set approach

Unlike a variable that sorts, ranks, or arrays cases relative to each other; a set is a grouping and therefore is more case-oriented than a variable because it entails membership criteria and has classificatory consequences. Based on variables, one might say that a particular individual is more oriented to sustainability than other, labelling the degree of sustainability. A set cannot be labelled as a degree of something because the label does not refer to instances; nevertheless it is possible to construct the set of sustainability entrepreneurs and then to list the relevant cases as members of this set. It is not simply about a nominal-scale variable, cases can fluctuate in the degree to which they satisfy membership criteria, which is the inspiration behind fuzzy sets (Ragin 2008b).

As mentioned, the basic idea behind fuzzy sets is to permit the scaling of membership scores and thus allows partial or fuzzy membership (Rihoux and Ragin, 2008). In this vein, fuzzy membership scores address the varying degree to which different cases belong to sets, not how cases rank relative to each other on dimensions of open-ended variation (Ragin and Pennings, 2005).

Thus, fuzzy sets identify qualitative states while simultaneously measuring varying degrees of membership between full inclusion and full exclusion. Hence, a fuzzy set can

[4] The minimization logic states that if two Boolean expressions differ in only one causal condition, yet produce the same outcome, then the causal condition that distinguishes the two expressions can be considered irrelevant and can be removed to create a simpler, combined expression (Marx, 2008:263). The goal of the logical minimization of a truth table is to represent - in a logically shorthand manner –the information in the truth table regarding the different combinations of conditions that produce a specific outcome (Ragin, 1999:1233)

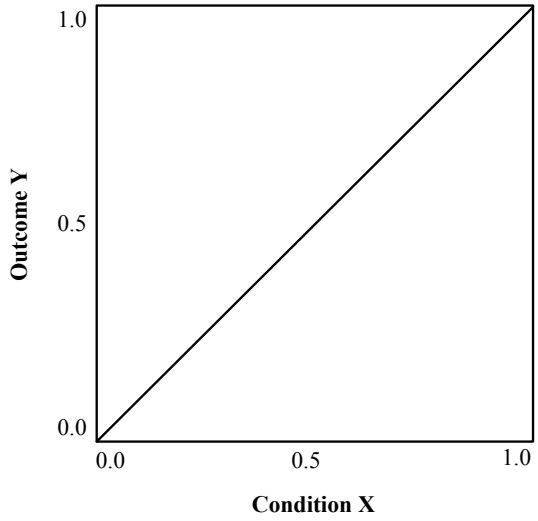
be seen as a continuous variable that has been purposefully calibrated to indicate degree of membership in a defined set (Ragin, 2000). Such calibration is possible only through the use of theoretical and substantive knowledge, which is essential to the specification of the three qualitative thresholds: full membership, full non-membership, and the point of maximum uncertainty.

Theory formulated in terms of set relations, as it is in the context of understanding how opportunities develop in sustainability entrepreneurship, should be evaluated as statements about set relations, not about correlation; and set-theoretic relationships are very difficult to evaluate using traditional measurement techniques such as the general linear model (Ragin, 2008). Ragin and Pennings (2005) indicate that, when set relations reflect integral social or causal connections and are not merely definitional in nature, they require explication. The fuzzy-set approach permits the evaluation and explanation of set-theoretic relationships such as intersection and inclusion and, thereby, the identification of necessary and sufficient conditions.

### 3.3.2 Fuzzy Set and necessary and sufficient conditions

In a dichotomous Qualitative Comparative Analysis (i.e. csQCA), the statement that X is necessary for Y requires the non-existence of cases where the condition is absent and the outcome is present (X = 0 and Y = 1). In the same way, the statement of that X is sufficient for Y requires the non-existence of cases where the condition is present and the outcome is absent (X = 1 and Y = 0). This does not hold true with fuzzy sets. The fact that fsQCA permits degrees of set membership allows for partial necessity (e.g. almost always necessary) and partial sufficiency (e.g. almost always sufficient). This entails moving the analysis from the four possible types of relationships defined in section 3.2.4 (i.e. X,Y; X,~Y; ~X,Y; ~X,~Y) to an open property space where cases can be anywhere in the area of an XY plot (Figure 3.2) that displays fuzzy set membership scores for the outcome Y and the condition X (Schneider and Wagemann, 2012). These are values in the interval between 0 (non-membership) and 1 (full-membership).

**Figure 3.2 Property space based on fuzzy set membership scores**

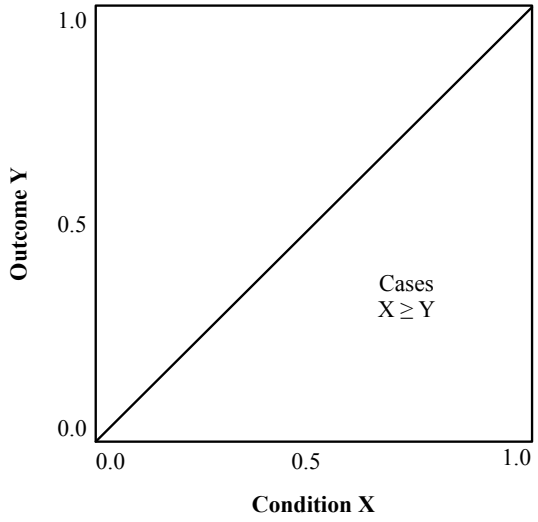



Source: Schneider and Wagemann, 2012

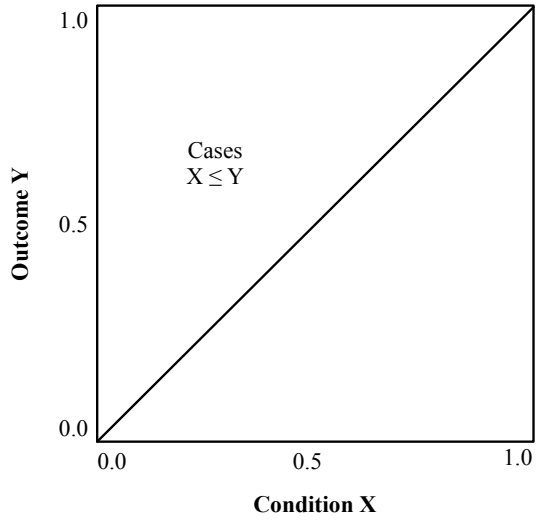
The latter implies that in fsQCA one can make an argument of causal necessity when each case's fuzzy set membership score in the condition X is equal or greater that its fuzzy set membership score in the outcome Y. X is therefore a superset of Y and graphically all cases are in the lower triangle of the plot (Plot A in Figure 3.3). Likewise, one can make an argument of causal sufficiency when each case's fuzzy set membership score in the condition X is equal or lower that its fuzzy set membership score in the outcome Y. Y is therefore a superset of X and graphically all cases are in the upper triangle of the plot (Plot B in Figure 3.3)

**Figure 3.3 XY plot – distribution of cases for necessary and sufficient condition X**

Plot A. Necessary condition X




Plot B. Sufficient condition X




Source: Ragin, 2000

Since contradictions exist (i.e. cases in violation of the patterns of necessity or sufficiency), fsQCA uses probabilistic criteria to allowing for partial necessity and partial sufficiency. For example, if a great number of cases are in the lower triangle and only a few falls on the upper triangle one can make the argument that the condition is almost always necessary for the outcome to occur. Similarly, if a great number of cases are in the upper triangle and only a few falls on the lower triangle one can make the argument that the condition is almost always sufficient for the outcome to occur.

Given that partial necessity and sufficiency is permitted, the analysis must define a minimum level of consistency (i.e. necessity and sufficiency benchmarks and significance levels) whereby a certain condition can be deemed to be almost always necessary / usually necessary or almost always sufficient / usually sufficient for the outcome under examination. Section 3.6.4 provides further details of the evaluation of necessity and sufficiency using graphical representations.

## 3.4 Cases selection

### 3.4.1 Sampling strategy

In case-oriented research (small and intermediate Ns) case selection is guided by explicit theoretical concerns and the underlying research questions (Rihoux and Ragin, 2008). Once the conceptual framework is established, two considerations need to be taken into account in defining the sampling strategy. First, the study must define an area of homogeneity, meaning that cases must parallel each other and be comparable in terms of their background characteristics. Allowing for varying degrees of membership, all cases need to be in line with the notion that sustainability entrepreneurship is focused on pursuing business opportunities to bring into existence future products, processes, and services, while contributing to improve the development of society, the economy and the environment.

Within this conceptual space, maximum heterogeneity over a minimum number of cases needs to be achieved (Rihoux and Ragin, 2008). This means that the sample requires cases with both positive and negative outcomes. The fact that fsQCA sees cases as configurations of factors enables the emergence of a middle path between assuming that cases are homogenous enough to equate their dissimilarities and attending to the specificity of each case (Ragin, 2000).

As seen, case selection in QCA does not rely on mechanistic procedures (e.g. random sampling), but rather on a tentative and iterative process where the criteria of sufficient homogeneity and maximum heterogeneity are constantly pursued (Rihoux and Ragin, 2008). The nature of the procedure used to construct the sample in fsCQA studies minimizes the threat of sample selection biases (Berk, 1983), which generally affect studies that require random sampling. Fiss (2009) explains this point:

> The non-parametric nature of fsQCA as a method of analysis should further alleviate concerns about sample bias, since fsQCA is not based on the assumption of a representative random sample (18)

Self-selection bias, in this sense, is particularly problematic in quantitative studies. The fact that individuals select themselves into a group may have a profound effect on the validity of the causal inferences made by the researcher (Berk, 1983). Thus, both external and internal validity are threatened. This issue is less of a threat in this diversity-oriented comparative study (Collier, 1995). Given that fsQCA requires the creation of an area of homogeneity (i.e. sample with similar background characteristics), the strategy was aimed at recruiting participants that, in fact, identify and select themselves into the group of sustainability entrepreneurs. This is central to understanding the development of sustainability-oriented opportunities, in that my interest is not in entrepreneurs in general, but in those entrepreneurs who present a clear orientation to sustainability. In explaining the logic of case selection in QCA, Rihoux (2006) indicates:

> In any small-*N* or medium-*N* design the quest for generalization should always be bounded, by comparing cases that share a sufficient number of features and that operate within sufficiently comparable contexts. (In contrast to large-N research) the population of cases is not a given; it is actually delimited by the researcher, informed by theory and empirical knowledge (687-688)

One important consideration to make in proceeding further with this research design is the feasibility of gathering a group of entrepreneurs truly committed to sustainability, and not simply driven by the benefits that using sustainability, e.g. as part of a marketing strategy, may bring to the business.

Following the criteria outlined above, I established a sampling frame consisting of sustainability-oriented new ventures that have taken part in sustainability-related business competitions in the last 3 years (2009-2011). 289 new ventures - winners and finalists - from 12 competitions in the United States and the United Kingdom were invited to

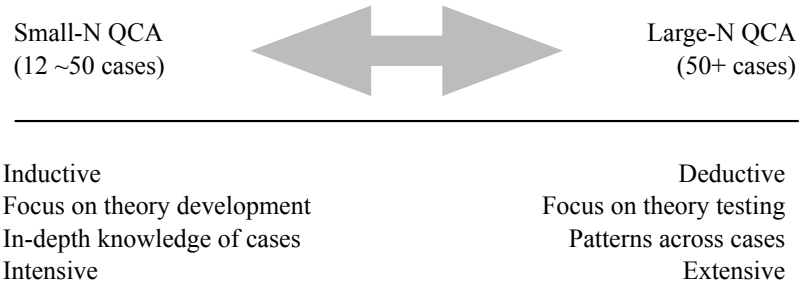
participate. The competitions are: The William James Foundation, Cleantech Open Business, Blue Print, Imagine H2O, Opportunity Green, Unreasonable Institute, Acterra Business Environmental Awards, Root Cause, Echoing Green, Ashen Awards for Sustainable Energy, GSEC Washington and Observer Ethical Awards.

Sustainability business competitions offer an optimal milieu for balancing the required homogeneity and heterogeneity in the selection of cases. The fact that all 289 ventures have gone through a similar evaluation process and then selected based on standardized criteria (i.e. sustainability-related requirements imposed by the competitions) provides an area of homogeneity where basic commonalities are easily identifiable. However, within this frame of reference, ventures vary greatly in terms of, for example, industry, customers, profile of the founders, stage of development and approach to sustainability (See Table 7.4 Description of cases).

The size of the sample frame was defined based on an expected response rate of 15% (~40 cases), which is in line with the requirements for an inductive fsQCA study (Ragin, 2008).

Despite recent applications of QCA to large samples (e.g. Greckhamer et al. 2007), this method was conceived as a small-N approach (Ragin, 1999) and it works robustly with small and medium numbers of cases (Leiberson, 1991), i.e. between 12 and 50 cases (Fiss, 2011). One of the most salient benefits of working with small to intermediate-Ns in inductive QCA is that it allows for thick cross-case comparison (Rihoux and Lobe, 2009) while maintaining familiarity with the cases (Crilly, 2011). Figure 3.4 highlights the main differences between small-N and large-N QCA.

**Figure 3.4 Comparison of small-N and large-N QCA**




Source: Aguilera et al. 2012

67 entrepreneurs responded to the survey (response rate 23%), and 45 cases were finally selected in line with three criteria: the survey must have been completed by the

founder, he or she identifies him/herself as a sustainability entrepreneur and the venture aims to balance environmental, social and economic objectives and allocates the relevant resources to accomplishing these objectives (See screening and confirmatory questions in Table 7.7). The selection process is explained in the following paragraph.

First, I drop those cases that provided a negative response to the following question: were you actively involved in the creation of [the venture]?. Subsequently, I drop those cases that, based on the following definition, do not consider themselves as sustainability entrepreneurs: sustainability entrepreneurship is focused on pursuing business opportunities to bring into existence future products, processes, and services, while contributing to improve the development of society, the economy and the environment. Finally, I drop those cases that obtained a score of ≥3 in the question that measures how important are (financial, social and environmental) goals to the organization, or those that, regardless of having obtained a high score, are currently not allocating the appropriate amount of resources (human resources, monetary resources and equipment) to accomplishing these objectives.

### 3.4.2 Overview of the cases

The sample represents a diverse group of new ventures (Table 3.1). Cases belong to 17 different sectors in five countries. At the time when the data were collected, only 10% of the cases report having been trading for five to seven years, 23% of the cases report having been trading for four to five years, and most of the cases (67%) report having been trading for three years or less. The median for years of trading for the entire sample is three. This is in line with the research framework used by the Global Entrepreneurship Monitor (Bosma et al. 2012), which considers within the group of 'Early-Stage Entrepreneurial Activity' (i.e. nascent entrepreneur and new business owner) to those ventures that are up to 3.5 years old.

In terms of implementation of sustainability practices, the sample also exhibits high diversity. 59% of the cases reported having started with the measurement of their sustainability impacts and the development of targets and actions to reduce those impacts (Table 7.7 Appendix D). This is adapted from the Wal-Mart Supplier Sustainability Assessment (2009), and measures 5 areas of impact: strategy, energy and emissions, material efficiency, resources and people and community.

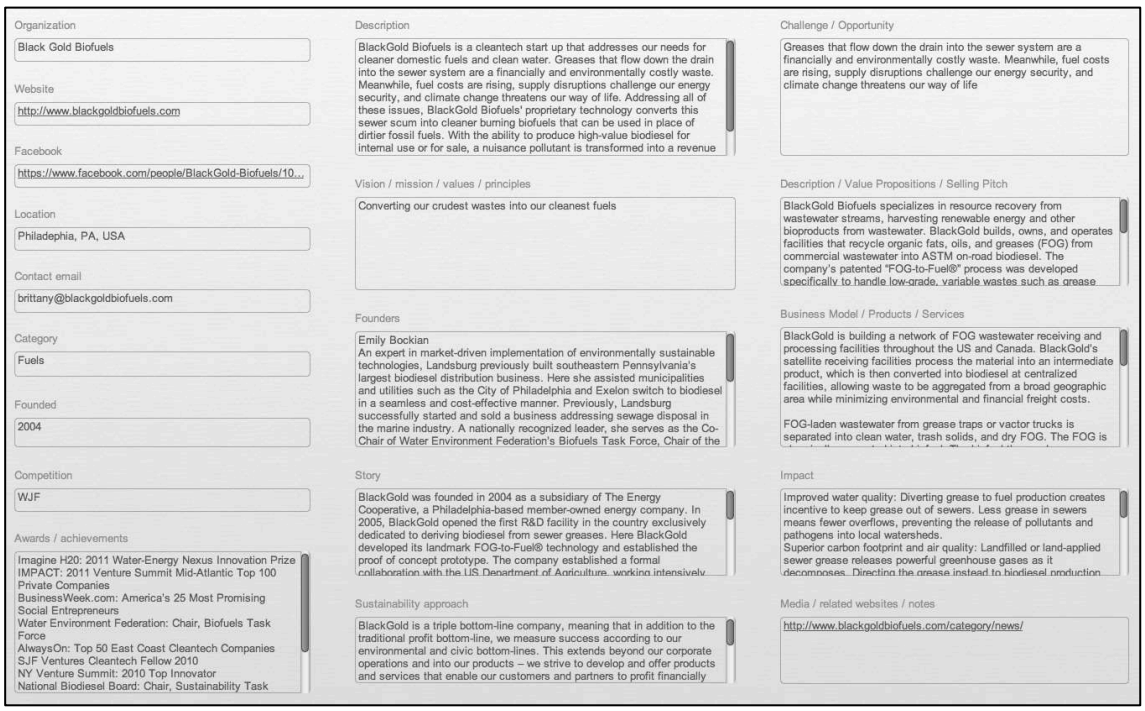
**Table 3.1 Overview of the cases**

| | Case | Sector | Location | Founded |
|---|---|---|---|---|
| 1 | AWW | Recycling | Washington, DC, USA | 2008 |
| 2 | ACO | Consulting | Kalama, WA, USA | 2010 |
| 3 | BTR | Food | Oakland, CA, USA | 2009 |
| 4 | BGF | Fuels | Philadelphia, PA, USA | 2004 |
| 5 | BCY | Transportation | Ft. Collins, CO, USA | 2009 |
| 6 | BST | Furniture | San Jose, CA, USA | 2008 |
| 7 | BVG | Retail | Brooklyn, NY, USA | 2005 |
| 8 | CLI | Services | Palo Alto, CA, USA | 2009 |
| 9 | CLE | Food | San Francisco, CA, USA | 2004 |
| 10 | CHU | Internet platform | New York, NY, USA | 2007 |
| 11 | CUL | Fuels | New York, NY, USA | 2011 |
| 12 | DLI | Energy | San Francisco, CA, USA | 2008 |
| 13 | DFL | Energy | Salt Lake City, UT, USA | 2011 |
| 14 | EPU | Internet platform | Boise, ID, USA | 2009 |
| 15 | ECV | Packaging | New York, NY, USA | 2008 |
| 16 | ECW | Vending | Pullman, WA, USA | 2009 |
| 17 | ECZ | Appliances | Portland, OR, USA | 2011 |
| 18 | GSU | Consulting | Graz, Austria | 2007 |
| 19 | GTR | Consulting | Vienna, Austria | 2009 |
| 20 | HAR | Food | Brewster, MA, USA | 2009 |
| 21 | HFR | Media | Sheffield, MA, USA | 2006 |
| 22 | IPA | Project development | Washington, DC, USA | 2010 |
| 23 | IWB | Project development | Pittsburgh, PA, USA | 2008 |
| 24 | KOR | Food | Miami, FL, USA | 2004 |
| 25 | MCP | Energy | La Motte-Fanjas, France | 2007 |
| 26 | MST | Media | Sunderland, UK | 2010 |
| 27 | MOG | Urban agriculture | Washington, DC, USA | 2007 |
| 28 | ODS | Energy | Philadelphia, PA, USA | 2009 |
| 29 | PEM | Agriculture | Washington, DC, USA | 2006 |
| 30 | PRE | Health care | Portland, OR, USA | 2006 |
| 31 | PRI | Services | New York, NY, USA | 2010 |
| 32 | PWO | Packaging | San Rafael, CA, USA | 2011 |
| 33 | PLY | Water | Beaverton, OR, USA | 2007 |
| 34 | RMA | Services | Houston, TX, USA | 2009 |
| 35 | RNA | Food | New York, NY, USA | 2009 |
| 36 | STW | Services | Felton, CA, USA | 2009 |
| 37 | STR | Fuels | San Rafael, CA, USA | 2011 |
| 38 | SSG | Internet platform | Washington, DC, USA | 2011 |

| | | | | |
|---|---|---|---|---|
| 39 | TGT | Consulting | Vienna, Austria | 2009 |
| 40 | TOU | Architecture / design | Los Angeles, CA, USA | 2007 |
| 41 | TPS | Retail | London, UK | 2010 |
| 42 | VEH | Urban agriculture | Jackson, WY, USA | 2010 |
| 43 | WEW | Water | New York, NY, USA | 2008 |
| 44 | WHT | Architecture / design | Stoddard, WI, USA | 2007 |
| 45 | WIS | Energy | Canberra, Australia | 2003 |

In order to keep a close connection with relevant information of each case, I created individual profiles for each venture. I used the data collected for the documentary review and complemented with information from the interviews when needed. Alongside the basic information of the firm, i.e. name, category, location, website and social media references (if available), each file provides information in the following categories: (1) mission, vision, values or/and principles, (2) business opportunity or/and challenge, (3) description, value proposition or/and selling pitch, (4) sustainability orientation, (5) impact, (6) business model, products or/and services, (7) founders' profile, (8) story of the venture, and (9) awards, achievements or/and recognitions.

**Figure 3.5 Example of the profile of the ventures**



Each file also provides links to external sources of information (e.g. press articles, videos, photos, related websites, etc.), which can be used to support the evaluation. Individual files were created and managed using the database software Bento 4.0. Figure 3.5 provides an example of the individual files.

## 3.5 Data collection: methods and procedure

The data gathering for this study involved multiple sources. The primary method of data collection was a web-based survey. This was complemented with a number of follow-up activities comprising semi-structured interviews, non-participant observation and a comprehensive review of documents that account for the entrepreneurial process and current state of each of the ventures involved in the study.

The purpose of the follow-up activities is twofold. First, they seek to provide support and corroborate the results of the configurational analysis, in particular those related to necessary conditions and sufficient configuration of conditions. Second, by means of uncovering pieces of reality reflecting the sustainability entrepreneurship process, the data that stems from these activities help explaining and illustrating how different configurations of conditions produce the outcomes of interest. This in turn contributes to producing more convincing and accurate findings and conclusions, as well as more robust theoretical constructs (Eisenhardt, 1989). In order to do so, I provide examples of entrepreneurial stories and tables with representative quotations. These seek to illustrate the conjunctural nature of the solutions, i.e. how the different conditions combine to produce the integration of sustainability in the different manifestations of the opportunity process. As such, stories and quotations describe (1) actions, events and circumstances involved in the development of the sustainability-oriented venture ideas; (2) initial actions after specifying the venture idea; and (3) the discourse whereby entrepreneurs position their ventures.

The use of multiple sources of evidence allows for addressing a broader range of behavioural and historical issues, and corroborating the same fact or phenomenon, which in turn permits the triangulation of data. Triangulation offers a way of developing converging lines of inquiry, increasing the internal and external validity of the study (Yin, 2009) and is particularly important when using self-reports measures (Short et al. 2009). In section 5.4.2.1, I discuss the limitations of retrospective self-reports.

### 3.5.1 Survey

The primary method of data collection was a web-based survey, consisting of a 45-item questionnaire divided in eight sections. Table 3.2 provides details of the structure of the survey.

**Table 3.2 Survey structure**

| Section | #Qs | Description |
|---|---|---|
| 1 | 4 | Screening questions |
| 2 | 2 | Outcome measures: (a) venture ideas, (b) entrepreneurial actions |
| 3 | 2 | Moral intensity: (a) identification of the sustainability challenge / problem, (b) PMIS |
| 4 | 12 | Individual variables |
| 5 | 2 | Contextual variables |
| 6 | 10 | Venture variables: (a) mission statement, objectives, value creation, competitive advantage and strategic returns, (b) sources of revenue, (c) firm, clients and industry characteristics) |
| 7 | 5 | Measurement of sustainability impacts |
| 8 | 8 | Respondent's education, experience and demographics |

#### 3.5.1.1 Item development, testing, validation and reliability

Given that no measures exist for most of the constructs of interest, I had to derive my own based on deductive and inductive techniques (Hinkin, 1998). Deductively, I derived some of the items from relevant literature (Figure 3.6) and adaptations from extant instruments: (1) self-efficacy, start-up motivation and prior experience from the Panel of Entrepreneurial Dynamics (Reynolds, 2000); (2) moral intensity from the perceived moral intensity scale (Singhapakdi et al. 1996; Frey 2000; and McMahon and Harvey 2006); (3) mindfulness from the mindful attention awareness scale (Brown and Ryan, 2003), (4) prospective sustainability entrepreneur from the entrepreneurial intention questionnaire (Liñan and Chen, 2009); (5) sustainability orientation from the sustainability orientation scale developed by Kuckertz and Wagner (2010); sustainability understanding from the theoretical propositions of Patzelt and Shepherd (2010); and (6) sustainability contribution belief from a number of conceptual frameworks dealing with strategic returns of sustainability (Elkington 1994; DeSimmone and Popoff 2000; Vagasi, 2004; Ginsberg et al. 2004; Mitchell et al. 2010). Further details are provided in the *independent measures* section.

In terms of confirmatory questions, I derived (6) sustainability impacts from the Wal-Mart Supplier Sustainability Assessment (Wal-Mart, 2009) and (7) venture variables from the State of Social Enterprise Survey 2011 (Social Enterprise UK, 2011)

The development of three of the items, i.e. sustainability understanding, prospective sustainability entrepreneur and sustainability orientation, was assisted by information collected from five semi-structured interviews conducted in an exploratory study. This inductive technique proved helpful in that the conceptual basis for the development of the items was not clear, hindering the identification of relevant dimensions.

In developing the items, I targeted the vocabulary and grammar to the sample to be surveyed. Although the cases have been selected from a group of sustainable ventures I did not assume prior knowledge of sustainability entrepreneurship, therefore no technical language or acronyms were included (Hardy et al. 2011). The use of simple terms aids the participants in providing more realistic responses to a survey (Roxas and Lindsay, 2012), which in turn reduces the risk of social desirability bias (King and Bruner, 2000).

In order to assess the validity and reliability of the instrument I conducted three tests. Four experts from academia (Ph.D. students and faculty) were invited to participate in the first two assessments. The purpose and logic of the instrument was appropriately explained and the experts were trained on how to conduct the evaluations.

The first assessment relates to content validity, readability and optimal flow. In evaluating the content adequacy of the measures (Hardy et al. 2011), I asked the experts to complete the survey and encouraged them to think aloud as they answer each survey question. This evaluation aims to uncover experts' difficulties with specific terms or phrases, elucidate whether they are capable of recalling the necessary information and how they go about doing that (Campanelli, 1997). This assessment allows for reducing ambiguity and lack of clarity and proved helpful in improving the survey experience and increasing the response rate.

The second assessment relates to construct and criterion validity. After discussing with the experts about potential areas of improvement, I refined the instrument and then conducted semi-structured interviews with the same group of individuals. I presented the experts the constructs (i.e. conceptual definition), measures and indicators and then asked them to descriptively evaluate (1) the conceptual relation between constructs and measures, and (2) the extent to which the measures are useful in explaining the different constructs (Hardy et al. 2011).

The final assessment draws upon the survey responses and uses Cronbach's Alpha to test the internal consistency reliability of the reflective measures. In section 3.5.1.2, I provide the reliability scores ($\alpha$) for each of the reflective measures. Together, these data were used to establish appropriate levels of content, convergent and discriminant validity for the instrument.

#### 3.5.1.2 Outcomes and independent measures

This study seeks to understand how opportunities develop in sustainability entrepreneurship. In doing so, it explores the way in which entrepreneurs integrate the four components of sustainability entrepreneurship (described in section 2.5.1), i.e. reflective economic growth, socio-effectiveness, eco-effectiveness and intergenerational equity, throughout the process of development of venture opportunities.

I apply these four characteristics to three empirical dimensions: (1) venture ideas: actions, events and circumstances that precede the recognition of sustainability-oriented venture opportunities; (2) entrepreneurial action: the relationship between immediate goals and set of actions, which explains how a sustainability-oriented venture idea gets elaborated in actionable terms; and (3) interaction with market structures: exchange interactions whereby the relationship between sustainability entrepreneurs and market structures is formed (Dimov, 2011).

Building on my previous elaboration on the kind of observations we can make of prospective sustainability entrepreneurs (2.5.3), I operationalize these empirical dimensions by means of focusing on three distinct units of observation. In capturing the development of venture ideas, I assess the way in which the entrepreneur senses and responds to economic, social, ecological and intergenerational anomalies. In capturing the organization of entrepreneurial actions, I assess the way in which the entrepreneur aspires to solve these anomalies by means of setting up the objectives for its new business. Finally, in capturing the formation of exchange relationships, I assess the degree to which the entrepreneur integrates sustainability in forming exchange relationship with market structures. Based on these empirical dimensions and units of observation I developed and tested three outcome measures: the development of sustainability-oriented venture ideas (SVI), the organization of sustainability-oriented entrepreneurial actions (SAC), and the formation of sustainability-driven exchange relationships (SER).

***Outcomes measures***

*The development of sustainability-oriented venture ideas* (SVI) is evaluated by observing the way in which entrepreneurs sense and respond to economic, social, ecological, and intergenerational anomalies. This substantive conception of opportunity (Dimov, 2011) is measured on 8-item Likert scale ($\alpha$=.90) reflecting the extent to which the entrepreneur is aware of the existence of an opportunity for sustainable development, and of the relationship between this opportunity and the venture idea. This measure draws upon Tang et al. (2012), in that it captures the integration of sustainability in the process of scanning the environment, searching for alternatives and making associations and connection between relevant pieces of information regarding the idea under formation.

*The organization of sustainability-oriented entrepreneurial actions* (SAC) is evaluated by observing the momentary aspirations of the entrepreneurs. This is measured on a 8-item Likert scale ($\alpha$=.84) reflecting the extent to which the entrepreneur aims to solve sustainability problems in setting up the objectives for its new business. I selected 8 objectives which are traditionally related to sustainability and cover all four dimensions: improving health and well-being, creating and distributing economic value amongst all stakeholders, improving the quality of life in a particular community, creating employment opportunities, protecting or restoring the natural environment, creating ethical and fair products, establishing fair trading with suppliers, and promoting democratic business models. These dimensions are based on Dyllick and Hockerts, 2002; Schlange, 2006; and Cohen et al. 2008.

*The formation of sustainability-driven exchange relationships* (SER) is evaluated by observing the way in which the entrepreneurs interact with market structures. Based on sociological approach to markets, this was captured on a 7-item Likert scale ($\alpha$=.92) reflecting the extent to which the entrepreneur integrates sustainability-related elements in the discourse whereby products and services, risks and broader benefits are positioned; which ultimately leads to the formation of exchange relationships with first customers, suppliers and potential investors. Two researchers separately evaluated the integration of sustainability in formation of exchange relationships. The degree of agreement between researchers is significant (Kappa[5]=.82). The evaluation of the cases is based on information provided in a collection of 45 files (Figure 3.5). These are standard forms

[5] Kappa coefficient evaluates the degree and significance of agreement between observers in their assignment of objects or subjects to nominal categories (Watkins, 2001).

that contain information referring to the way in which the ventures integrate sustainability in their daily interaction with market structures. The standard forms provide an organized view of the information, but do not alter the character of the texts. Hyperlinks are provided to allow the researchers tracking each piece of information back to its source, or context where the text is embedded.

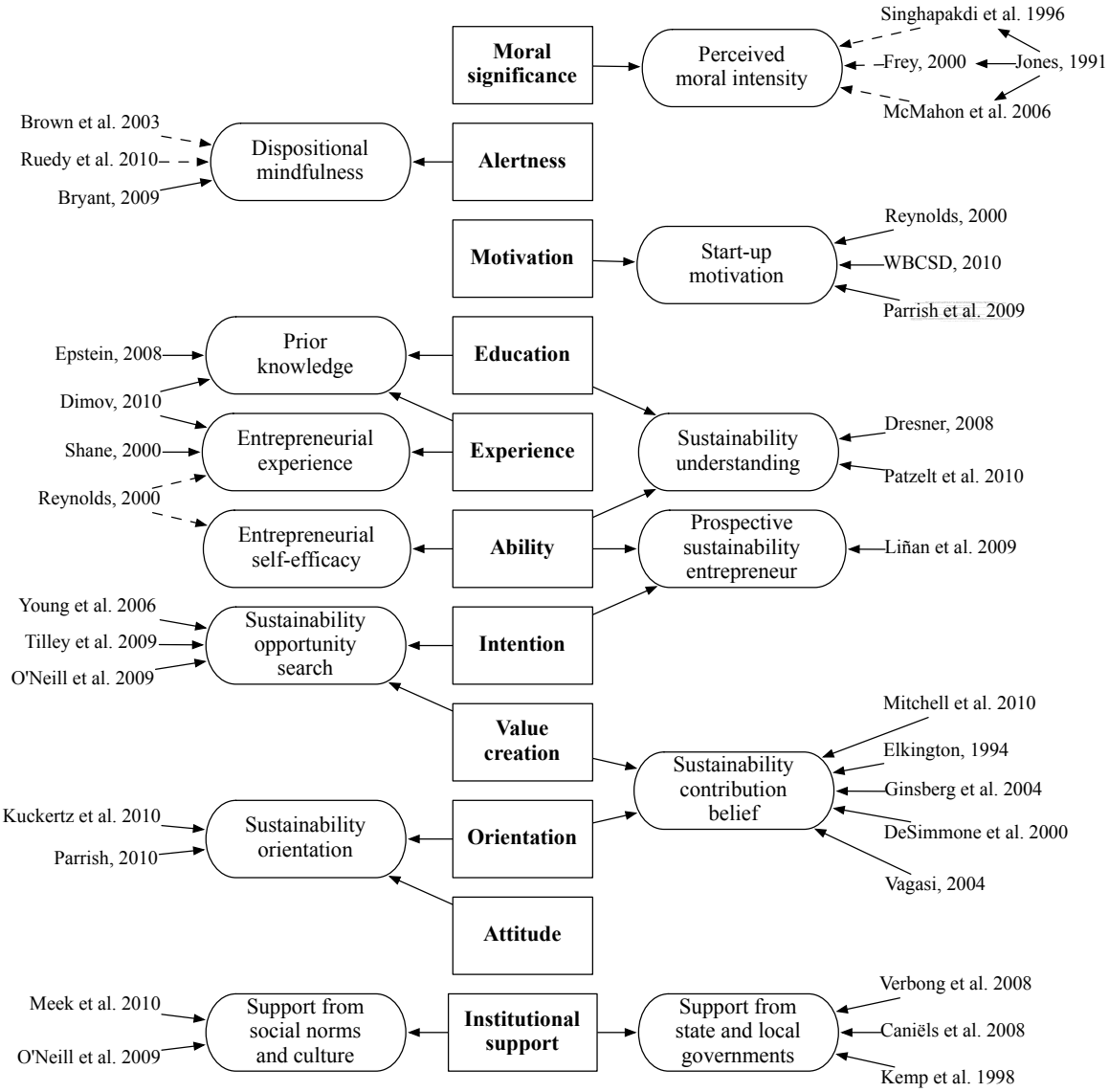
As explained in section 3.4.2, the files provide the researchers with information in nine different categories. These are: (1) mission, vision, values or/and principles, (2) business opportunity or/and challenge, (3) description, value proposition or/and selling pitch, (4) sustainability orientation, (5) impact, (6) business model, products or/and services, (7) founders' profile, (8) story of the venture, and (9) awards, achievements or/and recognitions. Each file also provides links to external sources of information (e.g. press articles, videos, photos, related websites, etc.), which can be used to support the evaluation.

***Causal conditions***

In defining potential conditions for sustainability entrepreneurship, I developed and validated 13 measures (see 3.5.1.1) that represent the main areas discussed in the literature review. These are: dispositional mindfulness (MIN), sustainability understanding (UND), prospective sustainability entrepreneur (PRO), sustainability opportunity search (SEA), prior knowledge (KNO), sustainability orientation (ORI), perceived moral intensity (MOR), entrepreneurial self-efficacy (EFF), sustainability contribution belief (CON), entrepreneurial experience (EXP), start-up motivation (MOT), support from social norms and culture (SNC) and support from state and local governments (SLG).

Figure 3.6 presents the conception and sources of independent measures. As depicted in this figure, there are several overlaps between measures, for example between sustainability understanding and prior knowledge. The presence of overlaps between measures is intended to extend the possibilities of extant constructs, which in the context of sustainability seem unable to capture the entire complexity of the various ingredients of the phenomenon. It can be argued that this may lead to a problem of collinearity, however, a closer look at to the tables with descriptive statistics and correlation (Table 7.1, Table 7.2, Table 7.3) shows that there are no collinear factors.

**Figure 3.6 Independent measures: conception and sources**




*Dispositional Mindfulness* (MIN) is measured on a 7-item Likert scale ($\alpha$=.88) adapted from the Mindful Attention Awareness Scale (Brown and Ryan, 2003), which evaluates individual differences in the frequency of mindful states over time. Unlike traditional measures of entrepreneurial alertness, which primarily seek to assess cognitive processes in the development of profitable entrepreneurial opportunities (e.g. Kizner, 1997; 1999), this measure allows for capturing broader aspects of awareness, relevant to the present study. Due to the fact that individual's awareness of his or her present experience impacts ethical decision-making (Ruedy and Schweitzer 2010), dispositional mindfulness seems more appropriate in the study of sustainability entrepreneurship.

*Sustainability understanding* (UND) is captured on a 5-item Likert scale ($\alpha$=.71) referring to the entrepreneur's overall understanding of the economic, social and environmental problems we are currently facing as a society, the problems new generations will be facing in the future and how these issues relate to each other. These items are not separable aspects of the concept, rather intertwined components that respond to the systemic nature of sustainability problems (Dresner 2008). *Sustainability understanding* is based on the idea that individuals who attend to social and ecological environments are more likely to recognize changes in such environment and eventually the opportunities that arise from socially and environmentally relevant market imperfections (Patzelt and Shepherd, 2010).

*Prospective sustainability entrepreneur* (PRO) is captured on a 5-item Likert scale ($\alpha$=.8). Based on Liñan and Chen (2009), it assesses the extent to which the entrepreneur has the ability and willingness to pursue sustainability-oriented venture opportunities. I presented the participants a number of statements that can apply to any individual, and asked them to rate how well these statements describe them. The items are: "I am able to find solutions to current challenges and problems", "I am regularly coming up with new ideas on how to create a better world", "I like taking ideas and make something important of them", "I am constantly seeking business ideas with the potential of making contributions beyond making money", and "I do what it takes to create value for others". Despite capturing drivers for the development of a new venture, this measure differs from *start-up motivation* (below), in that these items essentially reflect having the capacity and intention to create sustainable value in the future by means of developing a new business, and not only the mere presence of sustainability-related motives.

*Sustainability opportunity search* (SEA) is measured on a 4-item scale referring to the extent to which the entrepreneur considered the four dimensions of sustainability in the search of opportunities for value creation. In other words, this question seeks to capture the search for holistic value creation (Young et al. 2006; Tilley et al. 2009), which implies that the higher the average score the more comprehensive the potential value is of the opportunities under consideration (i.e. holistic value proposition; O'Neill et al. 2009), and therefore the stronger the search for sustainability opportunities. Although sustainability entrepreneurs seek to contribute to improving the development of society, the economy and the environment, the ventures they create might differ in purpose. Some of them give preference to environmental issues, some of them to social issues and some others to a combination of both, yet all tend to be present to some extent.

Unlike *sustainability understanding* (UND) for example, which seeks to capture the entrepreneur's understanding of the complex and systemic nature of sustainability problems, here it is important to allow entrepreneurs to judge the relative importance of each factor. That being the case, this measure is formative rather than reflective in nature (Coltman et al. 2008).

*Prior knowledge* (KNO) is measured on a 6-item scale. The scale assesses the participant's knowledge of sustainability by means of requesting information about its formal training or work experience in sustainability-related areas, these are: corporate sustainability, corporate social responsibility, environmental management, triple bottom line accounting, socio-economic development, renewable energy and earth and environment (Epstein, 2008). I calculate an overall score of prior knowledge based on the sum of individual scores. Given that the 6x2 components capture different facets of sustainability and access to knowledge, this measure is formative rather than reflective in nature. *Prior knowledge* (KNO) takes a different approach than *sustainability understanding* (UND), in that it assumes that the level of attention to social, environmental, economic and intergenerational issues depends on the amount of information captured by the individual through either formal training or work experience (Dimov, 2010b).

*Sustainability orientation* (ORI) is captured on a 6-item Likert scale ($\alpha$=.71) referring to the extent to which the entrepreneur considers sustainability in visualizing the nature of the business it is trying to create; it captures the entrepreneur's vision regarding the relationship between its business and the different dimensions of sustainability. I present the participants a number of considerations that any entrepreneur can have during the process of development of the business, and ask them to rate the degree to which these considerations apply to them. The items are: 'I strongly believe in the power of my business in contributing to solve many of the problems we have as a society', 'my firm has an obligation to society that extends beyond making money', 'my firm has to give back to society since it derive its profits from society', 'regardless of the nature of my business, it has to trade fairly with customers and suppliers', 'regardless of the nature of my business, it has to make a responsible use of natural resources', 'when I was choosing between the business ideas I had in mind, I always chose the one that contributed to building a better society'. In line with Kuckertz and Wagner (2010), these items essentially reflect underlying attitudes and convictions and provide relevant evidence regarding the role of the business in society.

*Moral Intensity* (MOR) is measured on a 6-item Perceived Moral Intensity Scale (PMIS) adapted from Singhapakdi et al. (1996), Frey (2000) and McMahon and Harvey (2006). PMIS measures perception of the moral significance of the specific circumstances faced by entrepreneur in exploring the business opportunity. The perceptions of each of the six moral intensity components (Jones, 1991) are measured using one item for each component. The items use a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). In order to minimize common method bias (Podsakoff et al. 2003) two randomly selected items were reverse coded. Given that the six components capture different facets of *moral intensity*, the PMIS is formative in nature. I calculate an overall *moral intensity* score based on the average of the 6 items. Before measuring perceived moral intensity, I asked the participant to recall information about the sustainability problem the venture is trying to solve (Table 7.7 in Appendix D). Given that cognition and memory are dependent on context, i.e. out-of-context memories are more difficult to retrieve than in-context memories (Feenan and Snodgrass 1990), this procedure reduced the threat of memory bias by context effect.

*Entrepreneurial self-efficacy* (EFF) is measured on a 7-item Likert scale ($\alpha$=.80) adapted from the Panel Study of Entrepreneurial Dynamics (Reynolds, 2000), which assess the degree to which the entrepreneurs consider they have the knowledge and skills to successfully establish a meaningful business.

*Sustainability contribution belief* (CON) is measured on a 9-item Likert scale ($\alpha$=.89) referring to the entrepreneur's perception regarding the relevance and potential benefits of having a strong orientation to sustainability. The measure covers 8 dimensions of potential impact: competitive advantage, value proposition, customers, sales, employees, investors, community, and suppliers. This means that the higher the average score, the higher the belief that integrating sustainability in the venture's principles and practices brings benefits to the business. This is based on the idea that the integration of the sustainability concept into strategy and marketing increases the intangible assets of the venture (Vagasi, 2004), improves its reputation (Elkington, 1994), positively influences stakeholders' attitudes towards the business (Ginsberg et al. 2004) and, as a result, generates strategic returns (DeSimmone and Popoff, 2000; Mitchell et al. 2010).

*Entrepreneurial experience* (EXP) is measured by the number of other businesses the respondent had helped start as owner or part-owner (0 for no business, 3 for only one business and 5 for more than one business) and the nature and industry of the other

business (Reynolds, 2000). According to Shane (2000), entrepreneurial experience increases the knowledge of markets and how to serve those markets, therefore the number of businesses the entrepreneur has started, their nature and the context where they have been developed play equally important roles. Given this, I understand that similarities in purpose and industry of the prior business compare to the current venture represent a meaningful addition to entrepreneurial experience simply derived from number of business. In order to capture the nature of previous entrepreneurial experience, I used a complementary measure (Table 7.6). Based on the logic of addition, if the prior business is of similar nature or pursues similar objectives, the entrepreneurial experience score adds one point. Similarly, if the prior business operates in a similar industry, the score also adds one point. If the prior business is of similar nature and operates in the same industry, I assume that the entrepreneur has a strong entrepreneurial experience relevant to the current venture; therefore, the score for entrepreneurial experience adds two points (+2). If this is the case, participants will achieve the same score by having started several businesses or by having started only one but with the same purpose and in the same industry as the current business. Adding scores based on the nature and industry of the prior business allows for capturing a more comprehensive and refined entrepreneurial experience.

*Start-up motivation* (MOT) is captured on a 5-item multiple selection question. The question seeks to capture the intensity of sustainability in guiding the creation of the business, which implies that the higher the score the more present is sustainability as a guiding force. This question does not rule out other possible motives, indeed the survey does capture more traditional drivers in a different question, such as 'to make an income or to make money' or 'to do more fulfilling work'. It only seeks to establish the role that the combination of the different dimensions of sustainability plays in motivating the formation of the venture. I presented the participant five different sustainability-related reasons to starting the new business, the items are: 'to solve environmental problems', 'to solve social problems', 'to help others', 'to create and distribute economic wealth' and 'to help in the socio-economic development of my community/region'. This measure is based on the Panel of Entrepreneurial Dynamics (Reynolds, 2000), and inspired by Parrish and Foxon (2009) and the ideas promoted by the World Business Council on Sustainable Development, which indicate that sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality and social equity.

Companies aiming for sustainability need to perform not against a single, financial bottom line but against the triple bottom line (WBCSD, 2010).

*Sustainability entrepreneurship support from social norms and culture* (SNC) is captured on a 4-item Likert scale ($\alpha$=0.94) referring to the entrepreneur's perception of support from the community where the venture was created. It explores the role of the social norms and culture of the community in the promotion of sustainable behaviours and the development of new businesses (Meek et al. 2010). The items are: *the social norms and culture of the community…* 'Encourage sustainable behaviours', 'Emphasize the responsibility that the individual has in contributing to address community issues', 'Promote environmental responsibility', and 'Encourage young people to be independent and start their own businesses'. These items are based on Meek et al. 2010 and O'Neill et al. 2009.

*Sustainability entrepreneurship support from state and local governments* (SLG) is captured on a 4-item Likert scale ($\alpha$=0.88) referring to the entrepreneur's perception of support from the political space where the venture was created. It explores the role of state and local governments in the promotion of sustainable behaviours and the development of new businesses. The items are: *State and local governments…* 'Provide good support for those starting new businesses', 'Promote sustainable business practices', 'Provide good support for those developing a socially responsible business', and 'Provide good support for those developing an environmentally responsible business'. This measure is based on the idea that policy measures, access to formal assistance institutions and provision of technical assistance and general advisory services from local and central authorities have a major effect on the development of sustainable innovations (Kemp et al. 1998; Caniëls and Romijn, 2008; Verbong et al. 2008).

Table 3.3 presents an overview of the 13 dependent and 3 outcome variables.

**Table 3.3 Overview of causal conditions and outcomes**

| Measures | Operationalization |
|---|---|
| MIN | Individual differences in the frequency of mindful states. Adapted from the Mindful Attention Awareness Scale |
| UND | Entrepreneur's overall understanding of sustainability issues and how these issues relate to each other |
| PRO | Entrepreneur's ability and intention to pursue sustainability-oriented venture opportunities |
| SEA | Entrepreneur's search for holistic value creation (economic, social, environmental and intergenerational) |
| KNO | Entrepreneur's formal training or work experience in sustainability-related areas |

| | |
|---|---|
| ORI | Entrepreneur's underlying attitudes and convictions regarding the role of its business in society. |
| MOR | Entrepreneur's perception of the moral significance of the sustainability problem at stake. Adapted from the Perceived moral intensity scale |
| EFF | Entrepreneur's degree of confidence in its knowledge and skills to successfully establish a meaningful business. |
| CON | Entrepreneur's perception regarding the relevance and benefits of having a strong orientation to sustainability |
| EXP | Number of businesses the entrepreneur has started, plus the purpose and industry of the other businesses (if any) |
| MOT | Intensity of sustainability in guiding the creation of the business |
| SNC | Entrepreneur's perception of support from social norms and culture of the community |
| SLG | Entrepreneur's perception of support from state and local governments |
| SVI | Degree to which the entrepreneur integrates sustainability in sensing and responding to economic, social and environmental anomalies |
| SAC | Degree to which the entrepreneur integrates sustainability in its momentary aspirations, specifically in setting up the objectives for the business |
| SER | Degree to which the entrepreneur integrates sustainability in the formation of exchange relationships, specifically through the entrepreneurial position statement. |

#### 3.5.1.3 Procedure

All 289 ventures were contacted via email with a detailed message explaining the purpose and procedures of the study, as well as the link to the web-based survey. Following Hardy et al.'s (2011) recommendation, the 'home page' of the web-based survey presents a text with the description and purpose of the instrument and clear and standard instructions on how to respond the questionnaire (Appendix B. Survey: Introduction text). Situating the survey in a specific context and time frame ensured that there was no evident memory bias and negative context effects (e.g. out-of-context memories).

All ventures received four notifications: an initial invitation to take part in the study in November 2011 and three reminders during December 2011 and January 2012. The survey was made available for two months until the 15$^{th}$ of January 2012.

Despite being recognized as the best method available to the social scientist interested in collecting original data (Babbie, 1995), survey questionnaires on topics related to sustainability might present methodological issues associated with social desirability bias (Roxas and Lindsay, 2012). Social desirability bias is the tendency to over-report socially desirable characteristics or behaviours, so they create a more positive impression in their survey participation (King et al. 2000). This needs to be taken into

account because it represents an important threat to the validity, reliability and overall quality of the data generated by a survey.

In order to reduce the risk of social desirability bias, I build on Roxas and Lindsay's (2012) recommendation to design and implement three methodological techniques. First, at the pre-survey stage, I conducted a thoughtful development of new measures and adaptations of existing measures (section 3.5.1), and then pilot tested them to ensure their validity and reliability. Second, at the survey administration stage, I triangulated data sources by making use of information from the semi-structured interviews and secondary data. The authors point out that this procedure is central in reducing and detecting response biases. Finally, at the post-survey stage, I assessed the validity of survey data by comparing the responses with data from the follow-up interviews.

### 3.5.2 Follow-up interviews

Qualitative data was collected by means of field interviews. I conducted 14 semi-structured interviews with founders of the ventures; the sessions lasted between one and two hours each and were recorded and transcribed. This is 1,042 minutes of recording and approximately 420 pages of transcripts, which were organized and analysed using Nvivo9. Seven of the participants were interviewed at neutral places, four at their organizations and three over Skype. Interviews were conducted between April and July 2012 based on an interview guide (Table 3.4) constructed primarily at the intersection of the different dimensions of sustainability (Young and Tilley, 2006) and the empirical examination of entrepreneurial opportunities (Dimov, 2011). Together with reconstructing the entrepreneurial process, the interview guide seeks to capture the entrepreneur's past experience and how this connects to the formation of the business, how sustainability was integrated in the pursuit of the business opportunity and the role of various contextual variables.

The latter provides the interviewees exactly the same context of questioning, which means that each participant receives the same stimulus as any other. This method, recommended for multi-case study research, increases the possibilities that the interviewees' replies can be aggregated, which in turn enhances cross-case comparability (Yin, 2009).

**Table 3.4 Interview guide**

| Thematic area | Main areas of inquiry |
|---|---|
| Entrepreneur's background | Personal story |
| | Professional background |
| | The connection between the entrepreneur's background and the idea for the business |
| The development of the business opportunity | Reasons for starting the business |
| | The business opportunity: description, relevance, evaluation, decisions |
| | The development of the idea for the business |
| | Initial actions |
| | Interaction with market structures: initial customers, suppliers and investors |
| | Why would someone choose this business and not any other |
| | Key milestones |
| Sustainability | The meaning of sustainability |
| | Integration of sustainability principles and values in the development of the business |
| | Perceived differences between sustainability-driven entrepreneurs and traditional entrepreneurs |
| Contextual variables | Role of social norms and culture |
| | Role of location and local legislation |

#### 3.5.2.1 Selection of participants

I selected those ventures with a consistent presence in the most empirically relevant solution paths (i.e. high levels of membership in the solution term as well as in the outcome) and whose unique and interesting story better contributes to understanding how sustainability entrepreneurs develop venture opportunities. The latter is in line with criteria outlined by Berglund (2007), which is relevant for the present study in that it permits producing a fine-grained account of each of the solution paths in relation to the entrepreneurs' unique lived experience.

Table 7.11, Table 7.12 and Table 7.13 in Appendix H show the cases sorted in descending order based on their joint fuzzy set membership score in each solution term and highlight the cases selected for the follow-up interviews. All 14 entrepreneurs (Table 3.5) were contacted via email with a detailed message explaining the overall purpose of the interview. However, the specific research questions were kept from the interviewees to limit respondent bias and allow the interviewees' stories to emerge (Berglund, 2007). Two days before the interview, I sent each participant an email explaining the procedure

and the rationale of the interview guide. This proved helpful in building a more coherent and precise narrative of the entrepreneurial process.

**Table 3.5 Profile of the participants**

**Alejandro** (Colombia, United States): Alejandro was born in Colombia and moved to the US at a young age. He is a business graduate with a minor in education. In 2009 was named Undergraduate of the Year and awarded the Good Citizen Award for his highest commitment to the community. Prior to changing career paths, he worked as an investment-banking analyst at various financial services institutions. After spending 6 months in Ghana, and inspired by the idea of turning waste into fresh, local food, he created a business that grows and sells gourmet mushrooms entirely on recycled coffee grounds.

**Alex** (United States) Alex holds degrees in geography, political science and public policy. He has worked as a travel writer, in social media and volunteering for a local social enterprise in India. It was there when he realized that it is not going to be 2 or 3 big organizations that will change the world, but it's going lots of entrepreneurs pursuing change in their individual ways that will make the difference. Based on this experience and the conviction that technology and media can empower change makers around the world, he created a crowd-funding platform to help social enterprises get off the ground.

**Ali** (United States) Ali holds degrees in women studies and business. She has she experience in online marketing, policy development and social enterprise in India. After she returned to the US, she wanted to start a business based her experience in the social sector and her passion for holistic health. In 2010, she created a business that packages and delivers healthy individually portioned snacks using reusable containers and bike trailers.

**Damion** (United States) Damion holds BS in Business Administration and an MA in International Affairs with a concentration in Economic Development. After 3 years of service at the Peace Corps in Panama and based on his experience with subsistence farmers he comes back to the USA in 2006 to co-found a sustainable forestry investment firm. His aim is to mitigate tropical deforestation on a broad scale by promoting impact investments in sustainable forestry.

**Gabriel** (Peru, United States). Gabriel was born in Peru and moved to the US at a young age. He studied international studies, urban studies, liberal arts and management. He has worked in community development, supporting minority-owned businesses and sustainable transport. After years in policy development he became dissatisfied with a model not at all connected to the actual experience of people. In 2011 he started a laundry service focused on minimizing resource use from end-to-end and work-force development.

**Gaurav** (India, United States). Gaurav was born in India and moved to the US at a young age. He holds a degree in International Development and Technology Transfer, and has experience as a consultant in renewable energy and technology for the health sector in developing countries. In 2009, after trying for 2 years the traditional donor model to development in Liberia, and being frustrated with the situation of minimal progress, he founded a technology venture focused on providing solar energy products that improve access to power and connectivity in Africa.

**Janine** (United States). Janine holds a BA in Environmental Policy and a MBA in Sustainable Enterprise. After nearly 15 years of work experience in community organizing, project management, outreach, facilitation, and policy/advocacy she joined efforts with two MBA classmates and co-founded a bio-lubricants venture. Her firm provides high-quality renewable, non-toxic and biodegradable industrial lubricants made from sustainably-sourced plant and algae oils. In doing so, the idea is that current industrial systems can transition to a clean, post-petroleum economy.

**Jen** (United States). Jen holds a BA in Commerce and an MBA and has more than 20 years of experience in the financial sector. As a response to the outmoded, outdated and wasteful food packaging she decided in 2007 to join efforts with an old friend to start a firm that designs, licenses and manufactures sustainable food packaging. Based on the principles of eco-design, she seeks to provide creative, competitively priced, environmentally friendly alternatives that add utility, utilise sustainable materials, reduce carbon footprints and divert waste from landfills.

**Josh** (United States). Josh comes from a family of organic vegetable gardeners. After college he went to peace corps in Bulgaria and then returned to the US to work in international development. In 2007, based on his experience in rural Bulgaria, family tradition and knowledge of bio-intensive methods of

agriculture he became a backyard farmer. His venture sets up organic gardens for people and takes care of them. Unfortunately, the people who actually need to grow their own food can't afford the price of the service. With the aim of maintaining the sustainability nature of the business, he teaches disadvantaged communities how to grow the garden on their own.

**Kate** (United Kingdom): Kate is a former senior commercial executive, and known as an expert retailer disenchanted with way the top end of the industry was functioning and treating its staff, customers and suppliers. In 2010 she co-founded a sustainable cooperative store. Using communities and local food networks, her aim is to offer an alternative to supermarkets that provides good-quality food at affordable prices, and restores the link between the shopper and the producer. She believes that a sustainable business is the one that can achieve its growth and profitability targets whilst operating within values based on equity and advances the cause of community development and healthy living.

**Laurie** (United States): Laurie is an entrepreneur, publisher, editor, and writer. He has spent his entire career working in media and marketing for sustainability causes. He has co-founded and managed several institutions aimed at increasing the awareness of environmental protection and social justice in North America. Laurie defines himself as an impact entrepreneur, and believes in the impact economy as new paradigm for global business that defies the destructive, one dimensional, single bottom line thinking. Based on this idea, he founded an internet platform that aims to promote transformation and systemic change, which can only be achieved by transcending the consciousness that created the current, flawed state of things.

**Michael** (Austria): Michael holds a technical diploma in telecommunications and bio-med-technology, and an MBA/MSc in Finance. Based on his expertise in strategy, process management and controlling, in 2011 he co-founded a consultancy firm focused on sustainability. His firm promotes a zero waste society, one that cares for material resources, as well as nurturing human capacity. His venture is founded on the idea that a zero-waste society is a better and more equal society.

**Stephanie** (United States): Stephanie is a trained economist with more than 10 years of experience in financial management in the USA and economic development in Central America, Western Europe and Africa. After multiple experiences in developing economy environments she decided to help change what it is to be an American consumer. In 2009 she founded and currently coordinates an Institute for Policy Analysis with focus on The Green Economy. She wants to help foster economic stewardship and contribute to the field with a focus on long-term environmental impact.

**Stig** (United States): Stig is a serial entrepreneur, having started 6 companies in less than 10 years. He holds a BS in Biochemistry and an MBA in Sustainable Enterprise. In his more recent venture, he decided to combine his passion for green chemistry and business to create a bio-fuels firm that focuses on offering innovative products that are both good for the environment and good for people while maintaining profits.

### 3.5.3 Non-participant observation

Another secondary source of data was non-participant observation. Data was collected in May 2012 during the Annual Meeting of the William James Foundation Business Plan Competition. This 3-day event gathers entrepreneurs, investors and reading judges with the aims of presenting, discussing and evaluating the business plans in competition as well widening the network between current and past entrants. Data was collected from three key sources, which produced 273 minutes of recordings and 50 pages of field notes. These are: (1) entrepreneurs' presentations and discussions with judges from the competition, (2) open meetings with potential investors, and (3) discussion round tables - past and current entrants from different sustainable business competitions.

### 3.5.4 Documentation review

A different secondary source of data was documentary review. I examined documents, both private and publicly available, describing different aspects of the venture. Documentation review considers the revision of the following types of documentary evidence: (1) business plans; (2) entrepreneurs' profiles, comprising information available on the firm's website, curriculum vitae and descriptions of the entrepreneurs provided by third parties; (3) organizational records, comprising project reports, CSR and environmental reports, impact assessments and internal evaluations; (4) public material whereby products and services, risks and broader benefits are positioned, including product descriptions, marketing material, press releases, media articles and notes, promotional videos and audio and video interviews; and (5) personal writings (when available) that reflect the entrepreneur's approach to sustainability, which comprises personal diaries, opinion articles and blog entries.

## 3.6 Data analysis in fsQCA

### 3.6.1 Calibration

Calibration is an essential process in fsQCA. By means of a simple estimation technique it transforms variable raw scores into set measures (Ragin, 2008c), rescaling the original measure into scores ranging from 0.0 to 1.0 (Ragin, 2008b). This enables to specify the score that would qualify a case for full membership in the sets of *sustainability-oriented venture ideas* (SVI), *sustainability-oriented entrepreneurial actions* (SAC), and *sustainability-driven exchange relationships* (SER), as well as in the set of each condition, and also the score that would completely exclude it from each of the sets.

Table 3.6 specifies thresholds for full inclusion ($\geq$0.95), full exclusion ($\leq$0.05) and the crossover point (0.5). Deviation scores are calculated using the crossover point as an anchor (Fiss, 2011). Theoretical and substantive knowledge define the thresholds for the three states (Ragin, 2007), which, once established, are computed and transformed into set scores by the fsQCA (2.5) software. Based on these thresholds, membership in each

conceptual category is established when the case's score surpasses the point of maximum ambiguity (i.e. 0.5) (Ragin, 2008b).

**Table 3.6 Thresholds for outcomes and conditions**

| | Total score | Full membership (≥ 0.95) | Cross-over point (=0.5) | Full non-membership (≤0.05) |
|---|---|---|---|---|
| **Independent measures** | | | | |
| MIN | 6.0 | ≥ 5.0 | = 3.6 | ≤ 2.0 |
| UND | 5.0 | ≥ 4.5 | = 3.5 | ≤ 1.5 |
| PRO | 5.0 | ≥ 4.5 | = 3.5 | ≤ 1.5 |
| SEA | 5.0 | ≥ 4.5 | = 3.5 | ≤ 1.5 |
| KNO | 14 | ≥ 10 | = 5.0 | ≤ 2.0 |
| ORI | 5.0 | ≥ 4.5 | = 3.5 | ≤ 1.5 |
| MOR | 5.0 | ≥ 4.5 | = 3.5 | ≤ 1.5 |
| EFF | 5.0 | ≥ 4.5 | = 3.5 | ≤ 1.5 |
| CON | 5.0 | ≥ 4.5 | = 3.5 | ≤ 1.5 |
| EXP | 8.0 | ≥ 5.0 | = 3.0 | ≤ 1.0 |
| MOT | 5.0 | ≥ 4.0 | = 3.0 | ≤ 2.0 |
| SNC | 5.0 | ≥ 4.0 | = 3.0 | ≤ 2.0 |
| SLG | 5.0 | ≥ 4.0 | = 3.0 | ≤ 2.0 |
| **Outcome measures** | | | | |
| SVI | 6.0 | ≥ 5.5 | = 4.0 | ≤ 2.0 |
| SAC | 5.0 | ≥ 4.5 | = 3.5 | ≤ 1.5 |
| SER | 5.0 | ≥ 4.5 | = 3.5 | ≤ 1.5 |

The calibration points presented in Table 3.6 seek to create fuzzy-set scores that represent strong membership in casual conditions and outcomes. For example, the set of entrepreneurs with strong sustainability orientation is created by setting the cross-over point above the middle of the five-points Likert scale and the threshold for full membership close to the maximum score. In this case, moving the point of maximum ambiguity by +0.5 also creates a well-ordered distribution of cases that optimizes the fuzzy-set analysis. This procedure is repeated to calibrate *dispositional mindfulness* (MIN), *sustainability understanding* (UND), *prospective sustainability entrepreneur* (PRO), *sustainability opportunity search* (SEA), *perceived moral intensity* (MOR), *sustainability contribution belief* (CON), and the three outcomes (SVI, SAC, SER).

*Sustainability Start-up Motivation* (MOT) is captured by adding up the scores from five different motives for starting a business, all related to solving sustainability

problems. Given that sustainability is a three-dimensional concept, the presence of three of the five motives would qualify an entrepreneur as more in than out of the set of strong sustainability start-up motivation, more than four as fully in and less than two as fully out.

The specification for strong *knowledge of sustainability* (KNO) and strong *entrepreneurial experience* (EXP) is based on the examination of empirical evidence and theoretical knowledge. *Prior knowledge* (KNO) captures a mixture of formal training and experience in sustainability-related areas, given than no theory exists to qualify someone as knowledgeable of sustainability; the cross-over point is set by taking the median score as a point of maximum ambiguity and adding one point. The specification for strong *entrepreneurial experience* (EXP) is based on previous work on human capital and entrepreneurship (Dimov, 2010a).

The calibration of *sustainability entrepreneurship support from social norms and culture* (SNC) and *from state and local governments* (SLG) seeks to create sets that capture perceived - positive or negative - support from social norms and culture, and from state and local governments. Given that the verbal labels for SNC and SLG are positive / negative support, rather than very strong, strong and more or less strong, I set the cross-over point in the middle of the five-points Likert scale, and the thresholds for full inclusion and full exclusion at four and two respectively.

Together with permitting capturing strong membership in casual conditions and outcomes, setting the point of maximum ambiguity above the middle of the scales reduces the possibility of leniency effects[6] (Kane et al. 1995). Changes in the calibration thresholds (i.e. model specification) and parameters of fit, as described in the sensitivity analysis (section 3.6.6), also contribute to reducing these potential rating errors.

### 3.6.2 Exploratory analysis of necessity

The purpose of the exploratory necessity analysis is to test the subset relationships between the three outcomes and the 13 causal factors under consideration, and then to select the most relevant causal conditions to be used in the subsequent configurational analysis. In order to do so, this analysis evaluates the degree to which instances of an outcome agree in displaying the causal condition thought to be necessary (consistency) and the empirical relevance of each causal condition (coverage). The analysis of

[6] Leniency effects is a type of rating error where ratings are skewed so that the mean rating given is substantially higher than the midpoint of the rating scale (Saal et al. 1980)

necessary conditions in fsQCA looks at which individual factors may be necessary or mostly necessary for the outcome to occur. This entails that the membership score on the outcome is consistently lower than the membership score of the causal factor under consideration (Kent, 2008).

With fuzzy sets, the consistency of the necessary condition relationship depends on the degree to which it can be shown that membership in the outcome is consistently less than or equal to membership in the cause, $Y_i \leq X_i$. The measure of the consistency of the subset relationship indicating necessity is:

$$Necessity\ Consistency\ (Y_i \leq X_i) = \Sigma[min(X_i, Y_i)] / \Sigma(Y_i)$$

Where *min()* indicates the selection of the lower of the two values; $X_i$ is the degree of membership in a causal combination, and $Y_i$ is degree of membership in the outcome. When the $Y_i$ values are all less than or equal to their corresponding $X_i$ values, the consistency score is 1.00; when only a few misses are present, the score is slightly less than 1.00; when many inconsistent scores are present, with some $Y_i$ values greatly exceeding their corresponding $X_i$ values, consistency can drop below 0.50 (Ragin, 2008b).

A subset relationship of necessity also needs to be evaluated in terms of its empirical importance. The measure of the relevance of X as a necessary condition for Y is given by the degree of coverage of $X_i$ by $Y_i$:

$$Necessity\ Coverage\ (Y_i \leq X_i) = \Sigma[min(X_i, Y_i)] / \Sigma(X_i)$$

When the coverage of X by Y is small, then the constraining effect of X on Y is insignificant. Conceptually, very low coverage corresponds to an empirically irrelevant (trivial) necessary condition. By contrast, when the coverage of X by Y is substantial, then the constraining effect of X as a necessary condition may be great, i.e. relevant or non-trivial necessary condition (Ragin, 2006).

#### 3.6.2.1 Selection of conditions

Although there is no formula to mechanistically define the number of conditions to be considered in a configurational analysis of inductive nature, authors recommend for Intermediate-Ns studies (30-50 cases) the use of six conditions (Marx and Dusa, 2011), in that this number allows for balancing parsimony and explanatory richness (Ragin, 2006).

Even though the use of a reduced number of conditions (≤5) can produce a more parsimonious set of solutions, it increases the likelihood of limited diversity. On the contrary, although the use of seven or more conditions offers the possibility of producing a greater number of explanations (i.e. solution paths) the number of cases present in each solution term would be too low, which ultimately affects their empirical relevance.

In order to assess the appropriateness of this recommendation, and building on the exploratory nature of this study, I run different configurational analyses using four, five, seven and eight conditions. The results support the claim that, given the number of cases, six conditions offer the best explanation in terms of parsimony and explanatory richness.

#### 3.6.2.2 Robustness

In order to assess the robustness of the exploratory necessity analysis, I compare the results with those of a more traditional method, such as cluster analysis (Ketchen and Shook, 1996). This procedure seeks to identify relatively homogeneous groups of variables based on selected characteristics. I conducted a hierarchical cluster analysis of variables using Ward's method (Hair et al. 1992). In this method all possible pairs of clusters are combined and the sum of the squared distances within each cluster is calculated. The cluster analysis of variables is presented on a dendrogram diagram that specifies which clusters have been joined and the distance between clusters.

### 3.6.3 Truth tables and configurational analysis

The analysis of the data was conducted using the fsQCA (2.5) software (Ragin et al. 2006). Once the data are collected and the measures calibrated, the software constructs a *truth table* listing the different logically possible combinations of causal conditions along with the cases conforming to each combination. In order to reduce the truth table to simplified combinations, two thresholds need to be defined: frequency and consistency. The frequency threshold specifies the minimum amount of cases to be considered in the analysis. Setting a frequency threshold of one observation is acceptable when the aim is to build theory from a relatively small sample (Ragin, 2006; Crilly, 2011).

On the other hand, the consistency threshold defines the minimum acceptable level to which a combination of causal conditions is reliably associated with the each of the

outcomes. Consistency thresholds of at least 0.8 and up to 0.95 are recommended (Ragin, 2008), but should not be applied mechanistically (Crilly, 2011). Following this recommendation, and in line with Schneider and Wagemann's (2010) approach, I selected thresholds that correspond to a gap observed in the distribution of consistency scores.

#### 3.6.3.1 Configurational analysis and counterfactuals

Based on these frequency and consistency thresholds, fsQCA applies a Boolean algorithm based on a counterfactual analysis of causal conditions to logically reduce the truth table rows to a solution table comprising simplified combinations of conditions (Ragin et al. 2006; 2008a), which can be understood as different solution paths or recipes for the outcome.

In dealing with limited diversity and abundance of logically possible combinations of causal conditions lacking empirical instances (Ragin et al. 2004), fsQCA uses counterfactual analysis to speculate about the most plausible outcomes of the combinations that do not exist in the data set (Ragin, 2008a), upon which it yields three types of solution terms: complex, parsimonious and intermediate. The complex solution does not permit counterfactual cases and makes no assumptions about the logical reminders (i.e. configuration of conditions lacking empirical instances). The parsimonious solution incorporates easy and difficult counterfactuals to produce the simpler solution without any evaluation of its plausibility. Here, easy counterfactuals refer to situations where a redundant causal condition is added to a set of causal conditions that by themselves already lead to the outcome in question. Difficult counterfactuals refer to situations where a condition is removed from a set of causal conditions leading to the outcome on the assumption that this condition is redundant (Fiss, 2008).

Given that the first solution may lead to results needlessly complex and the second to results that are unrealistically parsimonious (Ragin, 2008b), fsQCA uses only easy counterfactuals, derived from substantive and theoretical knowledge, and produces intermediate solutions that allow for balancing parsimony and complexity (Ragin et al. 2004). They constitute subsets of the most parsimonious solution and supersets of the most complex solution (Schneider and Wagemann, 2012). The definition of easy and difficult counterfactuals is based on substantive and theoretical knowledge (Ragin and Sonnett, 2005).

Because of the exploratory nature of this study, I do not make assumptions regarding the presence or absence of conditions in the delineation of counterfactuals, meaning that all positive and negative expressions are considered plausible. More details on the treatment of logical reminders are provided in section 5.4.1.

#### 3.6.3.2 Solution Tables: core and peripheral conditions

Solution tables distinguish core and peripheral conditions. The distinction between core and peripheral conditions is based on how causal components are causally connected to a specific outcome. In any solution term there are decisive causal ingredients that distinguish configurations, and complementary ingredients that only make sense as contributing factors (Ragin, 2008b) that reinforce the central features of the core conditions (Grandori and Furnari, 2008). Core conditions are present in both parsimonious and intermediate solutions and exhibit a strong causal relationship with the outcome, whereas peripheral conditions are present only in the intermediate solution and exhibit a weak causal relationship with the outcome (Fiss, 2011). Core elements are essential whereas more peripheral elements are less important and perhaps expendable or exchangeable (Fiss, 2009). In this sense, Ragin (2008b) points out:

> Peripheral conditions can be removed from the solution only if the researcher is willing to make assumptions that are odds with the existing substantive and theoretical knowledge (204)

In the solutions tables, black circles indicate the presence of the condition, and circles with 'X' indicate the absence. Large circles indicate core conditions; small circles indicate peripheral conditions. Blank spaces indicate 'irrelevant condition' (Ragin, 2008b; Fiss, 2008). Numbers accompanying core conditions indicate their relative importance within the overall solution. They are sorted in ascending order and are based on the raw coverage scores given by the parsimonious solution (Ragin, 2008b). Solutions or combination of conditions are sorted by raw coverage and unique coverage to provide a view the solutions' relative empirical importance.

#### 3.6.3.3 Analysis of solutions: sufficiency consistency and coverage

Solution paths are evaluated in terms of consistency and coverage. Set-theoretic consistency assesses the degree to which the cases sharing a given condition or

combination of conditions agree in displaying the outcome in question. It is estimated by dividing the number of cases that are present in a given configuration of conditions and exhibit the outcome by the number of cases that are present in the same configuration but do not exhibit the outcome (Fiss, 2011). Set-theoretic coverage, by contrast, assesses the degree to which a causal combination accounts for instances of an outcome (Ragin, 2006). If multiple configurations are sufficient for the outcome, raw and unique coverage provide assessments of their empirical relevance (Greckhamer, 2011).

These set-theoretic measures of fit are descriptive, not inferential and were developed as methods of exploring cross-case evidence in a configurational way. They are oriented towards the evaluation of set relations reflecting explicit relationships. In this sense, Ragin (2006) indicates:

> These measures are not ends in themselves. Calculations of consistency and coverage do and should provide guidance, but the ultimate 'test' of the results of a configurational analysis is not their consistency or coverage but how well they help researchers make sense of their cases (310)

Sufficiency consistency means that the membership score on the outcome is consistently higher than the membership score of the causal combination, weighted by the relevance of each case. The measure of the consistency of the subset relationship indicating sufficiency is:

$$\textit{Sufficiency Consistency } (X_i \leq Y_i) = \Sigma[\min(X_i, Y_i)] / \Sigma(X_i)$$

The membership score of a causal combination is the minimum fuzzy score in each of the conditions. Consistency scores of less than 0.8 means that there is considerable inconsistency, scores should be close to 0.9 (Kent, 2008).

Conversely, set-theoretic coverage evaluates the degree to which a causal combination accounts for instances of an outcome. When there are several paths to the same outcome, the coverage of any given causal combination may be small. Thus, coverage evaluates the empirical relevance of the causal configuration (Ragin, 2006). The measure of fuzzy set coverage indicating sufficiency is simply the overlap expressed as a proportion of the sum of the membership scores in the outcome (Y).

$$\textit{Sufficiency Coverage } (X_i \leq Y_i) = \Sigma[\min(X_i, Y_i)] / \Sigma(Y_i)$$

Raw coverage and unique coverage provide a more detailed assessment of the empirical importance of each configuration of conditions (Ragin, 2006). The purpose of

partitioning in fuzzy set analysis is to assess the importance of different combinations of causally relevant conditions in relative terms. As Ragin (2006) illustrates,

> The issue in set-theoretic analyses is not 'correlated independent variables' because causal conditions are not viewed in isolation from one another, as they are in multiple regression analysis. Rather, partitioning coverage is important because some cases conform to more than one path (305)

While raw coverage refers to the size of the overlap between the size of the causal configuration and the outcome set relative to the size of the outcome set, unique coverage controls for overlapping explanations by partitioning the raw coverage. The latter is calculated for a certain causal combination by subtracting the joint raw coverage of all the remaining causal paths from the joint raw coverage of all causal paths including the one of interest (Schneider et al. 2010).

### 3.6.4 Analysis of fuzzy necessity and sufficiency

Fuzzy subset relations are evaluated in terms of necessity and sufficiency. An argument of causal necessity is supported when it can be demonstrated that instances of an outcome constitute a subset of instances of a causal condition (Ragin, 2006:297). In contrast, a combination of conditions is assessed as being sufficient for the outcome when all instances of the combination are followed by the occurrence of the outcome. Sufficiency assessments in QCA make use of probabilistic comparisons, hence, as Greckhamer et al. 2007 indicate:

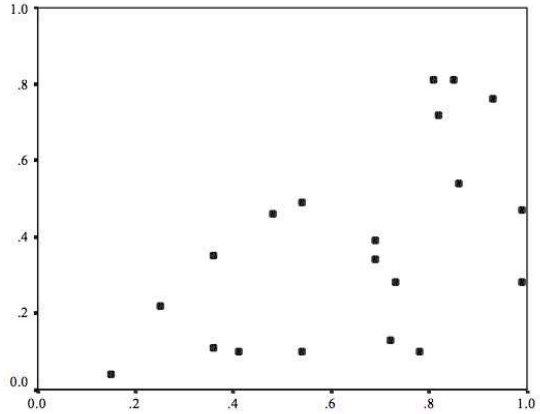
> A combination is deemed as quasi-sufficient if the outcome of interest occurs in a proportion of cases displaying the causal condition that is significantly higher than the set benchmark (717)

Arguments of necessity and sufficiency can be assessed in a graphical representation. In a scatterplot, the property space is defined by the condition under evaluation on the horizontal axis and the outcome of interest on the vertical axis. The fuzzy subset relationship is evaluated by using membership scores. Cases in the lower triangle (Plot A in Figure 3.7) establish that the degree of membership in the outcome is a fuzzy subset of the degree of membership in the causal condition, a pattern of results consistent with an argument of necessity. On the contrary cases in the upper triangle (Plot B in Figure 3.7) establish that the degree of membership in the causal condition is a fuzzy

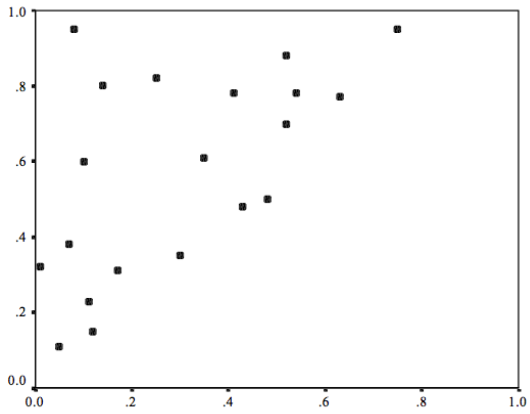
subset of the degree of membership in the outcome, a pattern of results consistent with an argument of sufficient causation (Ragin, 2008).

**Figure 3.7 Example of fuzzy subset relationship indicating necessity and sufficiency**

Plot A. Pattern of necessity




Plot B. Pattern of sufficiency




Source: Ragin, 2000; 2008

Therefore, one can make the argument of causal sufficiency or quasi-sufficiency when a high proportion of cases are in the upper triangle of the x-y plot, and of causal necessity or quasi-necessity when a high proportion of cases are in the lower triangle of the x-y plot.

In order to assess the necessity or sufficiency of a combination of conditions, it is necessary to compute the case's degree of joint membership in the causal combination. This follows the fuzzy algebra's logical operator AND, which simply uses the lowest membership score among the causal conditions under consideration (Ragin, 2008).

### 3.6.5 Integrating narratives in the explanation of relevant configurations

Based on the results of the configurational analysis, the purpose of integrating narratives is to deepen the explanation of how and why entrepreneurs integrate sustainability in each stage of the opportunity process. It considers the most empirically relevant causal paths for the outcome of interest and incorporates qualitative data from the cases.

In order to do so, as specified in section 3.6.3, I select the most empirically relevant configurations for each of the outcomes, comprising the solution paths which raw coverage is ≥0.65. Then, I select those ventures with high fuzzy set membership scores

both in the relevant solution term and the outcome of interest, and whose story better (Berglund, 2007) contributes to understanding how sustainability entrepreneurs develop venture ideas, organize entrepreneurial actions and establish exchange relationships. Section 3.5.2.1 (selection of participants) provides further details on the selection process.

In integrating the narratives into the explanation of each causal path I conduct a simple content analysis. First, transcripts from the interviews and documents are organized and categorized using Nvivo9. Second, I analyse the data based on pre-defined codes derived from each relevant configuration of condition. Finally, the relevant pieces of text are clustered in three conceptual categories that represent each component (stage) of the opportunity process. This requires dividing the data depending on whether the text corresponds to the idea phase, the action phase or the interaction phase. This procedure permits identifying, in the narrative, the central elements of each stage of the process, and subsequently deepening the explanation of the conditions and combination of conditions identified as necessary and/or sufficient for the outcomes to occur.

Given that diversity-oriented research, and particularly fsQCA, emphasizes the relevance of in-depth case-based knowledge (Ragin, 2000), the integration of qualitative data is central to assist in the explanation of causal relationships.

### 3.6.6 Robustness tests

In order to assess the robustness of my findings I conducted three different tests, the first two are based on changes in the parameters of fit (Schneider and Wagemann, 2012) and the last one is based on changes in the outcome specification.

First, I conduct a test with changes in the frequency threshold. Its purpose is to assess the stability of the solutions. Setting a frequency threshold of 2 permits a change in the number of possible configurations, in that it treats those configurations with less than two instances as logical reminders. By eliminating configurations with a lesser number of empirical instances, this test reduces the heterogeneity of the associated causal relationships, and therefore corroborates the solutions with higher explanatory power that emerged from the configurational analysis.

Second, I conduct a sensitivity analysis to examine whether my findings, particularly those of necessity and sufficiency, are robust to the use of alternative specifications of causal conditions. By squaring and taking the root square of membership

scores (Ragin, 2000), the aim of this analysis is to observe causal relationships under higher and lower degree of membership in the set of each relevant condition. Indeed, the use of modifiers ($X_i^2$ and $\sqrt{X_i}$) can have a major impact on patterns of necessity and sufficiency revealed in plots of causal conditions and outcomes (Ragin, 2000). This analysis is central to support the arguments of necessary conditions and sufficient combinations of conditions. Alternative configurations with higher consistency, empirical relevance or explanatory richness can a have major impact on the explanation of how opportunities develop in sustainability entrepreneurship, in that it can modify the number of causal paths and the explanation of the role of each causal condition.

Third, I conduct a negate analysis to eliminate alternative explanations regarding possible causal links between conditions and absence of the outcome. This entails an examination of the conditions or configurations of conditions that lead to the non-integration of sustainability en each stage of the process, i.e. conditions for ~SVI, ~SAC and ~SER. This procedure provides an alternative path for the analysis of conditions for SVI, SAC and SER, and sometimes can present a higher explanatory power. It is expected that finding necessary and sufficient conditions for the presence of SVI, SAC and SER is more effective that looking for conditions for their absence.

# Chapter 4. Analysis and Results

## 4.1 Exploratory necessity analysis

The analysis of necessary conditions in fsQCA looks at which individual factors may be necessary or mostly necessary for the outcome to occur (Kent, 2008). In this exploratory necessity analysis I test the subset relationships between the three outcomes and the thirteen causal factors under consideration. The analysis evaluates the degree to which instances of an outcome agree in displaying the causal condition thought to be necessary (consistency) and the empirical relevance of each causal condition (coverage). Given that the outcomes occur in a sequential order I also consider the effect of the development of sustainability-oriented venture ideas (SVI) in producing organization of sustainability-oriented entrepreneurial actions (SAC) and the formation of sustainability-driven exchange relationships (SER) and the effect of SAC in producing SER. Even though the proximity between SVI, SAC and SER may distort a potential relationship of necessity, this embedded effect needs to be accounted for as a possible explanation.

Based on the results of the exploratory analysis of necessity (Table 4.1) I select the six causal conditions with higher consistency levels to be used in the subsequent configurational analysis. Higher consistency implies that the membership in the outcome is consistently less or equal than membership in the condition. Regarding the number of conditions, as explained in section 3.6.2.1, the use of six conditions in intermediate-Ns studies allows for balancing parsimony and explanatory richness (Marx and Dusa, 2011; Ragin, 2006). In this sense, a clarification needs to be made regarding the relationship between MOR and SAC and EFF and SER, which exhibit high consistency levels. Excluding these conditions does not imply that they are irrelevant in absolute terms, but in relative terms. Other conditions exhibit stronger relationship of necessity with the outcomes and their integration in the configurational analysis would negatively affect the parsimony and explanatory richness of the results. I tested the latter by running different configurational analyses using four, five, seven and eight conditions. The results support the claim that, given the number of cases, six conditions offer the best explanation in the terms outlined above.

All necessary conditions selected are also empirically relevant (coverage ≥.65), which means that the constraining effect of each necessary condition may be great. Although the development of sustainability-oriented venture ideas (SVI) and organization

of sustainability-oriented entrepreneurial actions (SAC) seem to contribute to producing SAC and formation of sustainability-driven exchange relationships (SER) (consistency ≥0.80), in relative terms the set-theoretic relationship with their respective outcomes is not strong enough to be included in the configurational analysis.

**Table 4.1 Exploratory necessity analysis** (presence of conditions)

| | **SVI** | | **SAC** | | **SER** | |
|---|---|---|---|---|---|---|
| **Conditions tested** | Consistency | Coverage | Consistency | Coverage | Consistency | Coverage |
| MIN | 0.800 | 0.837 | 0.784 | 0.869 | 0.828 | 0.741 |
| UND | 0.881 | 0.829 | 0.878 | 0.875 | 0.909 | 0.731 |
| PRO | 0.874 | 0.762 | 0.891 | 0.823 | 0.919 | 0.684 |
| SEA | 0.934 | 0.800 | 0.929 | 0.844 | 0.939 | 0.687 |
| KNO | 0.400 | 0.815 | 0.436 | 0.941 | 0.476 | 0.828 |
| ORI | 0.953 | 0.783 | 0.939 | 0.818 | 0.958 | 0.673 |
| MOR | 0.849 | 0.819 | 0.844 | 0.862 | 0.910 | 0.749 |
| EFF | 0.867 | 0.814 | 0.881 | 0.877 | 0.893 | 0.716 |
| CON | 0.829 | 0.808 | 0.854 | 0.882 | 0.899 | 0.749 |
| EXP | 0.486 | 0.763 | 0.499 | 0.830 | 0.508 | 0.681 |
| MOT | 0.611 | 0.861 | 0.612 | 0.913 | 0.611 | 0.734 |
| SNC | 0.732 | 0.772 | 0.712 | 0.796 | 0.662 | 0.596 |
| SLG | 0.386 | 0.829 | 0.414 | 0.943 | 0.402 | 0.739 |
| SVI | - | - | 0.826 | 0.876 | 0.835 | 0.713 |
| SAC | - | - | - | - | 0.895 | 0.722 |

In order to evaluate the robustness of the exploratory analysis of necessity, I conducted the same procedure with absence of conditions. As Table 4.2 shows, there is only one condition that surpasses the minimum acceptable consistency of 0.7. This means that the lack of support of state and local governments could be considered as a necessary condition for the development of sustainability-oriented venture ideas (0.729) and the formation of sustainability-oriented exchange relationships (0.718).

However, compared to the results of the exploratory analysis with positive conditions, it presents lower consistency levels than the lowest score for SVI (perceived moral intensity, MOR = 0.849), SAC (sustainability contribution belief, CON = 0.854) and SER (sustainability contribution belief, CON = 0.899). If the consistency level of the lack of support from state and local governments (~SLG) is higher than any of the lowest consistency scores in Table 4.2 and its relationship with the outcome makes theoretical

sense, the subsequent configurational analysis must consider ~SLG as part of the model specification.

Given the logic of fsQCA, a case can have membership in both a set and its negation, leading to a situation where, after the configurational analysis, the same combination can be quasi-sufficient for an outcome and its negation (Cooper and Glaesser, 2011). This exploratory necessity analysis with absence of conditions also permits ruling out some of these paradoxical results that can follow from the use of fuzzy sets.

**Table 4.2 Exploratory necessity analysis** (absence of conditions)

| | **SVI** | | **SAC** | | **SER** | |
|---|---|---|---|---|---|---|
| **Conditions tested** | Consistency | Coverage | Consistency | Coverage | Consistency | Coverage |
| ~MIN | 0.390 | 0.885 | 0.362 | 0.871 | 0.374 | 0.725 |
| ~UND | 0.309 | 0.928 | 0.285 | 0.905 | 0.303 | 0.776 |
| ~PRO | 0.239 | 0.962 | 0.216 | 0.919 | 0.226 | 0.775 |
| ~SEA | 0.206 | 0.902 | 0.190 | 0.878 | 0.218 | 0.813 |
| ~KNO | 0.689 | 0.762 | 0.667 | 0.781 | 0.649 | 0.613 |
| ~ORI | 0.150 | 0.835 | 0.147 | 0.869 | 0.134 | 0.636 |
| ~MOR | 0.336 | 0.936 | 0.299 | 0.883 | 0.324 | 0.772 |
| ~EFF | 0.305 | 0.924 | 0.279 | 0.893 | 0.312 | 0.805 |
| ~CON | 0.316 | 0.854 | 0.298 | 0.854 | 0.303 | 0.698 |
| ~EXP | 0.574 | 0.756 | 0.563 | 0.786 | 0.607 | 0.684 |
| ~MOT | 0.522 | 0.761 | 0.494 | 0.763 | 0.506 | 0.630 |
| ~SNC | 0.322 | 0.720 | 0.358 | 0.847 | 0.436 | 0.832 |
| ~SLG | **0.729** | 0.783 | **0.698** | 0.795 | **0.718** | 0.659 |

In a different test, I compare the results of the exploratory necessity analysis with those of a cluster analysis (Ketchen and Shook, 1996). The dendrogram diagram (Figure 4.1) shows a clear cluster of variables comprising sustainability understanding (UND), start-up self-efficacy (EFF), prospective sustainability entrepreneur (PRO), sustainability orientation (ORI), and sustainability opportunity search (SEA). These variables are close to each other and connected to sustainability contribution belief (CON), perceived moral intensity (MOR) and dispositional mindfulness (MIN), forming a cluster in line with the results of the exploratory necessity analysis. The proximity matrix (Table 4.3) shows the distance between all observations in the data set.

**Figure 4.1 Cluster analysis**

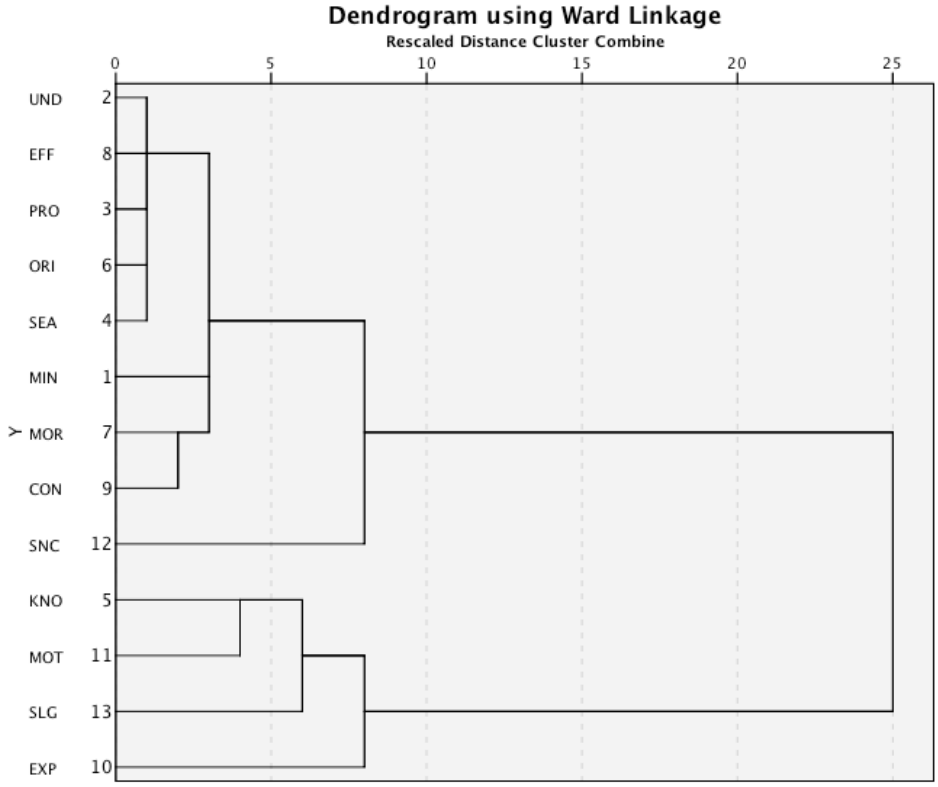



**Table 4.3 Proximity matrix**

| | Matrix file input | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Var. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1.MIN | 0 | | | | | | | | | | | |
| 2.UND | 4.12 | | | | | | | | | | | |
| 3.PRO | 4.74 | 3.15 | | | | | | | | | | |
| 4.SEA | 5.13 | 2.91 | 3.39 | | | | | | | | | |
| 5.KNO | 11.76 | 12.96 | 15.68 | 16.59 | | | | | | | | |
| 6.ORI | 4.57 | 2.54 | 2.98 | 3.18 | 17.78 | | | | | | | |
| 7.MOR | 4.61 | 3.13 | 4.69 | 3.57 | 14.18 | 3.68 | | | | | | |
| 8.EFF | 4.39 | 2.33 | 3.04 | 3.58 | 13.89 | 3.80 | 3.97 | | | | | |
| 9.CON | 7.12 | 4.33 | 5.48 | 3.68 | 13.43 | 5.22 | 4.17 | 4.81 | | | | |
| 10.EXP | 13.57 | 13.57 | 14.42 | 16.65 | 11.88 | 16.02 | 12.30 | 12.82 | 12.22 | | | |
| 11.MOT | 7.98 | 8.62 | 10.59 | 11.51 | 7.99 | 11.63 | 8.75 | 10.04 | 9.72 | 9.92 | | |
| 12.SNC | 11.27 | 8.87 | 10.00 | 9.19 | 16.79 | 11.89 | 10.23 | 7.56 | 10.44 | 21.15 | 15.75 | |
| 13.SLG | 12.87 | 16.31 | 18.73 | 19.22 | 8.46 | 22.08 | 14.99 | 15.07 | 14.95 | 15.07 | 12.35 | 11.47 |

## 4.2 Explaining the development of sustainability-oriented venture ideas

### 4.2.1 Fuzzy set membership scores and truth table

Table 4.4 presents the calibration table for the following outcome and causal conditions:

SVI = f(UND, PRO, SEA, ORI, MOR, EFF)

The table provides an overview of the condition and outcome values for each case after calibration. These values are the input for the construction of the truth table and the fuzzy-set analysis.

**Table 4.4 Calibration table - sustainability-oriented venture ideas**

| Case | Conditions | | | | | | Outcome |
|---|---|---|---|---|---|---|---|
| | **UND** | **PRO** | **SEA** | **ORI** | **MOR** | **EFF** | **SVI** |
| AWW | 0.71 | 0.82 | 0.71 | 0.89 | 0.82 | 0.65 | 0.95 |
| ACO | 0.57 | 0.57 | 0.57 | 0.92 | 0.95 | 0.32 | 0.46 |
| BTR | 0.98 | 0.82 | 0.99 | 0.98 | 0.71 | 0.65 | 0.98 |
| BGF | 0.82 | 0.71 | 0.82 | 0.5 | 0.89 | 0.97 | 0.46 |
| BCY | 0.39 | 0.99 | 0.94 | 0.03 | 0.39 | 0.35 | 0.35 |
| BST | 0.82 | 0.99 | 0.39 | 0.99 | 0.43 | 0.99 | 0.69 |
| BVG | 0.32 | 0.39 | 0.98 | 0.39 | 0.89 | 0.96 | 0.97 |
| CLI | 0.98 | 0.99 | 0.98 | 0.97 | 0.95 | 0.99 | 0.9 |
| CLE | 0.89 | 0.99 | 0.96 | 0.99 | 0.89 | 0.77 | 0.21 |
| CHU | 0.99 | 0.99 | 0.99 | 0.98 | 0.43 | 0.92 | 0.88 |
| CUL | 0.89 | 0.57 | 0.46 | 0.82 | 0.95 | 0.35 | 0.95 |
| DLI | 0.32 | 0.99 | 0.57 | 0.95 | 0.71 | 0.86 | 0.95 |
| DFL | 0.89 | 0.99 | 0.96 | 0.99 | 0.89 | 0.99 | 0.98 |
| EPU | 0.89 | 0.96 | 0.98 | 0.99 | 0.89 | 0.86 | 0.98 |
| ECV | 0.98 | 0.32 | 0.89 | 0.92 | 0.65 | 0.99 | 0.98 |
| ECW | 0.57 | 0.82 | 0.99 | 0.97 | 0.95 | 0.32 | 0.95 |
| ECZ | 0.46 | 0.32 | 0.82 | 0.97 | 0.95 | 0.46 | 0.55 |
| GSU | 0.71 | 0.98 | 0.57 | 0.98 | 0.39 | 0.82 | 0.43 |
| GTR | 0.99 | 0.99 | 0.99 | 0.99 | 0.82 | 0.99 | 0.26 |
| HAR | 0.71 | 0.89 | 0.98 | 0.71 | 0.5 | 0.92 | 0.32 |
| HFR | 0.99 | 0.96 | 0.99 | 0.99 | 0.71 | 0.97 | 0.95 |
| IPA | 0.82 | 0.96 | 0.96 | 0.92 | 0.89 | 0.77 | 0.86 |
| IWB | 0.57 | 0.99 | 0.89 | 0.99 | 0.82 | 0.65 | 0.98 |
| KOR | 0.94 | 0.96 | 0.99 | 0.99 | 0.95 | 0.65 | 0.55 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MCP | 0.96 | 0.96 | 0.96 | 0.95 | 0.5 | 0.77 | 0.83 |
| MST | 0.46 | 0.26 | 0.21 | 0.71 | 0.43 | 0.65 | 0.65 |
| MOG | 0.57 | 0.26 | 0.98 | 0.71 | 0.43 | 0.32 | 0.93 |
| ODS | 0.57 | 0.82 | 0.32 | 0.57 | 0.89 | 0.77 | 0.18 |
| PEM | 0.99 | 0.71 | 0.96 | 0.99 | 0.97 | 0.97 | 0.97 |
| PRE | 0.89 | 0.71 | 0.71 | 0.92 | 0.89 | 0.35 | 0.43 |
| PRI | 0.89 | 0.96 | 0.57 | 0.65 | 0.98 | 0.99 | 0.5 |
| PWO | 0.99 | 0.98 | 0.94 | 0.89 | 0.89 | 0.94 | 0.98 |
| PLY | 0.57 | 0.96 | 0.71 | 0.89 | 0.65 | 0.92 | 0.55 |
| RMA | 0.71 | 0.97 | 0.94 | 0.89 | 0.5 | 0.65 | 0.94 |
| RNA | 0.98 | 0.96 | 0.99 | 0.99 | 0.5 | 0.94 | 0.88 |
| STW | 0.71 | 0.94 | 0.89 | 0.99 | 0.89 | 0.65 | 0.86 |
| STR | 0.71 | 0.96 | 0.99 | 0.95 | 0.65 | 0.96 | 0.46 |
| SSG | 0.57 | 0.89 | 0.46 | 0.95 | 0.43 | 0.57 | 0.46 |
| TGT | 0.82 | 0.46 | 0.96 | 0.92 | 0.97 | 0.65 | 0.77 |
| TOU | 0.32 | 0.96 | 0.96 | 0.97 | 0.71 | 0.57 | 0.5 |
| TPS | 0.96 | 0.82 | 0.96 | 0.98 | 0.97 | 0.92 | 0.94 |
| VEH | 0.99 | 0.99 | 0.99 | 0.99 | 0.82 | 0.96 | 0.96 |
| WEW | 0.99 | 0.99 | 0.94 | 0.99 | 0.65 | 0.99 | 0.46 |
| WHT | 0.94 | 0.99 | 0.99 | 0.99 | 0.65 | 0.86 | 0.98 |
| WIS | 0.46 | 0.46 | 0.82 | 0.5 | 0.65 | 0.77 | 0.46 |

The 64 logically possible configurations ($2^6$) were reduced in line with two conditions: the minimum number of cases required for a solution to be considered (frequency = 1) and the minimum consistency level of a solution (0.91). Table 4.5 shows the truth table with the resulting 13 configurations and 39 cases that are relevant for the outcome (87% of the cases). 38 cases exceed the lowest acceptable consistency, set at ≥0.91, which is above the minimum recommended of 0.8, and only 1 case is below the consistency cutoff line.

The consistency threshold of 0.91 corresponds to a gap observed in the distribution of consistency scores (Schneider and Wagemann 2010). As indicated in the methods section, consistency is the degree to which cases correspond to the set-theoretic relationships articulated in a solution (Ragin 2008). It is estimated dividing the number of cases that are present in a given configuration of conditions as well as the outcome by the number of cases that are present in the same configuration but do not exhibit the outcome (Fiss 2011).

**Table 4.5 Truth table for sustainability venture ideas**

| Conditions | | | | | | Outcome | | |
|---|---|---|---|---|---|---|---|---|
| **UND** | **PRO** | **SEA** | **ORI** | **MOR** | **EFF** | **N/cases** | **SVI** | **Consist.** |
| 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0.988 |
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0.987 |
| 1 | 1 | 0 | 1 | 0 | 1 | 2 | 1 | 0.981 |
| 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0.975 |
| 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0.968 |
| 1 | 1 | 1 | 1 | 1 | 0 | 3 | 1 | 0.954 |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0.935 |
| 1 | 1 | 1 | 1 | 1 | 1 | 21 | 1 | 0.913 |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0.903 |

There are 51 logically possible configurations lacking empirical evidence; these are the remainders to be excluded from the minimization process. I cannot infer sufficiency of a given combination of conditions for development of sustainability-oriented venture ideas (SVI) based only on the fact that such combination is logically possible. However, the areas with missing evidence are relevant and considered in the counterfactual analysis.

### 4.2.2 Configurational analysis

Based on the Truth Table 4.5 and by using a counterfactual analysis of causal conditions (automated in fsQCA), I logically reduced the truth table to the following intermediate solution, which includes easy counterfactuals and comprises nine simplified combinations of conditions:

SVI = UND • PRO • ORI • EFF
+ UND • SEA • ORI • MOR • EFF
+ UND • PRO • ORI • MOR
+ PRO • SEA • ORI • MOR • EFF
+ ~UND • ~PRO • SEA • ORI • MOR • ~EFF
+ ~UND • ~PRO • SEA • ~ORI • MOR • EFF
+ UND • ~PRO • SEA • ORI • ~MOR • ~EFF
+ ~UND • ~PRO • ~SEA • ORI • ~MOR • EFF

Each line represents a configuration of conditions associated with the development of sustainability-oriented venture ideas. In set-theory language tilde symbol (~) indicate absence, lack of or negation of the condition, the plus symbol (+) indicates OR, and the multiplication symbol (•) indicates AND. The logical AND operator is used to indicate set intersection or combination of aspects, whereas the logical OR operator is used to indicate the union of sets (Ragin, 2008).

Table 4.6 graphically reports the results of fuzzy set analysis for the integration of sustainability in the development of venture ideas (SVI). The solution table distinguishes core and peripheral conditions and shows single and overall degrees of consistency and coverage. As explained in section 3.6.3, black circles indicate the presence of the condition, and circles with "X" indicate their absence. Large circles indicate core conditions; small circles indicate peripheral conditions. Blank spaces indicate irrelevant condition (Ragin, 2008; Fiss, 2008).

Results indicate that lack of prospective sustainability entrepreneur (~PRO), presence of sustainability orientation (ORI), presence of perceived moral intensity (MOR) and presence of entrepreneurial self-efficacy (EFF) are causal conditions that exhibit a strong causal relationship with the outcome; whereas presence of sustainability understanding (UND), absence of sustainability understanding (~UND), presence of prospective sustainability entrepreneur (PRO), presence of sustainability opportunity search (SEA), absence of sustainability opportunity search (~SEA), absence of sustainability orientation (~ORI), presence of perceived moral intensity (MOR) and absence of entrepreneurial self-efficacy (~EFF) are complementary conditions that present weaker causal relationships with the outcome.

Solutions or combination of conditions are numbered I1, I2, etc., and have been sorted by raw coverage and unique coverage. The assessment of coverage provides the solutions' relative empirical importance.

**Table 4.6 Configurations for the development of sustainability-oriented venture ideas**

| | Solutions | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Configurations** | **I1** | **I2** | **I3** | **I4** | **I5** | **I6** | **I7** | **I8** |
| UND | ● | ● | ● | - | ⊗ | ⊗ | ● | ⊗ |
| PRO | ● | - | ● | ● | ⊗$_4$ | ⊗$_4$ | ⊗$_4$ | ⊗$_4$ |
| SEA | - | ● | - | ● | ● | ● | ● | ⊗ |
| ORI | ●$_1$ | ●$_1$ | ●$_1$ | ●$_1$ | ●$_1$ | ⊗ | ●$_1$ | ●$_1$ |
| MOR | - | ●$_3$ | ●$_3$ | ●$_3$ | ●$_3$ | ●$_3$ | ⊗ | ⊗ |
| EFF | ●$_2$ | ●$_2$ | - | ●$_2$ | ⊗ | ●$_2$ | ⊗ | ●$_2$ |
| Consistency | 0.86 | 0.92 | 0.88 | 0.91 | 1 | 0.99 | 1 | 1 |
| Raw coverage | **0.75** | **0.72** | **0.71** | **0.70** | **0.11** | **0.1** | **0.09** | **0.07** |
| Unique coverage | 0.067 | 0.026 | 0.026 | 0.016 | 0.002 | 0.007 | 0.004 | 0.009 |
| Overall solution consistency | 0.85 | | | | | | | |
| Overall solution coverage | 0.86 | | | | | | | |

Consistency threshold = 0.91 / Frequency threshold = 1

The solution table (above) shows that the set relation between configurations of conditions and the outcome is highly consistent, with individual results above 86%, and an overall consistency of 85%. A consistency of ≥80% indicates a strong set-theoretical relationship between the solution term and the outcome as well as between the overall solution and the outcome (Ragin, 2006).

**Table 4.7 Cases with membership greater than 0.5 in each solution term - SVI**

| **Solution** | **Cases** |
|---|---|
| **I1** | WEW*, GTR*, CLI, VEH, HFR, RNA, CHU, DFL, PWO, WTS, EPU, BST, TPS, MCP, IPA, CLE*, PEM, HAR*, STR*, GSU* |
| **I2** | PEM, CLI, TPS, DFL, PWO, EPU, VEH, GTR*, CLE*, IPA, HFR, WTS, WEW*, TGT, STR*, STW, KOR, ECV, BTR, AWW |
| **I3** | CLI, KOR, CLE*, PWO*, DFL, EPU, VEH, TPS, GTR*, IPA, STW, PRE*, PEM, HFR, BTR, AWW, PRI, STR*, WEW*, WTS |
| **I4** | CLI, DFL, PWO, EPU, VEH, GTR*, TPS, CLE*, IPA, HFR, PEM, WTS, WEW*, STR*, STW, PLY, KOR, IWB, BTR, AWW |
| **I5** | ECZ |
| **I6** | BVG |
| **I7** | MOG |
| **I8** | MST |

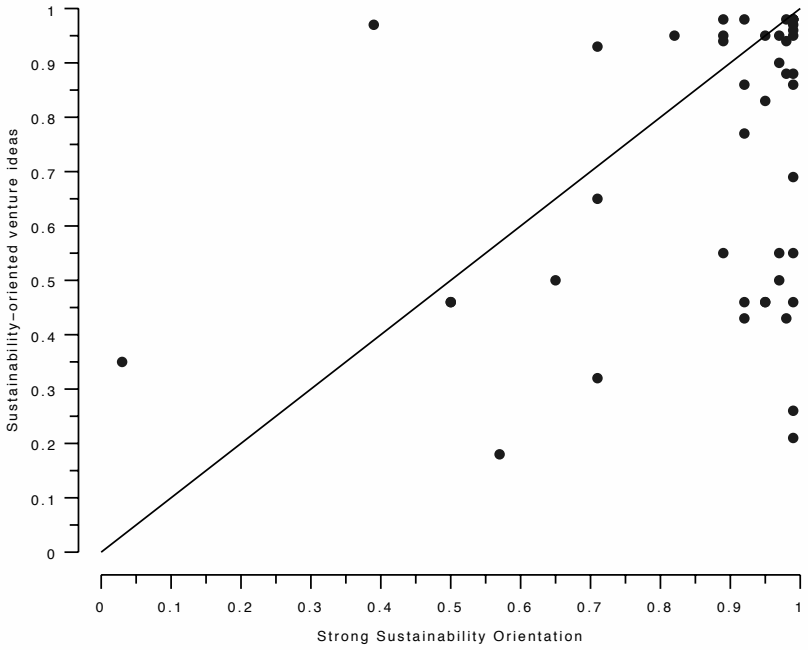
*Cases with membership lower than 0.5 in the outcome

Table 4.7 presents the cases with set membership greater than 0.5 in each solution term and the outcome, as well as highlights (*) those cases with set membership greater than 0.5 in the solution term but lower than 0.5 in the set of entrepreneurs with strong integration of sustainability in the development of venture ideas (SVI). Cases are classified in descending order based on their joint membership score in the solution term.

### 4.2.3 Necessity analysis

Necessity analysis found one usually necessary condition for high integration of sustainability in the development of venture ideas; this is the presence of strong sustainability orientation (consistency = 0.95). Figure 4.2 presents a scatterplot with the fuzzy subset relationship between development of sustainability-oriented venture ideas (SVI) and sustainability orientation (ORI). The fact that membership in the outcome (SVI) is almost always less or equal than membership in the cause (ORI) corroborates the argument of necessity. Despite the high concentration of instances along the full membership in sustainability orientation (ORI), the distribution of cases across the lower triangle shows that there is no set skewed towards high membership, eliminating the potential risk of trivialness of the necessary condition (Schneider and Wagemann 2012).

**Figure 4.2 Scatterplot of fuzzy subset relationship between SVI and strong ORI**



The presence of cases in the lower triangular plot suggests that almost every time an entrepreneur is developing a sustainability-oriented venture idea (SVI) there is a strong consideration of the responsibilities and obligations of the new venture in its social, environmental, economic and intergenerational dimensions (i.e. sustainability orientation). This reinforces the argument that sustainability entrepreneurship is indeed a particular approach to business development, which regardless of the nature of the business, combines economic, social, environmental and intergenerational aspects in a holistic and systemic way.

Sustainability orientation, as a necessary condition, reflects underlying values that guide the emergence of sustainability-oriented venture ideas. The way the founder of HFR (an impact digital media company focused on environmental and social justice issues) thinks about the origin and purpose of his business illustrates this necessity relationship:

> I really think there's a serious brain chemistry evolution thing here that needs to happen, where you move from thinking about environment, social, and financial issues in a compartmentalized fashion (…) we think of these things separately and with appropriate blended-value therapy you dissolve those firewalls, you have blended value. You're in dialog with each other, informing each other, and that value arises from that deep interplay of those qualities.

A further examination of the survey data corroborates this point. 92% of the entrepreneurs with strong membership in the set of sustainability-oriented venture ideas ($\geq$0.8) exhibit high scores in the prioritizing of intergenerational aspects, this in that when choosing between the business ideas they had in mind, they always chose the one that better contributes to building a better society.

The story of BTR is also highly illustrative. Inspired by the idea of producing local, fresh food, the founders realized that the firm needed to be driven by values, not by bulk farming. In building up the business, they created tools to make food personal again and bring sustainability, education, and healthy, local food into their community. As one of the founders indicate during the interview:

> If you look at BTR, we're in some sense creating tools for education. We're not creating profits. If you look at our product, we're not trying to solve world hunger, what we're trying to say is we're wanting to create an experience (…) of you being able to have a discussion to your kid, maybe for the first time ever about the fact that you're putting waste in your kitchen and then you're growing food out of something that was a waste before, and you're able to

> grow something in ten days and get the kid to be really excited by that. That to us is a tool, not a product. That ultimately comes from that founding belief in education (...) I think obviously this is tied back to sustainability, which my business partner was very passionate about as well.

These values are instrumental in that delineation of the business idea and strategic approach that accompany its development. For the founders of PEM, for example, the idea of creating socially and environmentally beneficial forestry company is rooted in such values. In shaping the idea, they were trying to find a more sustainable, long-term method to support subsistence farmers, so that they would be able to utilize their land, keep it, and actually not end up degrading the soil.

> How can we sustainably raise the standard of living without harming the resources that our communities have and creating a long-term strategy where they'll be able to keep those resources, keep the land, and be able to replicate what they're doing so their kids will actually be able to benefit from it as well?

In this case, sustainability values guided the challenge and issues they were trying to overcome, i.e. the way they sensed and responded to anomalies. As one of the founders explain:

> So we came up with the idea of leasing the land but doing it for forestry purposes, and we used degraded portions of land, so we don't use all of an individual's land. If they have a certain amount we're only using a small portion that's already degraded, that they're not using for farming that may have poor soil quality because they've overused it. We plant trees on that and it gives them a secondary source of income. They're using that to supplement other types of agriculture they have on the land. That was the whole idea, as far as motives were concerned, to be able to work with these people, we knew and that we considered our community partners and give them another economic option they would be able to utilize

These stories provide evidence supporting the necessity relationship between the cause, sustainability orientation (ORI), and the integration of sustainability in the development of venture ideas. The quotations have been extracted from sections of the interviews and specific documents where the entrepreneur describes the actions, events and circumstances involved in the development of the sustainability-oriented venture opportunity. In particular, the quotations reflect the presence of underlying attitudes and convictions regarding the role of the business in society as a necessary condition for the integration of sustainability in the development of venture ideas, which is understood as a

particular way of sensing and responding to economic, social, ecological, and intergenerational anomalies (see outcome measures).

### 4.2.4 Sufficiency analysis

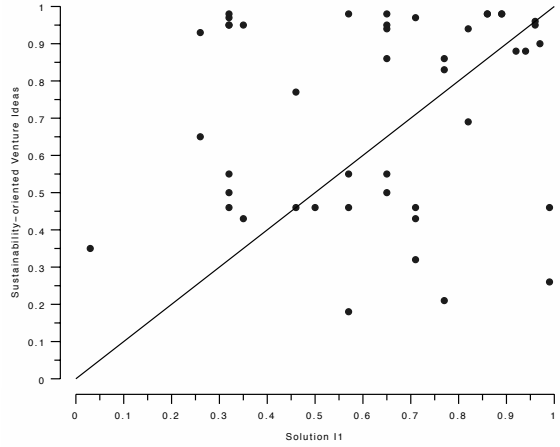
Sufficiency analysis found no single condition sufficient for the integration of sustainability in the development of venture ideas (SVI). The results point out a situation of true equifinality, with eight consistent paths to membership in the set of entrepreneurs with high integration of sustainability in the development of venture ideas. These eight quasi-sufficient combinations are understood as alternate paths for the outcome SVI and they are logically equivalent or substitutable (Ragin 2006). The total coverage of the solution (i.e. joint importance of all paths) is 0.86 indicating that most of the outcome is covered or explained by the eight causal paths and that the solution as a whole is empirically relevant.

Among the eight causal paths, there are four empirically dominant configurations: I1 (raw coverage = 0.75, unique coverage = 0.067), I2 (raw coverage = 0.72, unique coverage = 0.026), I3 (raw coverage = 0.71, unique coverage = 0.026) and I4 (raw coverage = 0.70, unique coverage = 0.016). Figure 4.3 presents the scatterplots of fuzzy subset relationship between the development of sustainability-oriented venture ideas (SVI) and the four configurations.

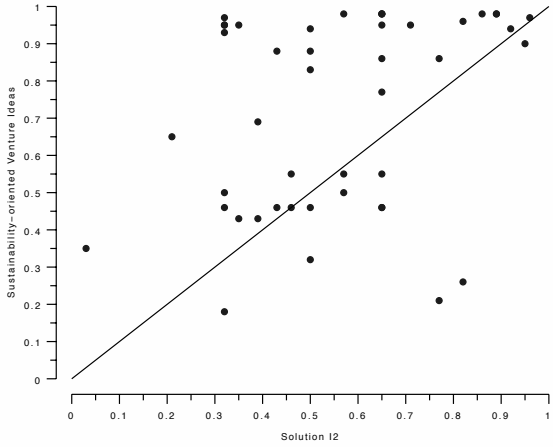
Solution I1 combines the core conditions strong sustainability orientation (ORI) and strong entrepreneurial self-efficacy with two complementary conditions: strong sustainability understanding (UND) and strong prospective sustainability entrepreneur (PRO). Unlike sustainability orientation (ORI) and entrepreneurial self-efficacy (EFF), which occur in both parsimonious and intermediate solutions, sustainability understanding (UND) and prospective sustainability entrepreneur (PRO) are reminders that only occur in the intermediate solution.

**Figure 4.3 Scatterplots of fuzzy subset relationships between SVI and solutions I1, I2, I3 and I4**

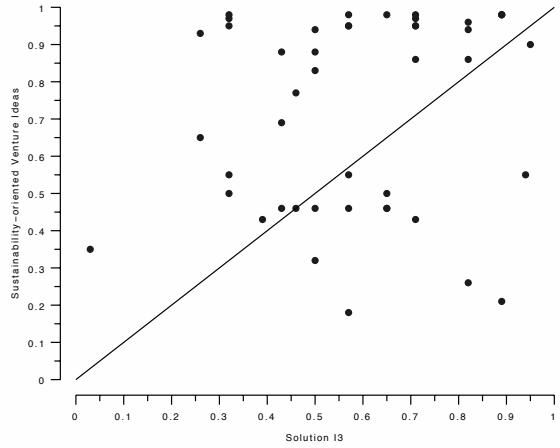
Plot A. SVI and solution I1



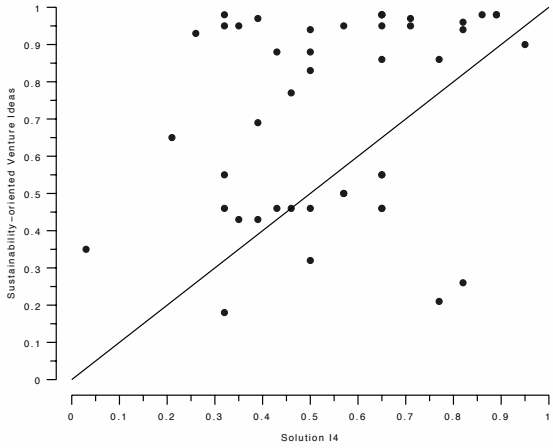

Plot B. SVI and solution I2




Plot C. SVI and solution I3




Plot D. SVI and solution I4




The story of HFR illustrates how conditions in solution I1 combine in reality. As mentioned in the explanation of *sustainability orientation* as a necessary condition for the development of *sustainability venture ideas*, HFR is a global impact digital media company that delivers content, social networking and other web-based products and services that focus on sustainability issues.

At that time the founder was developing the idea for HFR, there were some other similar initiatives starting up that he recognizes as part of an emerging *impact infrastructure*. In his words, this is an infrastructure that truly understands current pressing - social, environmental and economic - problems and consequently seeks to create and support companies that are rigorously certified triple-bottom line (UND). As he explains, this infrastructure is primarily about like-minded people that believe that, in order to achieve a truly sustainable world, we need to read the vital signs of the planet and tweak business as usual (ORI).

HFR was conceived as a triple-bottom line certified B Corporation[7] from the intention of pursuing a sustainability-oriented venture opportunities and from the willingness to create sustainable value in the future (PRO). As the founder states in an interview:

> Becoming one of the first B Corps, and really embracing the best of this new infrastructure (rating system, mission markets and impact investing platforms) as it came out, actually added significantly to our value proposition, as an initiative. We were going to be able to speak from a place that no other media source could speak from.

HFR's founder was convinced about the relevance of the B Corp movement, and most importantly about the fact that, by means of building new, sustainable businesses, he and the impact infrastructure around him will be capable of initiating the wave of changes much needed (EFF). Ultimately, in his view, it is all about creating sustainable value capable of catalysing a systemic, paradigmatic change (PRO). The quote below illustrates this point:

> We really have to think in terms of systemic change and paradigm change and I saw in -- certainly what HFR is set up to focus on and be an expression of -- I saw in the B Corps effort and consciousness that we needed a new paradigm and you needed new structures to support this new paradigm.

Similar to I1, solution I3 combines two peripheral conditions: sustainability understanding (UND) and prospective sustainability entrepreneur (PRO) with the core condition sustainability orientation (ORI). However, unlike I1, perceived moral intensity (MOR) is present and entrepreneurial self-efficacy (EFF) is irrelevant indicating that, when it comes to integrating sustainability in the development of venture ideas, perceived moral intensity (MOR) and entrepreneurial self-efficacy (EFF) are interchangeable.

The case of BTR illustrates solution I3. The idea for BTR emerged from a particular view and understanding of the meaning of sustainability (UND). For its founders, sustainability is simply about being transparent and doing the right thing in business (ORI). In particular, it is about fighting the wasteful bulk mushroom farming (MOR) by developing a responsible business; one that treats team members and community well, and sources raw materials the right way (ORI). By doing so, they have articulated a moved forward a holistic approach to business (PRO). By implementing this

[7] B Corps are certified by the non-profit B Lab to meet rigorous standards of social and environmental performance, accountability, and transparency. More information available at http://www.bcorporation.net

approach they have sought not only to transform waste into products but also to create sustainable value in the future (PRO). The combination of orientation and intention emerges in the following quote:

> If you're able to have and push that holistic view on your business (PRO) and you're able to tell everybody about it, you'll have financial sustainability and you'll also be doing the right thing (ORI).

Given the background of BTR's founders (Alejandro in Table 3.5), there is a natural inclination to think that sustainable entrepreneurs will combine their strong orientation and intention to create sustainable value, with a strong confidence in their skills to develop venture ideas capable of creating such value. However, this configuration shows something different, i.e. that sustainable venture ideas can emerge under conditions of irrelevant self-efficacy. By contrasting solutions I3 and I1 one may infer that the perceived moral significance of the sustainability problem at stake plays a similar role in the development of sustainability-oriented venture ideas as the confidence in establishing a meaningful business. Combined with a strong orientation, the intensity of the problem seems to be sufficient to developing sustainability venture ideas. As the founder of BTR explains:

> All this organic waste (produced by coffee shops), when just dumped into the landfill decomposes to produce hundreds of thousands of tons of methane gas in our atmosphere, a greenhouse gas about 25x worse than carbon dioxide for our environment (MOR). We seek to address that by building our business on other businesses' waste. (However) I guess I never saw myself as an entrepreneur when we first started it (no EFF). It was such a novel concept and it was growing mushrooms, which isn't very sexy, so a lot of people were making fun of us with "What the hell are you guys doing?" So it never became a business (no EFF). I think what is cool is that both my business partner and I were stupid enough to be excited by it, where everybody else thought we were ridiculous (…) So it's interesting because we kind of both fed off each other's stupidity and that turned into a business (no EFF).

The following quote from the founder of IPA reinforces the argument:

> From a very early age I understood the idea of job creation and there are certain sectors of the economy that are more sustainable and can have more positive spillover effects (UND). And I really wanted to contribute to that (PRO) During volunteering work in Honduras, Costa Rica, Ghana and Uganda I was exposed to very high levels of inequality, as compared to my background, and I think that had a lasting impact on me (MOR). So, I would say, that's kind of where the inspiration came from (…) I never connected to the leadership role necessary to start your own company and I think that's really important to be able to view yourself as a leader (~EFF). So working

> with women who had been running their companies for a long time gave me that extra, I would say, confidence, that I needed.

Solution I2 combines the core conditions strong sustainability orientation, entrepreneurial self-efficacy (EFF) and perceived moral intensity (MOR) with two complementary conditions: sustainability understanding (UND) and sustainability opportunity search (SEA). Solution I4 presents a similar configuration of causal conditions as I2. It combines three core conditions: sustainability orientation (ORI), perceived moral intensity (MOR) and entrepreneurial self-efficacy (EFF) with two peripheral conditions: prospective sustainability entrepreneur (PRO), which replaces sustainability understanding (UND) and sustainability opportunity search (SEA). In the same way as with I1 and I3, here sustainability understanding (UND) and prospective sustainability entrepreneur (PRO) are interchangeable conditions.

The facts that solutions I2 and I4 share their core conditions and exhibit high levels of raw coverage, yet lacking high levels of unique coverage, suggest that there is an overlap in the coverage of the solutions. In order to reduce the effect of overlaps, fsQCA allows for creating union of sets or supersets. The union of partially overlapping sets produces new consistency and raw coverage scores, and contributes to increasing the empirical importance of the solutions while maintaining a high level of consistency.

**Table 4.8 Overview of empirically relevant causal relationships – SVI**

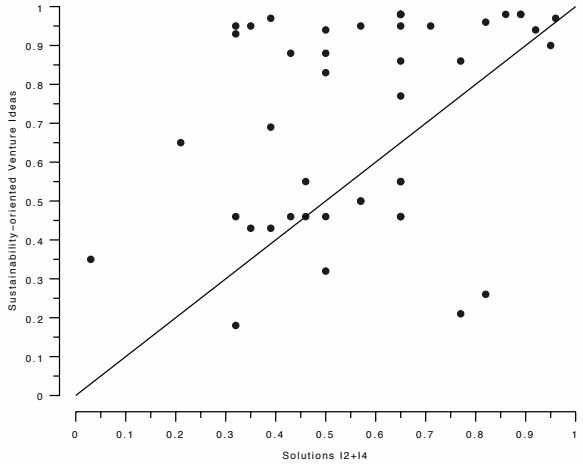
| **Configurations** | **I1** | **I3** | **I2+I4** |
|---|---|---|---|
| UND | ● | ● | ▼ |
| PRO | ● | ● | ▼ |
| SEA | - | - | ● |
| ORI | ● | ● | ● |
| MOR | - | ● | ● |
| EFF | ● | - | ● |
| Consistency | 0.86 | 0.88 | 0.91 |
| Raw coverage | **0.75** | **0.71** | **0.73** |

Table 4.8 presents the four dominant configurations for the development of sustainability-oriented venture ideas (SVI) and the new consistency and coverage score

for union of sets I2 and I4. As expected, the new set exhibits a stronger relationship of sufficiency than I2 and I4 independently.

In I2+I4, i.e. SEA•ORI•MOR•EFF•[UND+PRO] (0.91, 0.73), the development of sustainability-oriented venture ideas is the result of a combination of strong sustainability opportunity search (SEA), strong sustainability orientation (ORI), strong perceived moral intensity (MOR) and strong self-efficacy (EFF) with either strong sustainability understanding (UND) or strong prospective sustainability entrepreneur (PRO). Figure 4.4 shows a scatterplot with the fuzzy subset relationship between the outcome and the union of sets I2 and I4.

**Figure 4.4 Scatterplot of fuzzy subset relationship between SVI and I2+I4**




The case of TPS (0.98,0.94) illustrates the sufficiency relation between the superset I2+I4 and the development of sustainability venture ideas. Before starting TPS, Kate was working as a commercial executive at M&S in the UK. With the years she became very dissatisfied with retail because it seemed to her that this sector was less about shops and understanding customers as individuals and more about making a profit at any cost (MOR). She emphasizes that, at the time the focus of retail was shifting, the cleverness and skills of being a retailer were going. As she recounts during the interview:

> After my fifth restructure in seven years I felt, did I get it wrong five times? (MOR) Then I thought I've got to go, I don't believe what we are doing is right anymore. We believed that in a new playing ground where there is a growing demand for more ethical and sustainable models we could do it better, and actually make a significant difference (EFF).

The founders' original idea was to sell organic food in a loyal, decent and honest way, with the community running the supermarket, and profits being ploughed back in (ORI). They wanted it to be 'fresh and wild', however they realized that 90% of the population don't shop in 'fresh and wild'. The quote above support this idea:

> I started this business with this dream of creating an ultra green, ultra sustainable, environmental business (ORI). I realized very, very quickly that the business has to remain open and trading sustainably to enable me to be sustainable in the future (SEA). I'd love to think that it is just about the planet, it is just about the kids, and it is just about education; but it is also about the business retaining its business nature (SEA)

In facing this challenge, they articulated a vision and business idea aimed at creating commercially sustainable, social enterprises that achieve their growth and profitability targets whilst operating within values based on community development and cohesion (ORI).

> One of the things that happened is that my business partner and I came together and we actually realized that there was a different way of doing business (UND). A different way of selling food and trying to improve, not only the immediate buying community but also the farming community and that's what drove us to it (PRO). So we came together to make a difference where we could (EFF).

The interaction between moral intensity, sustainability orientation and entrepreneurial self-efficacy is also evident in the way one of the founders of TGT presents the development of the idea for the venture:

> The idea behind TGT was born in India during our trip to Kerala and Tamil Nadu during the winter of 2009. India doesn't leave anybody unaffected. The contrasts are tremendous; poor and colourful, rich and intense. For us, the trip to India became a symbol of the polarity of the world we live in. Happiness and despair, hand in hand (MOR). We felt powerless and encouraged at the same time – and we decided it was time to take a stand for a sustainable, balanced and respectful way of living and conducting our lives (ORI) In this spirit we decided that we wanted to create a business together, and that our business strategy would be to make solutions and tools to achieve social, environmental, and financial sustainability fun, understandable and accessible (EFF)

Table 4.9 provides further evidence supporting the sufficiency relationship between the four empirically dominant configurations and the development of sustainability venture ideas.

**Table 4.9 Data supporting sufficiency relationships between relevant solutions and SVI**

| Conf. | Conditions combined | Representative quotations |
|---|---|---|
| I1 | ORI•EFF•UND•PRO | In 2009, we moved to the Ecuadorian Amazon, days after graduating from college, with the dream of using business to create livelihoods for indigenous farmers (ORI). Together with the communities I began imagining how a Fair Trade business could share this rich-tasting tea with a global audience, and pioneer a proactive and culturally valuable way (PRO) for the Kichwa people to participate in the global economy. RNA (0.94,0.88) |
| I3 | ORI•UND•PRO | I served as project architect for three years on the Human Habitat portion of the Biosphere 2 in Arizona; and have focused my architecture on integrating living systems into buildings for food production, waste, air and water treatment (UND). Travel to Central America focused my architecture on the practical and environmental importance of using naturally abundant local materials (ORI) I have devoted the better part of the last 20 years exploring and experimenting with natural building (ORI) (Based on this idea) I have designed and built structures ranging from passive solar greenhouses, residences, an eco-tourism resort, eco-restaurants, educational facilities and an office building (PRO). WHT (0.65,0.98) |
| I2+I4 | ORI•MOR•EFF•UND | During our time in Peace Corps we all saw these logging trucks taking all of these old growth woods out of the region but we also saw some of the community members still continue with the slash and burn agriculture (MOR). We kind of came up with the idea of an innovative land lease model that would give an incentive to not deforest the land based upon some incentives as far as profit sharing and utilizing the land in a more sustainable manner (ORI). PEM (0.96,0.71) |
| | | As far as the drivers and the motivation, we'd lived in the communities where we worked for two to three years during our Peace Corps service (MOR), so we were very familiar with some of the challenges the people in the community faced and what some of the issues were that they had to overcome (UND); actually living there and experiencing it on a day-to-day basis with them (MOR). We had a better idea of what would work and what wouldn't as far as at the grass-roots level (EFF). PEM (0.96,0.71) |

Overall, lower solution coverage in solutions I5 to I8 and relatively balanced coverage among alternative paths suggest that causality underlying the development of sustainability-oriented venture ideas is complex.

Solutions I5, I6, I7 and I8 portray counterintuitive cases, demonstrating that the integration of sustainability in the development of venture ideas can occur even under conditions where, for example, there is no understanding of sustainability (I5, I6 and I8) nor ability and willingness to pursue sustainability-oriented venture opportunities (I5, I6, I7 and I8), although they might be exploring ideas with economic, social, environmental and intergenerational components (I5, I6 and I7). These configurations of causal conditions and their respective cases are not errors; they are simply different recipes for the development of sustainability-oriented venture ideas.

The personal history of MOG's founder in solution I7 (0.57,0.93) exemplifies how conditions combine in a counterintuitive way to producing the development of sustainability venture ideas. This is a venture that designs, plants and maintains organic vegetable gardens. Here, the entrepreneur does not have the ability and willingness to pursue sustainability-oriented venture opportunities, however he understands that the business he is creating needs to protect the environment and promote social justice.

What it seems to be a contradiction, it is actually not. Sustainable farming is a family tradition, and after merging his experiences in international development and Peace Corps in rural Bulgaria, he decided to continue the tradition, but now searching for holistic value creation. In doing so, alongside offering sustainable farming services, he teaches disadvantaged communities how to grow the garden on their own; because he simply believes that it is unjust that the people who actually need to grow their own food can't afford the price of the service. As the founder of MOG indicates during an interview:

> We were two years here in Bulgaria. When we came back to the U.S I started gardening on the side and during the winter I was doing a lot of reading up on it and getting caught up to all the stuff my father did when I was a kid and how that applied to organic gardening, and getting a good understanding. I started getting really interested in intensive organic growing, essentially growing as much as you can in as small of a space as possible. It started getting me thinking is this something where I could put together a small -- develop a template you could repeat and throw in someone's backyard, charge them so much and you set up the garden.

On the other hand, the analysis also shows cases that, although present in a sufficient configuration of conditions, do not exhibit the outcome. The story of CLE in solution I3 (0.89, 0.21) illustrates this situation. CLE is a seafood trading company that promotes sustainable practices across the fishing industry – upstream and downstream. It brings together artisan producers, both fishermen and farmers, and champions them in the marketplace under traceable, transparent brands. Although sustainability orientation (ORI), perceived moral intensity (MOR), sustainability understanding (UND) and prospective sustainability entrepreneur (PRO) are strong components of the narrative of the venture (see quote below) CLE exhibits low membership in the outcome.

> We are an unlikely pair (of entrepreneurs) on a timely mission — to use the marketplace to heal the oceans, one dinner at a time. No boycotts. No broad guidelines or colour codes. Just connect upstream artisan producers with downstream eaters, and tell the story of the fish so the choice would be clear

> (…) (we knew that) an answer to the growing seafood crisis was to create a commercial venture strong enough to successfully champion responsible artisan producers who were committed to sustainable practices while, at the same time, producing seafood of the highest quality.

The personal history of one of its founders explains the presence of the solution with absence of the outcome. For Tim, founder of CLE, this venture represents the culmination of a life long dream. He started in aquaculture in 1974, working in an operation that was designed as a means of feeding people in a responsible manner with quality protein as part of other energy and food systems. Although sustainability is embedded in the nature of the business, he gives an alternative explanation for the presence of social, environmental and intergenerational elements in the development of the idea for CLE. He indicates:

> The idea is the result of decades of hard work, countless hours of study and on-going interactions with some of the brightest minds in business, politics, education, research, spirituality and the sustainable and environmental movements.

In this sense, the venture idea is not the result of sensing and responding to one specific anomaly, but rather a life of knowing that aquaculture is an essential part of revitalizing the habitats of wild species.

The stories accompanying the solutions provide evidence supporting the sufficiency relationship between the different configurations and the integration of sustainability in the development of venture ideas. The stories and quotations seek to illustrate the conjunctural nature of the solutions, in other words how the different conditions combine in the development of sustainability venture ideas.

### 4.2.5 Robustness tests

#### 4.2.5.1 Frequency change

In order to assess the stability of the solutions, I replicated the analysis with a frequency threshold of 2. As the Truth Table 4.10 shows there is change in the number of configurations. After the minimization process, it maintains those configurations with a high number of instances and eliminates those configurations (7) with less than 2 instances, which are treated as logical reminders.

**Table 4.10 Truth table for SVI (f=2)**

| Conditions | | | | | | Outcome | | |
|---|---|---|---|---|---|---|---|---|
| UND | PRO | SEA | ORI | MOR | EFF | N/cases | SVI | Consist. |
| 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| 1 | 1 | 0 | 1 | 0 | 1 | 2 | 1 | 0.981 |
| 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0.975 |
| 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0.968 |
| 1 | 1 | 1 | 1 | 1 | 0 | 3 | 1 | 0.954 |
| 1 | 1 | 1 | 1 | 1 | 1 | 21 | 1 | 0.913 |

**Table 4.11 Configurations for sustainability-oriented venture ideas (f=2)**

| | Solutions | | | |
|---|---|---|---|---|
| **Configurations** | **I1*** | **I2*** | **I3*** | **I4*** |
| UND | ● | ● | - | ● |
| PRO | - | ● | ● | ● |
| SEA | ● | ● | ● | - |
| ORI | ● | ● | ● | ● |
| MOR | ● | ● | ● | ⊗ |
| EFF | ● | - | ● | ● |
| Consistency | 0.92 | 0.89 | 0.91 | 0.95 |
| Raw coverage | **0.72** | **0.71** | **0.70** | **0.31** |
| Unique coverage | 0.033 | 0.026 | 0.018 | 0.013 |
| Overall solution consistency | 0.88 | | | |
| Overall solution coverage | 0.77 | | | |

Consistency threshold = 0.91 / Frequency threshold = 2

Although this increases the limited diversity over 64 logically possible configurations, it allows for increasing the consistency and relevance of the solutions in that it uses configurations with a greater number of empirical instances.

As Table 4.11 shows, the most empirically relevant solutions remain the same. I1* and I3* maintain the same solution pattern as I2 and I4, and I2* reconciles I1 and I3, eliminating the overlapping effect.

#### 4.2.5.2 Sensitivity analyses

The aim of the sensitivity analysis is to examine whether my findings, particularly those of necessity and sufficiency, are robust to the use of alternative specifications of causal conditions. For example, based on a deep knowledge of the cases one can argue that the relationship between strong sustainability orientation (ORI) and the development of sustainability-oriented venture ideas (SVI) is not strong enough to support the argument of necessity, and that the relationship of full necessity between ORI and SVI emerges with a more or less strong sustainability orientation (√ORI). From another perspective, and based on substantive knowledge, one can doubt that the relationship between ORI and SVI is one of necessity, but one of sufficiency when there is a very strong sustainability orientation ($ORI^2$). This might mean that having a very strong sustainability orientation ($ORI^2$) is sufficient but not necessary for the integration of sustainability in the development of venture ideas. This can a have major impact on the explanation of how opportunities develop in sustainability entrepreneurship, in that it can modify the number of causal paths and the explanation of the role of each causal condition.

This analysis is conducted by observing causal relationships under higher and lower degree of membership in the set of each relevant condition.

Squaring fuzzy set membership scores shifts causal conditions in a downward direction, creating sets of very strong sustainability understanding ($UND^2$), very strong prospective sustainability entrepreneur ($PRO^2$), very strong sustainability opportunity search ($SEA^2$), very strong sustainability orientation ($ORI^2$), very strong perceived moral intensity ($MOR^2$) and very strong self-efficacy ($EFF^2$). Likewise, taking the square root of membership scores shifts causal conditions in a upward direction, creating the sets of more or less strong sustainability understanding (√UND), more or less strong prospective sustainability entrepreneur (√PRO), more or less strong sustainability opportunity search (√SEA), more or less strong sustainability orientation (√ORI), more or less strong perceived moral intensity (√MOR) and more or less strong self-efficacy (√EFF).

Shifting membership scores in an upward or downward direction can shift points from one side to the other of the diagonal in the plot of an outcome against a causal condition (Ragin 2000). Indeed, the use of modifiers ($X_i^2$ and $\sqrt{X_i}$) can have a major impact on patterns of necessity revealed in Figure 4.2. Table 4.12 presents fuzzy-set membership scores for sensitivity analysis after applying modifiers and Table 4.13

presents the results of the necessity analysis with very strong and more or less strong causal conditions contrasted to strong causal conditions.

**Table 4.12 Fuzzy-set membership scores for sensitivity analysis SVI**

| Case | Conditions | | | | | | | | | | | | Outcome |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Very strong (n squared) | | | | | | More o less strong (n root squared) | | | | | | |
| | $UND^2$ | $PRO^2$ | $SEA^2$ | $ORI^2$ | $MOR^2$ | $EFF^2$ | √UND | √PRO | √SEA | √ORI | √MOR | √EFF | SVI |
| AWW | 0.5 | 0.67 | 0.5 | 0.79 | 0.67 | 0.42 | 0.84 | 0.91 | 0.84 | 0.94 | 0.91 | 0.81 | 0.95 |
| ACO | 0.32 | 0.32 | 0.32 | 0.85 | 0.9 | 0.1 | 0.76 | 0.76 | 0.76 | 0.96 | 0.97 | 0.57 | 0.46 |
| BTR | 0.96 | 0.67 | 0.98 | 0.96 | 0.5 | 0.42 | 0.99 | 0.91 | 1 | 0.99 | 0.84 | 0.81 | 0.98 |
| BGF | 0.67 | 0.5 | 0.67 | 0.25 | 0.79 | 0.94 | 0.91 | 0.84 | 0.91 | 0.71 | 0.94 | 0.98 | 0.46 |
| BCY | 0.15 | 0.98 | 0.88 | 0 | 0.15 | 0.12 | 0.62 | 1 | 0.97 | 0.17 | 0.62 | 0.59 | 0.35 |
| BST | 0.67 | 0.98 | 0.15 | 0.98 | 0.18 | 0.98 | 0.91 | 1 | 0.62 | 1 | 0.66 | 1 | 0.69 |
| BVG | 0.1 | 0.15 | 0.96 | 0.15 | 0.79 | 0.92 | 0.57 | 0.62 | 0.99 | 0.62 | 0.94 | 0.98 | 0.97 |
| CLI | 0.96 | 0.98 | 0.96 | 0.94 | 0.9 | 0.98 | 0.99 | 1 | 0.99 | 0.98 | 0.97 | 1 | 0.9 |
| CLE | 0.79 | 0.98 | 0.92 | 0.98 | 0.79 | 0.59 | 0.94 | 1 | 0.98 | 1 | 0.94 | 0.88 | 0.21 |
| CHU | 0.98 | 0.98 | 0.98 | 0.96 | 0.18 | 0.85 | 1 | 1 | 1 | 0.99 | 0.66 | 0.96 | 0.88 |
| CUL | 0.79 | 0.32 | 0.21 | 0.67 | 0.9 | 0.12 | 0.94 | 0.76 | 0.68 | 0.91 | 0.97 | 0.59 | 0.95 |
| DLI | 0.1 | 0.98 | 0.32 | 0.9 | 0.5 | 0.74 | 0.57 | 1 | 0.76 | 0.97 | 0.84 | 0.93 | 0.95 |
| DFL | 0.79 | 0.98 | 0.92 | 0.98 | 0.79 | 0.98 | 0.94 | 1 | 0.98 | 1 | 0.94 | 1 | 0.98 |
| EPU | 0.79 | 0.92 | 0.96 | 0.98 | 0.79 | 0.74 | 0.94 | 0.98 | 0.99 | 1 | 0.94 | 0.93 | 0.98 |
| ECV | 0.96 | 0.1 | 0.79 | 0.85 | 0.42 | 0.98 | 0.99 | 0.57 | 0.94 | 0.96 | 0.81 | 1 | 0.98 |
| ECW | 0.32 | 0.67 | 0.98 | 0.94 | 0.9 | 0.1 | 0.76 | 0.91 | 1 | 0.98 | 0.97 | 0.57 | 0.95 |
| ECZ | 0.21 | 0.1 | 0.67 | 0.94 | 0.9 | 0.21 | 0.68 | 0.57 | 0.91 | 0.98 | 0.97 | 0.68 | 0.55 |
| GSU | 0.5 | 0.96 | 0.32 | 0.96 | 0.15 | 0.67 | 0.84 | 0.99 | 0.76 | 0.99 | 0.62 | 0.91 | 0.43 |
| GTR | 0.98 | 0.98 | 0.98 | 0.98 | 0.67 | 0.98 | 1 | 1 | 1 | 1 | 0.91 | 1 | 0.26 |
| HAR | 0.5 | 0.79 | 0.96 | 0.5 | 0.25 | 0.85 | 0.84 | 0.94 | 0.99 | 0.84 | 0.71 | 0.96 | 0.32 |
| HFR | 0.98 | 0.92 | 0.98 | 0.98 | 0.5 | 0.94 | 1 | 0.98 | 1 | 1 | 0.84 | 0.98 | 0.95 |
| IPA | 0.67 | 0.92 | 0.92 | 0.85 | 0.79 | 0.59 | 0.91 | 0.98 | 0.98 | 0.96 | 0.94 | 0.88 | 0.86 |
| IWB | 0.32 | 0.98 | 0.79 | 0.98 | 0.67 | 0.42 | 0.76 | 1 | 0.94 | 1 | 0.91 | 0.81 | 0.98 |
| KOR | 0.88 | 0.92 | 0.98 | 0.98 | 0.9 | 0.42 | 0.97 | 0.98 | 1 | 1 | 0.97 | 0.81 | 0.55 |
| MCP | 0.92 | 0.92 | 0.92 | 0.9 | 0.25 | 0.59 | 0.98 | 0.98 | 0.98 | 0.97 | 0.71 | 0.88 | 0.83 |
| MST | 0.21 | 0.07 | 0.04 | 0.5 | 0.18 | 0.42 | 0.68 | 0.51 | 0.46 | 0.84 | 0.66 | 0.81 | 0.65 |
| MOG | 0.32 | 0.07 | 0.96 | 0.5 | 0.18 | 0.1 | 0.76 | 0.51 | 0.99 | 0.84 | 0.66 | 0.57 | 0.93 |
| ODS | 0.32 | 0.67 | 0.1 | 0.32 | 0.79 | 0.59 | 0.76 | 0.91 | 0.57 | 0.76 | 0.94 | 0.88 | 0.18 |
| PEM | 0.98 | 0.5 | 0.92 | 0.98 | 0.94 | 0.94 | 1 | 0.84 | 0.98 | 1 | 0.98 | 0.98 | 0.97 |
| PRE | 0.79 | 0.5 | 0.5 | 0.85 | 0.79 | 0.12 | 0.94 | 0.84 | 0.84 | 0.96 | 0.94 | 0.59 | 0.43 |
| PRI | 0.79 | 0.92 | 0.32 | 0.42 | 0.96 | 0.98 | 0.94 | 0.98 | 0.76 | 0.81 | 0.99 | 1 | 0.5 |
| PWO | 0.98 | 0.96 | 0.88 | 0.79 | 0.79 | 0.88 | 1 | 0.99 | 0.97 | 0.94 | 0.94 | 0.97 | 0.98 |
| PLY | 0.32 | 0.92 | 0.5 | 0.79 | 0.42 | 0.85 | 0.76 | 0.98 | 0.84 | 0.94 | 0.81 | 0.96 | 0.55 |
| RMA | 0.5 | 0.94 | 0.88 | 0.79 | 0.25 | 0.42 | 0.84 | 0.98 | 0.97 | 0.94 | 0.71 | 0.81 | 0.94 |
| RNA | 0.96 | 0.92 | 0.98 | 0.98 | 0.25 | 0.88 | 0.99 | 0.98 | 1 | 1 | 0.71 | 0.97 | 0.88 |
| STW | 0.5 | 0.88 | 0.79 | 0.98 | 0.79 | 0.42 | 0.84 | 0.97 | 0.94 | 1 | 0.94 | 0.81 | 0.86 |
| STR | 0.5 | 0.92 | 0.98 | 0.9 | 0.42 | 0.92 | 0.84 | 0.98 | 1 | 0.97 | 0.81 | 0.98 | 0.46 |
| SSG | 0.32 | 0.79 | 0.21 | 0.9 | 0.18 | 0.32 | 0.76 | 0.94 | 0.68 | 0.97 | 0.66 | 0.76 | 0.46 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TGT | 0.67 | 0.21 | 0.92 | 0.85 | 0.94 | 0.42 | 0.91 | 0.68 | 0.98 | 0.96 | 0.98 | 0.81 | 0.77 |
| TOU | 0.1 | 0.92 | 0.92 | 0.94 | 0.5 | 0.32 | 0.57 | 0.98 | 0.98 | 0.98 | 0.84 | 0.76 | 0.5 |
| TPS | 0.92 | 0.67 | 0.92 | 0.96 | 0.94 | 0.85 | 0.98 | 0.91 | 0.98 | 0.99 | 0.98 | 0.96 | 0.94 |
| VEH | 0.98 | 0.98 | 0.98 | 0.98 | 0.67 | 0.92 | 1 | 1 | 1 | 1 | 0.91 | 0.98 | 0.96 |
| WEW | 0.98 | 0.98 | 0.88 | 0.98 | 0.42 | 0.98 | 1 | 1 | 0.97 | 1 | 0.81 | 1 | 0.46 |
| WHT | 0.88 | 0.98 | 0.98 | 0.98 | 0.42 | 0.74 | 0.97 | 1 | 1 | 1 | 0.81 | 0.93 | 0.98 |
| WIS | 0.21 | 0.21 | 0.67 | 0.25 | 0.42 | 0.59 | 0.68 | 0.68 | 0.91 | 0.71 | 0.81 | 0.88 | 0.46 |

**Table 4.13 Analysis of necessary conditions for SVI**

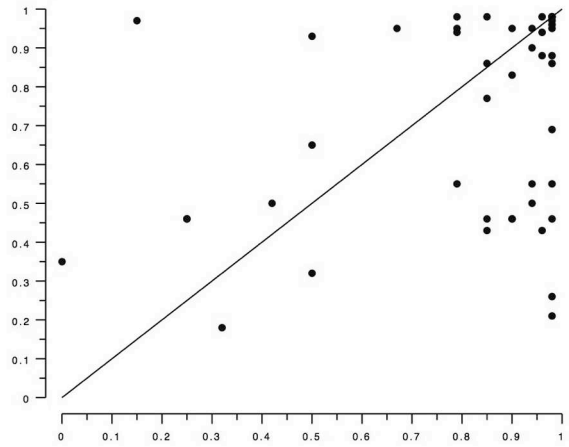
| | **Very strong causal conditions** | | **More or less strong causal conditions** | | **Strong causal conditions** | |
|---|---|---|---|---|---|---|
| Condition | Consistency | Coverage | Consistency | Coverage | Consistency | Coverage |
| UND | 0.751 | 0.863 | 0.947 | 0.785 | 0.881 | 0.829 |
| PRO | 0.786 | 0.775 | 0.940 | 0.751 | 0.874 | 0.762 |
| SEA | 0.858 | 0.829 | 0.971 | 0.767 | 0.934 | 0.800 |
| ORI | 0.899 | 0.807 | 0.977 | 0.758 | 0.953 | 0.783 |
| MOR | 0.695 | 0.846 | 0.936 | 0.786 | 0.849 | 0.819 |
| EFF | 0.722 | 0.822 | 0.941 | 0.779 | 0.867 | 0.814 |

With very strong causal conditions the necessity consistency level of sustainability orientation (ORI) drops from 0.95 to 0.9, not enough to discard very strong ORI as a usually necessary condition based on consistency level only. However, very strong ORI is absent in two configurations (I7+ and I8+). Although 7 cases moved to the upper triangular plot (15 in total) achieving a sufficiency consistency level of 0.8 (Plot A in Figure 4.5), I cannot sustain the argument of very strong sustainability orientation ($ORI^2$) as sufficient but not necessary for the outcome (SVI) to occur. Solution Table 4.14 corroborates this argument in that it shows no single solution path with very strong sustainability orientation ($ORI^2$) as sufficient condition for the outcome to occur; rather it presents a situation of complex causality and equifinality.

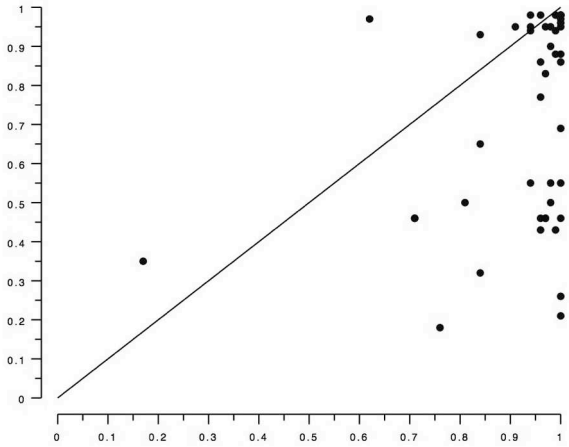
With more or less strong causal conditions the consistency level of sustainability orientation (ORI) increases from 0.95 to 0.98. Although the fuzzy subset relationship between SVI and ORI is stronger under a higher degree of membership in the set of ORI, I cannot sustain the argument of full necessity for SVI. This is given by the facts that one configuration (I1-) in the solution table table 4.14 exhibits ORI as an irrelevant condition and that only two cases - out of eight - moved to the lower triangular plot (Plot B in Figure 4.5).

**Figure 4.5 Scatterplots of fuzzy subset relationships between SVI and ORI+ / ORI-**

Plot A. SVI and very strong ORI



Plot B. SVI and more or less strong ORI



Regarding sufficiency in the analysis with very strong causal conditions, although the consistency levels of the causal paths (≥0.91) and the overall solution (0.88) are higher than the analysis with strong causal conditions (OSCon = 0.85), the coverage levels drop considerably, from 0.86 to 0.76 for the overall solution and below 0.65 for the individual causal paths, with 0.53 being the highest coverage level. Individual raw coverage below 0.65 implies that the solution is empirically less relevant.

Regarding sufficiency in the analysis with more or less strong causal conditions, the solution consistency (0.84) is lower than for the analysis of SVI with strong causal conditions (0.85). Although there is an increment in the individual levels of consistency, finding sufficiency with strong conditions is more effective that looking for sufficiency with more or less strong conditions.

In the same vein, even though the empirical relevance of this solution is the same (coverage = 0.86), the solution suffers from limited diversity, as shown in the Truth Table 4.15, and cannot account for the heterogeneity and conceptual richness of the associated causal relationships.

This sensitivity analysis corroborates the robustness of the results presented in the configurational analysis of SVI.

**Table 4.14 Sufficiency analyses results with very strong and more or less strong causal conditions**

| | Solutions | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Conf.** | **I1+** | **I2+** | **I3+** | **I4+** | **I5+** | **I6+** | **I7+** | **I8+** | **I9+** | **I1-** | **I2-** |
| UND | ●$_2$ | ●$_2$ | ●$_2$ | ●$_2$ | - | - | ⊗ | ⊗ | ●$_2$ | ● | ● |
| PRO | ● | ● | ● | - | - | ⊗$_3$ | ⊗$_3$ | ● | ● | ● | ● |
| SEA | ● | ● | - | ● | ● | - | ● | ⊗ | ⊗ | ● | - |
| ORI | ●$_1$ | ●$_1$ | ●$_1$ | ●$_1$ | ●$_1$ | ●$_1$ | ⊗ | ●$_1$ | ⊗ | - | ● |
| MOR | - | ● | ⊗ | ⊗ | ● | ● | - | ⊗ | ● | ● | ● |
| EFF | ● | - | ● | ● | ⊗ | ⊗ | ● | ⊗ | ● | ● | ● |
| Cons | 0.91 | 0.92 | 0.96 | 0.96 | 0.96 | 0.9 | 0.97 | 0.94 | 0.94 | 0.84 | 0.84 |
| RC | **0.53** | **0.48** | **0.36** | **0.35** | **0.32** | **0.2** | **0.13** | **0.13** | **0.11** | **0.86** | **0.85** |
| UC | 0.03 | 0.004 | 0.02 | 0.015 | 0.04 | 0.02 | 0.03 | 0.004 | 0.009 | 0.005 | 0.003 |
| OS Cons | | | | | 0.88 | | | | | 0.84 | |
| OS Cove | | | | | 0.76 | | | | | 0.86 | |

Configurations with (+) very strong causal conditions / (-) more or less strong causal conditions

**Table 4.15 Truth table for SVI with more or less strong causal conditions**

| **Conditions** | | | | | | **Outcome** | | |
|---|---|---|---|---|---|---|---|---|
| UND- | PRO- | SEA- | ORI- | MOR- | EFF- | N/cases | SVI | Consist. |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0.9402 |
| 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0.9071 |
| 1 | 1 | 1 | 1 | 1 | 1 | 43 | 1 | 0.8499 |

#### 4.2.5.3 Negate analysis

A different way of understanding the development of sustainability-oriented venture ideas is by analysing the conditions or configurations of conditions that lead or partially lead to the opposite result, which is the non-integration of sustainability in the development of venture ideas (~SVI). In doing so, I conducted a configurational analysis of conditions for ~SVI. Table 4.16 presents the truth table for ~SVI, with 13 configurations and 39 cases that are relevant for the outcome, with 3 cases above the minimum consistency, set at ≥0.8, and 36 cases below the cutoff line.

**Table 4.16 Truth table for ~SVI**

| Conditions | | | | | | Outcome | | |
|---|---|---|---|---|---|---|---|---|
| **UND** | **PRO** | **SEA** | **ORI** | **MOR** | **EFF** | **N/cases** | **~SVI** | **Consist.** |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0.8843 |
| 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0.8505 |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0.8023 |
| 1 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 0.7963 |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0.7826 |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0.7705 |
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0.7107 |
| 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0.7029 |
| 0 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 0.6764 |
| 1 | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 0.6156 |
| 1 | 1 | 1 | 1 | 0 | 1 | 2 | 0 | 0.5950 |
| 1 | 0 | 1 | 1 | 1 | 1 | 2 | 0 | 0.5837 |
| 1 | 1 | 1 | 1 | 1 | 1 | 21 | 0 | 0.4213 |

Given that there are configurations exhibiting high levels of consistency, I conducted an fsQCA of the following model:

~SVI = f(UND, PRO, SEA, ORI, MOR, EFF)

This provides an alternative path for the analysis of conditions for SVI, and sometimes can present a higher explanatory power. Table 4.17 presents consistency and coverage scores for each solution term and the solution as a whole.

**Table 4.17 Configurations for absence of sustainability-oriented entrepreneurial actions**

| | Scores | | |
|---|---|---|---|
| **Solution terms** | Consistency | Raw coverage | Unique coverage |
| u•p•s•A•m•E | 0.85 | 0.14 | 0.007 |
| u•P•S•a•m•e | 0.88 | 0.19 | 0.06 |
| U•P•s•A•M•E | 0.8 | 0.37 | 0.23 |
| **Overall solution consistency ~SVI** | **0.78** | | |
| **Overall solution coverage ~ SVI** | **0.45** | | |
| Overall solution consistency SVI | 0.85 | | |
| Overall solution coverage SVI | 0.86 | | |

As Table 4.17 shows, the solution's coverage (0.45) and consistency (0.78) levels are much lower than in the analysis of SVI (0.86, 0.85), meaning that finding sufficient conditions for the presence of sustainability-oriented venture ideas (SVI) is more effective that looking for conditions for its absence. This negate analysis corroborates the robustness of the results presented in the configurational analysis of SVI.

## 4.3 Explaining the organization of sustainability-oriented entrepreneurial actions

### 4.3.1 Fuzzy set membership scores and truth table

Table 4.18 presents the calibration table for the following outcome and causal conditions:

$$SAC = f(UND, PRO, SEA, ORI, EFF, CON)$$

The table provides an overview of the condition and outcome values for each case after calibration. These values are the input for the construction of the truth table and the fuzzy-set analysis.

**Table 4.18 Calibration table - sustainability-oriented entrepreneurial actions**

| Case | Conditions | | | | | | Outcome |
|---|---|---|---|---|---|---|---|
| | **UND** | **PRO** | **SEA** | **ORI** | **EFF** | **CON** | **SAC** |
| AWW | 0.71 | 0.82 | 0.71 | 0.89 | 0.65 | 0.46 | 0.46 |
| ACO | 0.57 | 0.57 | 0.57 | 0.92 | 0.32 | 0.82 | 0.86 |
| BTR | 0.98 | 0.82 | 0.99 | 0.98 | 0.65 | 0.99 | 0.96 |
| BGF | 0.82 | 0.71 | 0.82 | 0.5 | 0.97 | 0.94 | 0.77 |
| BCY | 0.39 | 0.99 | 0.94 | 0.03 | 0.35 | 0.99 | 0.39 |
| BST | 0.82 | 0.99 | 0.39 | 0.99 | 0.99 | 0.57 | 0.94 |
| BVG | 0.32 | 0.39 | 0.98 | 0.39 | 0.96 | 0.98 | 0.94 |
| CLI | 0.98 | 0.99 | 0.98 | 0.97 | 0.99 | 0.86 | 0.82 |
| CLE | 0.89 | 0.99 | 0.96 | 0.99 | 0.77 | 0.97 | 0.89 |
| CHU | 0.99 | 0.99 | 0.99 | 0.98 | 0.92 | 0.77 | 0.82 |
| CUL | 0.89 | 0.57 | 0.46 | 0.82 | 0.35 | 0.94 | 0.46 |
| DLI | 0.32 | 0.99 | 0.57 | 0.95 | 0.86 | 0.77 | 0.71 |
| DFL | 0.89 | 0.99 | 0.96 | 0.99 | 0.99 | 0.99 | 0.98 |
| EPU | 0.89 | 0.96 | 0.98 | 0.99 | 0.86 | 0.89 | 0.82 |
| ECV | 0.98 | 0.32 | 0.89 | 0.92 | 0.99 | 0.92 | 0.92 |
| ECW | 0.57 | 0.82 | 0.99 | 0.97 | 0.32 | 0.82 | 0.89 |
| ECZ | 0.46 | 0.32 | 0.82 | 0.97 | 0.46 | 0.77 | 0.82 |
| GSU | 0.71 | 0.98 | 0.57 | 0.98 | 0.82 | 0.77 | 0.23 |
| GTR | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.77 | 0.35 |
| HAR | 0.71 | 0.89 | 0.98 | 0.71 | 0.92 | 0.96 | 0.92 |
| HFR | 0.99 | 0.96 | 0.99 | 0.99 | 0.97 | 0.96 | 0.99 |
| IPA | 0.82 | 0.96 | 0.96 | 0.92 | 0.77 | 0.86 | 0.96 |
| IWB | 0.57 | 0.99 | 0.89 | 0.99 | 0.65 | 0.71 | 0.65 |
| KOR | 0.94 | 0.96 | 0.99 | 0.99 | 0.65 | 0.99 | 0.99 |
| MCP | 0.96 | 0.96 | 0.96 | 0.95 | 0.77 | 0.46 | 0.77 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MST | 0.46 | 0.26 | 0.21 | 0.71 | 0.65 | 0.39 | 0.82 |
| MOG | 0.57 | 0.26 | 0.98 | 0.71 | 0.32 | 0.46 | 0.32 |
| ODS | 0.57 | 0.82 | 0.32 | 0.57 | 0.77 | 0.14 | 0.5 |
| PEM | 0.99 | 0.71 | 0.96 | 0.99 | 0.97 | 0.98 | 0.99 |
| PRE | 0.89 | 0.71 | 0.71 | 0.92 | 0.35 | 0.46 | 0.65 |
| PRI | 0.89 | 0.96 | 0.57 | 0.65 | 0.99 | 0.03 | 0.99 |
| PWO | 0.99 | 0.98 | 0.94 | 0.89 | 0.94 | 0.99 | 0.99 |
| PLY | 0.57 | 0.96 | 0.71 | 0.89 | 0.92 | 0.77 | 0.35 |
| RMA | 0.71 | 0.97 | 0.94 | 0.89 | 0.65 | 0.1 | 0.99 |
| RNA | 0.98 | 0.96 | 0.99 | 0.99 | 0.94 | 0.39 | 0.99 |
| STW | 0.71 | 0.94 | 0.89 | 0.99 | 0.65 | 0.32 | 0.46 |
| STR | 0.71 | 0.96 | 0.99 | 0.95 | 0.96 | 0.92 | 0.92 |
| SSG | 0.57 | 0.89 | 0.46 | 0.95 | 0.57 | 0.65 | 0.1 |
| TGT | 0.82 | 0.46 | 0.96 | 0.92 | 0.65 | 0.82 | 0.77 |
| TOU | 0.32 | 0.96 | 0.96 | 0.97 | 0.57 | 0.82 | 0.82 |
| TPS | 0.96 | 0.82 | 0.96 | 0.98 | 0.92 | 0.99 | 0.94 |
| VEH | 0.99 | 0.99 | 0.99 | 0.99 | 0.96 | 0.99 | 0.95 |
| WEW | 0.99 | 0.99 | 0.94 | 0.99 | 0.99 | 0.99 | 0.99 |
| WHT | 0.94 | 0.99 | 0.99 | 0.99 | 0.86 | 0.86 | 0.99 |
| WIS | 0.46 | 0.46 | 0.82 | 0.5 | 0.77 | 0.07 | 0.32 |

The 64 logically possible configurations ($2^6$) were reduced in line with the following conditions: frequency = 1, consistency = 0.9. Table 4.19 shows the truth table with the resulting 14 configurations and 43 cases that are relevant for the outcome (96% of the cases). 40 cases exceed the lowest acceptable consistency, set at ≥0.9, which is above the minimum recommended of 0.8, and 3 cases are below the consistency cutoff line. The consistency threshold of 0.9 corresponds to a gap observed in the distribution of consistency scores (Schneider et al. 2010).

There are 50 logically possible configurations lacking empirical evidence; these are the remainders to be excluded from the minimization process. I cannot infer sufficiency of a given combination of conditions for the organization of sustainability-oriented entrepreneurial actions (SAC) based only on the fact that such combination is logically possible. However, the areas with missing evidence are relevant and considered in the counterfactual analysis.

**Table 4.19 Truth table for sustainability-oriented entrepreneurial actions**

| Conditions | | | | | | Outcome | | |
|---|---|---|---|---|---|---|---|---|
| **UND** | **PRO** | **SEA** | **ORI** | **EFF** | **CON** | **N/cases** | **SAC** | **Consist.** |
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 0.998 |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0.996 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0.966 |
| 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0.959 |
| 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0.956 |
| 1 | 1 | 1 | 1 | 1 | 1 | 21 | 1 | 0.939 |
| 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0.939 |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0.933 |
| 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0.930 |
| 1 | 1 | 1 | 1 | 1 | 0 | 6 | 1 | 0.929 |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0.918 |
| 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0.896 |
| 1 | 1 | 0 | 1 | 1 | 1 | 2 | 0 | 0.880 |

### 4.3.2 Configurational analysis

Based on the Truth Table 4.19 and by using a counterfactual analysis of causal conditions (automated in fsQCA), I logically reduced the truth table to the following intermediate solution, which includes easy counterfactuals and comprises nine simplified combinations of conditions:

SAC= UND • PRO • SEA • ORI
+ UND • SEA • ORI • EFF • CON
+ PRO • SEA • ORI • EFF • CON
+ UND • PRO • ORI • EFF • ~CON
+ UND • SEA • ORI • ~EFF • ~CON
+ ~UND • ~PRO • SEA • ORI • ~EFF • CON
+ ~UND • ~PRO • SEA • ~ORI • EFF • CON
+ ~UND • PRO • SEA • ~ORI • ~EFF • CON
+ ~UND • ~PRO • ~SEA • ~ORI • EFF • ~CON

Each line represents a configuration of conditions associated with the organization of sustainability-oriented entrepreneurial actions (SAC). Table 4.20 graphically reports the results of fuzzy set analysis for the integration of sustainability in the organization of entrepreneurial actions. The solution table distinguishes core and peripheral conditions and shows single and overall degrees of consistency and coverage.

Results indicates that presence of sustainability opportunity search (SEA) and absence of sustainability contribution belief (~CON) exhibit a strong causal relationship with the outcome; whereas presence and absence of sustainability understanding (UND and ~UND), presence and absence of prospective sustainability entrepreneur (PRO and ~PRO), absence of sustainability opportunity search (~SEA), presence and absence of sustainability orientation (ORI and ~ORI), presence and absence of self-efficacy (EFF and ~EFF) and presence of sustainability contribution belief (CON) are complementary conditions that present weaker causal relationships with the outcome.

**Table 4.20 Configurations for the organization of sustainability-oriented entrepreneurial actions**

| | **Solutions** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Configurations** | **A1** | **A2** | **A3** | **A4** | **A5** | **A6** | **A7** | **A8** | **A9** |
| UND | ● | ● | - | ● | ● | ⊗ | ⊗ | ⊗ | ⊗ |
| PRO | ● | - | ● | ● | - | ⊗ | ⊗ | ● | ⊗ |
| SEA | ●$_1$ | ●$_1$ | ●$_1$ | - | ●$_1$ | ●$_1$ | ●$_1$ | ●$_1$ | ⊗ |
| ORI | ● | ● | ● | ● | ● | ● | ⊗ | ⊗ | ⊗ |
| EFF | - | ● | ● | ● | ⊗ | ⊗ | ● | ⊗ | ● |
| CON | - | ● | ● | ⊗$_2$ | ⊗$_2$ | ● | ● | ● | ⊗$_2$ |
| Consistency | 0.90 | 0.94 | 0.94 | 0.93 | 0.92 | 0.97 | 1 | 0.92 | 0.99 |
| Raw coverage | 0.77 | 0.68 | 0.67 | 0.26 | 0.16 | 0.1 | 0.08 | 0.07 | 0.07 |
| Unique coverage | 0.06 | 0.032 | 0.025 | 0.009 | 0 | 0.002 | 0.006 | 0.01 | 0.008 |
| Overall solution consistency | | | | | 0.89 | | | | |
| Overall solution coverage | | | | | 0.87 | | | | |

Consistency threshold = 0.9 / Frequency threshold = 1

Solutions or combination of conditions are numbered A1, A2, etc., and have been sorted by raw coverage and unique coverage. The assessment of coverage provides the solutions' relative empirical importance.

The solution table (above) shows that the set relation between the configurations of conditions and the outcome is highly consistent, with individual results above 0.92, and an overall consistency of 0.89. A consistency of ≥0.80 indicates a strong set-theoretical relationship between each solution term, the overall solution and the outcome (Ragin, 2006).

Table 4.21 presents the cases with set membership greater than 0.5 in each solution term and the outcome, as well as highlights (*) those cases with set membership greater than 0.5 in the solution term but lower than 0.5 in the set of entrepreneurs with strong integration of sustainability in the organization of entrepreneurial actions (SAC). Cases are classified in descending order based on their joint membership score in the solution term.

**Table 4.21 Cases with membership greater than 0.5 in each solution term - SAC**

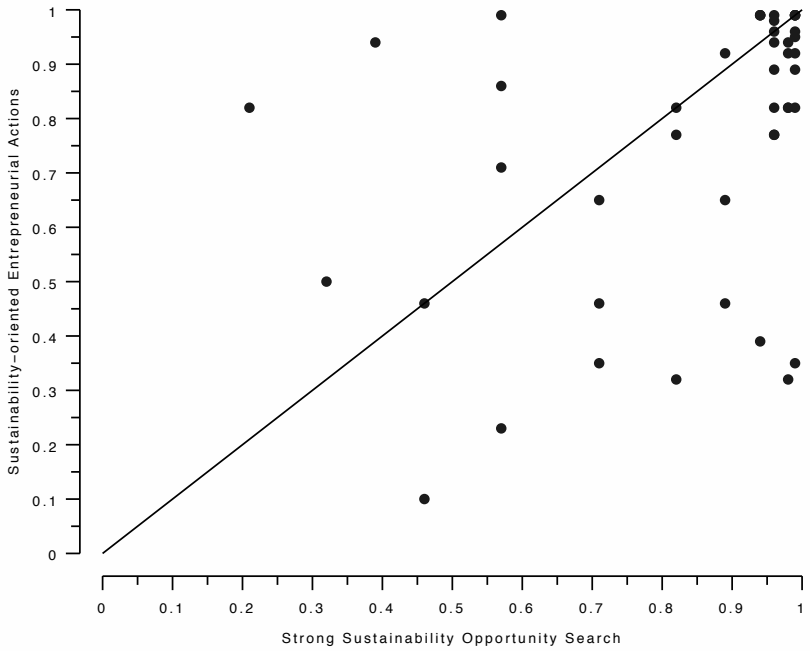
| Solution | Cases |
|---|---|
| A1 | VEH, GTR, CHU, CLI, RNA, HFR, MCP, WTS, WEW, KOR, EPU, DFL, CLE, PWO, BTR, TPS, IPA, AWW*, STR, STW* |
| A2 | VEH, PEM, HFR, WEW, TPS, DFL, ECV, PWO, WTS, CLI, EPU, IPA, GTR*, CHU, CLE, HAR, STR, KOR, TGT, BTR |
| A3 | VEH, DFL, HFR, WEW, STR, PWO, WTS, CLI, EPU, TPS, IPA, GTR*, CHU, CLE, HAR, PEM, PLY, IWB, KOR, BTR |
| A4 | PRI, RMA, STW*, RNA, ODS, AWW*, MCP |
| A5 | MOG*, PRE |
| A6 | ECZ |
| A7 | BVG |
| A8 | BCY* |
| A9 | MST |

*Cases with membership lower than 0.5 in the outcome

### 4.3.3 Necessity analysis

As with the development of sustainability-oriented venture ideas, the necessity analysis found one usually necessary condition for high integration of sustainability in the organization of entrepreneurial actions; this is the presence of sustainability opportunity search (consistency = 0.93). Figure 4.6 presents a scatterplot with the fuzzy subset relationship between the organization of sustainability-oriented entrepreneurial actions (SAC) and the search for sustainability opportunities (SEA). The fact that membership in the outcome SAC is almost always less or equal than membership in the cause SEA corroborates the argument of necessity.

**Figure 4.6 Scatterplot of fuzzy subset relationship between SAC and strong SEA**




The presence of cases in the lower triangular plot suggests that almost every time an entrepreneur is organizing sustainability-oriented actions, for example by establishing objectives for the business (Dimov, 2007b), there is a strong search for business opportunities with the potential of producing value that combines at least three of the aspects of sustainable development.

Sustainability opportunity search, as a necessary condition, pertains an action whereby entrepreneurs seek to create holistic value, which can be observed in the process of formalizing sustainability venture ideas. We can visualize this necessity relationship in the way Laurie from HFR (0.99,0.99) decides to operationalize the idea for an impact digital media company focused on environmental and social justice.

> We are a 'Global Impact Media Syndicate' that produces written and multimedia content designed to be the authoritative, globally ubiquitous voice for environmental, social and economic issues with the goal of pioneering the model of a vastly new way of doing business on Planet Earth.

As evidenced in the quote above, ideas become actions through a business model that seeks to articulate a new way of doing sustainable business. In order to integrate the principles of sustainability in a systemic and organic way, he decides to implement a blended value proposition in the initial planning for the venture. This is instrumental in the formalization of the venture idea. He emphasizes that the only way of putting this

business approach into practice is through a rigorous application of a business framework where social, environmental and economic values are not separated as different aspects of the venture's value proposition. He rather understands that these three functions need to be integrated and fully assessed if one is to maximize social, financial and environmental value creation. The following quote illustrates this point:

> HFR is one of the first companies to actually start with that principle (blended value). That's actually how we're doing it. We created ourselves as a company to model, to try to model the emerging, best thinking around triple-bottom line. Yeah, what it means for HFR again is setting ourselves up to operate as a triple-bottom line company.

This emerges from a strong criticizing of the single-bottom line approach. In line with Emerson (2003), he considers that the core nature of investment and return is not a trade off between social, environmental and financial interests but rather the pursuit of an embedded value proposition composed of these three aspects.

> The way we're currently structured which is all about the single bottom-line, it's all about growth and consumption, this is crazy. This is ludicrous and driving us towards the cliff with exuberance (…) we need to really create not a new ecosystem but a new bubble universe, one that is next door to our current universe, one where all the pieces are growing from the same seed (…) the seed of every piece of this universe grows from the rigorous application of blended value. We're not only talking about companies, we're talking about the mechanisms that support companies, whether they be exchanges, stock exchanges, or intermediary or funds and all these things. This is the way I think of finding true sustainability.

The way PEM puts its ideas into practice is also highly illustrative. In planning the venture, the founders of PEM decided to implement a model with multi-level investment goals. This approach, unlike the single-bottom line, involves holism and systemic thinking rather than a partial understanding of the nature of venture opportunities:

> What we try to do is include all three types of those goals within our investment, but also create income streams for the communities where we're based. Not only do they receive the lease payments for use of their land but we also try to hire exclusively from within the community so they're working their own land and getting paid for it, but also have the social impact that as far as we try to offer scholarships for the communities.

TPS (0.96,0.94) follows a similar pattern in the articulation of its holistic business model. The way one of the founders introduces the venture to a relevant group of stakeholders illustrates this necessity relationship:

> We are all about of being sustainable, so we are talking about being environmentally sustainable in the way that we actually interrelate with farmers, to the way we interrelate with the environment by reducing waste, by the fact that we actually work in a community to help us commercially to be sustainable. So throughout the whole of our business model and the whole of the way we operate we aim to be sustainable, and actually create something for the future.

These two stories provide evidence supporting the necessity relationship between sustainability opportunity search (SEA) and the integration of sustainability in the organization of entrepreneurial actions (SAC). The representative quotations have been extracted from specific sections of the interviews and documents where the entrepreneur describes the connection between the venture idea and initial set of actions, as expressed in the setting up of immediate goals. In other words, they explain how the venture idea gets elaborated in actionable terms (Dimov 2011). In this context, the quotations reflect the presence of a search for holistic value creation as a necessary condition for the integration of sustainability in organization of entrepreneurial actions.

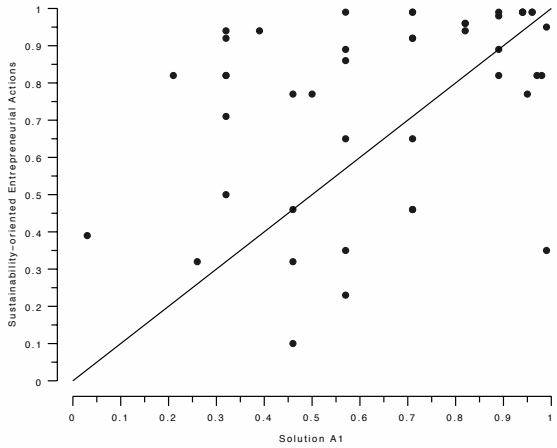
### 4.3.4 Sufficiency analysis

Sufficiency analysis found no single condition sufficient for the integration of sustainability in the organization of entrepreneurial actions (SAC). The results point out a situation of true equifinality, with nine consistent paths to membership in the set of entrepreneurs with high integration of sustainability in the organization of such actions. These nine quasi-sufficient combinations are understood as alternate paths for the outcome SAC and they are logically equivalent or substitutable (Ragin 2006). The total coverage of the solution is 0.87 indicating that most of the outcome is explained by the eight causal paths and that the solution as a whole is empirically relevant.

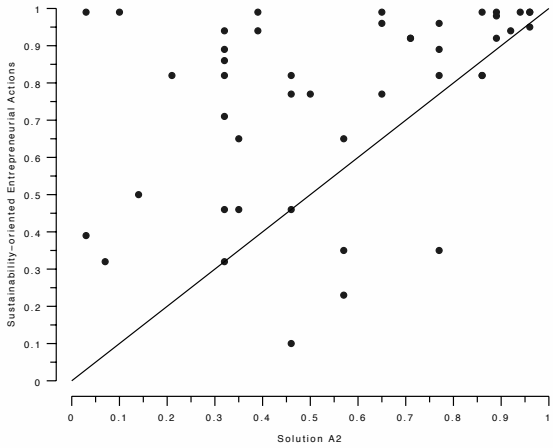
Among the nine causal paths, there are three empirically dominant configurations: A1 (raw coverage = 0.77, unique coverage = 0.06), A2 (raw coverage = 0.68, unique coverage = 0.03), and A3 (raw coverage = 0.67, unique coverage = 0.03). Figure 4.7 presents the scatterplots of fuzzy subset relationship between the organization of sustainability-oriented entrepreneurial actions (SAC) and these three configurations.

**Figure 4.7 Scatterplots of fuzzy subset relationships between SAC and solutions A1, A2 and A3**

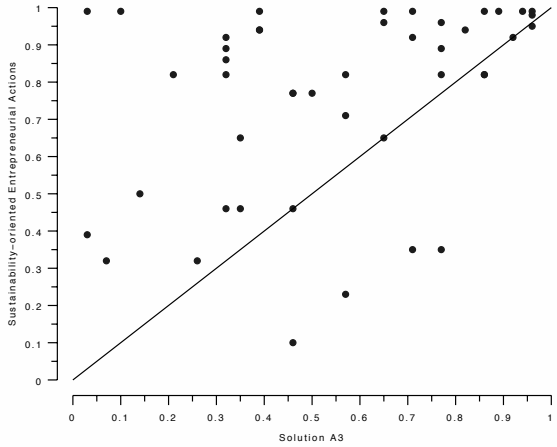
Plot A. SAC and solution A1




Plot B. SAC and solution A2




Plot C. SAC and solution A3




Solution A1 combines the core condition of strong sustainability opportunity search (SEA) with three complementary conditions: strong sustainability understanding (UND), strong prospective sustainability entrepreneur (PRO) and strong sustainability orientation (ORI). In A1, strong self-efficacy (EFF) and strong sustainability contribution belief (CON) are irrelevant conditions.

The strategic approach of CLE (0.89,0.89) provides evidence to understanding how the central and peripheral conditions in solution A1 interact to produce the organization of sustainability-oriented entrepreneurial actions (SAC). In describing their strategy (Table 4.23) the founders highlight three strategic pillars: ‘clarity, co-production and regeneration’, which offer a clear representation of the solution path SEA•ORI•PRO•UND. As the founders explain as part of the venture’s marketing strategy:

> Clarity, we want you to know where your fish has been. This clarity gives power to the producer and power to the chef and consumer (UND) Co-production ‘Conscious growers need conscious eaters. For upstream to survive and flourish, there must be a downstream to order and enjoy their labours, to join in this bold project as co-producers. Together, a hopeful web is woven (SEA). Regeneration ‘This new paradigm - of producers linked to chefs and consumers - is what will make a cleaner future (ORI); this is the soul of CLE. Markets are built, practices can be improved and new ideas are emerging (PRO). This is how we get to fish that’s the best of the season, better every season. This is how we help endangered fishing communities to flourish, all over the world. CLE works closely with its producers. Next generation practices are already in the works, from raising fish in polycultures, to wetlands filtration systems to experimental deepwater aquapods for raising shrimp without additional feed (SEA).

A2 and A3 present similar configurations of causal conditions. Both combine the core condition sustainability opportunity search (SEA) with three complementary conditions: sustainability orientation (ORI), entrepreneurial self-efficacy (EFF) and sustainability contribution belief (CON). These four conditions are combined with either sustainability understanding (UND) in A2 or prospective sustainability entrepreneur (PRO) in A3. This suggests that, when it comes to integrate sustainability in the organization of entrepreneurial actions (SAC), sustainability understanding (UND) and prospective sustainability entrepreneur (PRO) are interchangeable conditions.

The similitude between solutions A2 and A3 and the fact that both solution paths exhibit high levels of raw coverage (≥0.65) yet low levels of unique coverage suggests that there is an overlap in the coverage of such solutions, this is similar cases in both configurations. Indeed, they share 18 of the 20 cases relevant for each solution. In order to reduce the effect of overlaps fsQCA allows for creating union of sets or supersets.

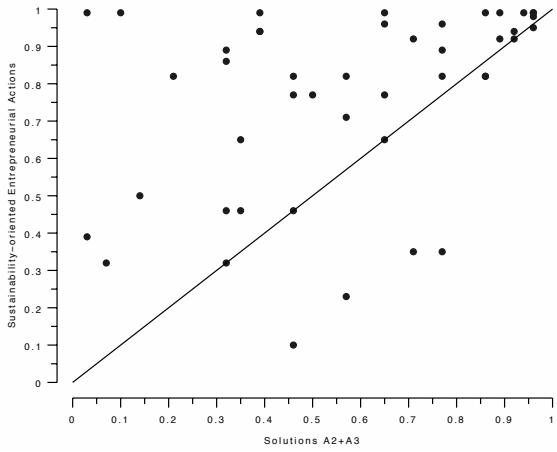
The union of partially overlapping sets produces new consistency and raw coverage scores and contributes to increasing the empirical importance of the solutions while maintaining a high level of consistency. Table 4.22 presents the three dominant configurations for the outcome SAC and the new consistency and coverage score for union of sets A2 and A3. As expected, the new set exhibits a stronger relationship of sufficiency than A2 and A3 independently.

**Table 4.22 Overview of empirically relevant causal relationships – SAC**

| Configurations | A1 | A2+A3 |
|---|---|---|
| UND | ● | ▼ |
| PRO | ● | ▼ |
| SEA | ● | ● |
| ORI | ● | ● |
| EFF | - | ● |
| CON | - | ● |
| Consistency | 0.90 | 0.94 |
| Raw coverage | 0.77 | 0.71 |

In A2+A3 (0.94, 0.71), i.e. SEA•ORI•EFF•CON•[UND+PRO], the organization of sustainability-oriented entrepreneurial actions is the result of a combination of strong sustainability opportunity search (SEA), strong sustainability orientation (ORI), strong entrepreneurial self-efficacy (EFF) and strong sustainability contribution belief (CON) with either strong sustainability understanding (UND) or strong prospective sustainability entrepreneur (PRO). Figure 4.8 shows a scatterplot with the fuzzy subset relationship between the organization of sustainability-oriented entrepreneurial actions and the union of sets A2 and A3.

**Figure 4.8 Scatterplot of fuzzy subset relationship between SAC and A2+A3**




The case of TPS (0.92,0.94) exemplifies the sufficiency relation between the superset A2+A3 and the organization of sustainability actions. In formalizing the venture

idea through initial actions, TPS focused on giving to the internal processes a sense of direction and meaning. In the founders' view, these processes should enable the employees, the suppliers, the customers to make positive choices:

> Yesterday I was asked, what made a company or organization particularly ethical or value based? For me – it is around the internal processes. The systems should be there to make it easy to do the right thing

Unlike solution A1, EFF and CON are relevant complementary conditions. Despite the challenges involved in the development of a sustainable venture, the founders were confident on their skills and knowledge to successfully implement their radical ideas, and they knew that a strong sustainability approach would produce some kind of strategic return. As Kate points out during the interview:

> At times over the last 12 months - and it is no exaggeration to say this - I didn't think we would make it to the end. But we have, and we've achieved some great things along the way (CON). We have continued to work towards our mission of creating a business that seeks to be commercially sustainable, to enable it to be both socially and environmentally sustainable (EFF).

Table 4.23 provides further evidence supporting the sufficiency relationship between the four empirically dominant configurations and the integration of sustainability in the organization of entrepreneurial actions. The representative quotations have been extracted from sections of the interviews and documents where the entrepreneur describes the initial actions after specifying the venture idea.

**Table 4.23 Data supporting sufficiency relationships between relevant solutions and SAC**

| Conf. | Conditions combined | Representative quotations |
|---|---|---|
| A1 | SEA•ORI•PRO | We are not a 501c3, we are a socially-conscious for-profit business that will be self sustainable for years to come. We are a new model for this type of business, 'whose time has come'. We are a hybrid entity that is considered to be a 'for profit with a non-profit soul (…) what makes this project truly unique is that we will develop an innovative hydroponic growing system that can be used in vertical greenhouses of all configurations. This innovative mechanism will maximize efficiency by dramatically increasing the amount of produce that can be grown in the greenhouse and will also use less energy to grow produce. In addition, this growing carousel is also specifically designed to provide a safe and meaningful work environment for adults with developmental disabilities, the employee base of VEH. With this technology, we will wrap agricultural, architectural and social innovation into one project that will be a critical milestone in urban agriculture. VEH (0.99,0,95) |
| A1 | SEA•ORI•PRO | We constantly are pushing ourselves to be more sustainable, we want to be proactive in the decisions that we make and make sure that everything we're doing, how it's affecting our community, our team, |

| | | |
|---|---|---|
| | | our retail partners, our customers. For example, right now our bag wasn't recyclable and our first thought was we should bring this up to our customers. We said, "Hey, our bag isn't as sustainable as we want it to be, isn't recyclable. Do you have any suggestions?" By brainstorming with them we're able to make now compostable bags so we're about to transition for the first time in this industry, never been done before, we're transitioning the entire industry to have compostable bags. BTR (0.82,0.96) |
| A1 | SEA•ORI•PRO | While conducting research with indigenous communities in South America during college, the founders of RNA witnessed first-hand the tradeoff indigenous communities face–while they want to preserve their cultural and environmental heritage, they also have an immediate need to earn cash and feed their families in an increasingly globalized world (…) After graduating in December 2008, Tyler turned down a Fulbright grant and Dan turned down a job offer in consulting so we could move to Ecuador to start our organization. RNA (0.96,0.99) |

A4 combines four peripheral conditions: strong sustainability understanding (UND), strong prospective sustainability entrepreneur (PRO), strong sustainability orientation (ORI) and strong entrepreneurial self-efficacy (EFF) with lack of sustainability contribution belief (~CON), which exhibits a strong causal relationship with the outcome. In A4, sustainability opportunity search (SEA) is an irrelevant condition suggesting that the integration of sustainability in the organization of actions can be produced even in a situation where there is no explicit search for holistic value creation.

The case of RMA illustrates solution A4. RMA is the first online business-to-business marketplace allowing companies to bid and transact online in order to buy, sell or give their waste or commodity recyclables. Given the nature of the business, RMA's central concern relates to environmental issues, which involves primarily achieving zero landfill through helping others reduce waste. Therefore, despite considering the different dimensions of sustainability in the setting up the objectives for the business, the value they seek to create tends to emphasize more environmental protection rather than social and intergenerational factors. In describing the benefits the venture provides to the market, one of the founders indicates:

> Companies in the U.S. spend $22 billion per year just in fees to put waste materials in landfills. Approximately 70% of that waste can be productively used it's estimated that the value of landfilled materials is $20B in the US each year. Sustainable supply-chain goals mandated by Wal-Mart, IBM and others have created significant motivation to move to zero waste. Sellers benefit by reducing landfill cost or receiving better prices for their recyclable materials, and by reducing waste and environmental impact. Buyers are able

> to immediately transact for the materials they want saving them time and money.

Solution A5 presents similar characteristics as A4, in that both solutions share the core condition absence of sustainability contribution belief (~CON) and two complementary conditions: presence of sustainability understanding (UND) and presence of sustainability orientation (ORI). Unlike A4, in the solution path A5, sustainability opportunity search (SEA) is a relevant condition exhibiting a strong causal relationship with the outcome SAC, lack of entrepreneurial self-efficacy (~EFF) is a peripheral condition and prospective sustainability entrepreneur (PRO) is an irrelevant condition.

Results suggest that for the entrepreneurs in configurations A4 and A5, the strategic value of sustainability is not as important as giving their ventures a purpose that goes beyond making a profit, which reflects their understanding of current sustainability problems. Indeed, the belief in strategic returns needs to be absent in order to produce the outcome.

Referring again to the RMA example, the company focuses on maximizing its clients' economic returns as well as improving their environmental efficiencies. As an online platform, the future of zero waste they envision is to be achieved by ensuring the best and highest use for all materials its clients generate. Thus, as described above, the strategic returns of focusing on achieving zero landfill are to be captured by its clients, not by them directly. The following quotation illustrates the latter:

> To achieve this vision (the future of zero waste), our clients need better access to markets, not another broker (…) They could not only accelerate zero waste goals, but you could turn a cost centre into a profit centre, which translates into maximum economic returns as well as improved environmental efficiencies.

In the same way as with development of sustainability-oriented venture ideas (SVI), lower solution coverage in solutions A5 to A9 and relatively balanced coverage among alternative paths suggest that causality underlying the organization of sustainability-oriented entrepreneurial actions (SAC) is complex.

Solutions A6, A7, A8 and A9 portray counterintuitive cases, demonstrating that the integration of sustainability in the organization of entrepreneurial actions can occur even under conditions where, for example, there is no understanding of sustainability (A6, A7, A8 and A9), nor the ability and willingness to pursue sustainability-oriented venture opportunities (A6, A7 and A9), although they might be exploring ideas with social,

environmental and intergenerational components (A6, A7 and A8). These configurations of causal conditions and their respective cases are not errors; they are simply different recipes for the organization of sustainability-oriented entrepreneurial actions.

This is the case of BVG (0.61,0.94) in solution A7. BVG is a community store that offers *local goods for the local people*. The founders describe themselves as providers of high quality food and merchandise *made by and for their neighbours*. By doing so, they seek to bridge the gap between producers and consumers, letting their clients know where the goods come from and who produce them. When Tess and Tom, founders of BVG, defined their store as a shop specialized in 'sustainably-raised' meat and fresh cheeses, they explicitly refer to and engage with the central components of sustainability. However, their main driver is not related to a deep understanding of sustainability, or to a specific orientation or even to the willingness of pursuing a sustainability-oriented venture opportunity. They do aim to solve sustainability problems, yet the combination of conditions is counterintuitive. A local newspaper captures the latter when describing the origins of the business:

> Tess is an animal-lover who wanted to eat in line with her belief but who had no interest in becoming a vegetarian, struggled to find ethically-raised meats she was comfortable buying and eating (…) Tess and Tom simply took that dilemma and transformed it into a business.

On the other hand, the analysis also shows cases that present a sufficient configuration of conditions, yet do not exhibit the outcome. The story of AWW in solution A1 (0.71, 0.46) illustrates this situation. AWW is a recycling firm that sells refurbished and repurposed household items and also transforms unwanted goods into affordable pieces of art. Although sustainability orientation (ORI), entrepreneurial self-efficacy (EFF), sustainability understanding (UND) and prospective sustainability entrepreneur (PRO) are strong components of the narrative of the venture (see quote below) AWW exhibits low membership in the outcome.

> We help you clean out garages, basements, attics, and other cluttered spaces. But we're not just here to provide helpful coaching and heavy lifting. We also ensure that any unwanted goods are recycled, donated, and resold (…) Our services allow our customers to turn their clutter into cash. They, in addition to getting high-quality used goods, enjoy the satisfaction of responsible consumption. Nothing is greener than re-use, and at AWW, everyone can be an eco-entrepreneur.

The personal history of its founders explains the presence of the solution with absence of the outcome. AWW was founded by a pair of sisters who work as professional organizers, helping people clear out space in their houses. The business objectives are based on the simple belief that material goods should be useful, durable and bring happiness to their owners. Therefore, the formalization of the idea that nothing should go to waste is more related to giving new life and finding new owners for unwanted items than related to building a sustainable business.

The stories accompanying the solutions provide evidence supporting the sufficiency relationship between the different configurations and the integration of sustainability in the organization of entrepreneurial actions. The stories and quotations seek to illustrate the conjunctural nature of the solutions, in other words how the different conditions combine in the formalization of sustainability ideas.

### 4.3.5 Robustness tests

#### 4.3.5.1 Frequency change

In order to assess the stability of the solutions, I replicated the analysis with a frequency threshold of 2. As the Truth Table 4.24 shows, there is change in the number of configurations. After the minimization process, it maintains those configurations with a high number of instances and eliminates those configurations (8) with less than 2 instances, which are treated as logical reminders.

Although this increases the limited diversity over 64 logically possible configurations, it allows for increasing the consistency and relevance of the solutions in that it uses configurations with a greater number of empirical instances.

**Table 4.24 Truth table for SAC (f=2)**

| UND | PRO | SEA | ORI | EFF | CON | N/cases | SAC | Consist. |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 0.998 |
| 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0.959 |
| 1 | 1 | 1 | 1 | 1 | 1 | 21 | 1 | 0.939 |
| 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0.939 |
| 1 | 1 | 1 | 1 | 1 | 0 | 6 | 1 | 0.929 |
| 1 | 1 | 0 | 1 | 1 | 1 | 2 | 0 | 0.880 |

As Table 4.25 shows, the most empirically relevant solutions remain. A3* and A4* maintain the same solution pattern as A2 and A3. A1* and A2* offer an extended view of A1, they combine the original configuration of A1 with either self-efficacy (EFF) or sustainability contribution belief (CON), which appear as interchangeable conditions, i.e. U•P•S•A•(E+C). The exclusion of configurations with lesser explanatory power, which account for most of the counterintuitive cases, reinforces the arguments of necessity of sustainability opportunity search (SEA).

**Table 4.25 Configurations for sustainability-oriented entrepreneurial actions (f=2)**

| | Solutions | | | |
|---|---|---|---|---|
| **Configurations** | **A1*** | **A2*** | **A3*** | **A4*** |
| UND | ● | ● | ● | - |
| PRO | ● | ● | - | ● |
| SEA | ● | ● | ● | ● |
| ORI | ● | ● | ● | ● |
| EFF | ● | - | ● | ● |
| CON | - | ● | ● | ● |
| Consistency | 0.91 | 0.94 | 0.94 | 0.94 |
| Raw coverage | **0.72** | **0.69** | **0.68** | **0.67** |
| Unique coverage | 0.08 | 0.04 | 0.04 | 0.03 |
| Overall solution consistency | 0.92 | | | |
| Overall solution coverage | 0.83 | | | |

Consistency threshold = 0.92 / Frequency threshold = 2

### 4.3.5.2 Sensitivity analyses

The aim of the sensitivity analysis is to examine whether my findings, particularly those of necessity and sufficiency, are robust to the use of alternative specifications of causal conditions. For example, based on a deep knowledge of the cases one can argue that the relationship between strong sustainability opportunity search and the organization of sustainability-oriented entrepreneurial actions is not strong enough to support the argument of necessity, and that the relationship of full necessity between sustainability opportunity search (SEA) and the organization of sustainability-oriented entrepreneurial actions (SAC) emerges with a more or less strong SEA.

From another perspective, and based on substantive knowledge, one could presume that the relationship between SEA and SAC is not one of necessity, but one of sufficiency when there is a very strong SEA. This might mean that having a very strong disposition towards searching business opportunities with potential multidimensional value is sufficient but not necessary for the integration of sustainability in the organization of entrepreneurial actions. This can a have major impact on the explanation of how opportunities develop in sustainability entrepreneurship, in that it can modify the number of causal paths and the explanation of the role of each causal condition.

This analysis is conducted by observing causal relationships under higher and lower degree of membership in the set of each relevant condition.

Squaring fuzzy set membership scores shifts causal conditions in a downward direction, creating sets of sustainability understanding ($UND^2$), very strong prospective sustainability entrepreneur ($PRO^2$), very strong sustainability opportunity search ($SEA^2$), very strong sustainability orientation ($ORI^2$), very strong self-efficacy ($EFF^2$) and very strong sustainability contribution belief ($CON^2$). Likewise, taking the square root of membership scores shifts causal condition in an upward direction, creating the sets of more or less strong sustainability understanding (√UND), more or less strong prospective sustainability entrepreneur (√PRO), more or less strong sustainability opportunity search (√SEA), more or less strong sustainability orientation (√ORI), more or less strong self-efficacy (√EFF) and more or less strong sustainability contribution belief (√CON)

Shifting membership scores in an upward or downward direction can shift points from one side to the other of the diagonal in the plot of an outcome against a causal condition (Ragin, 2000). Indeed, the use of modifiers ($X_i^2$ and $\sqrt{X_i}$) can have a major impact on patterns of necessity revealed in Figure 4.6. Table 4.26 presents fuzzy-set membership scores for sensitivity analysis after applying modifiers and Table 4.27 presents the results of the necessity analysis with very strong and more or less strong causal conditions contrasted to strong causal conditions.

**Table 4.26 Fuzzy-set membership scores for sensitivity analysis SAC**

| **Case** | **Conditions** | | | | | | | | | | | | **Outcome** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Very strong (n squared)** | | | | | | **More o less strong (n root squared)** | | | | | | |
| | $UND^2$ | $PRO^2$ | $SEA^2$ | $ORI^2$ | $EFF^2$ | $CON^2$ | √UND | √PRO | √SEA | √ORI | √EFF | √CON | √SAC |
| AWW | 0.5 | 0.67 | 0.5 | 0.79 | 0.42 | 0.21 | 0.84 | 0.91 | 0.84 | 0.94 | 0.81 | 0.68 | 0.46 |
| ACO | 0.32 | 0.32 | 0.32 | 0.85 | 0.1 | 0.67 | 0.76 | 0.76 | 0.76 | 0.96 | 0.57 | 0.91 | 0.86 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BTR | 0.96 | 0.67 | 0.98 | 0.96 | 0.42 | 0.98 | 0.99 | 0.91 | 1 | 0.99 | 0.81 | 1 | 0.96 |
| BGF | 0.67 | 0.5 | 0.67 | 0.25 | 0.94 | 0.88 | 0.91 | 0.84 | 0.91 | 0.71 | 0.98 | 0.97 | 0.77 |
| BCY | 0.15 | 0.98 | 0.88 | 0 | 0.12 | 0.98 | 0.62 | 1 | 0.97 | 0.17 | 0.59 | 1 | 0.39 |
| BST | 0.67 | 0.98 | 0.15 | 0.98 | 0.98 | 0.32 | 0.91 | 1 | 0.62 | 1 | 1 | 0.76 | 0.94 |
| BVG | 0.1 | 0.15 | 0.96 | 0.15 | 0.92 | 0.96 | 0.57 | 0.62 | 0.99 | 0.62 | 0.98 | 0.99 | 0.94 |
| CLI | 0.96 | 0.98 | 0.96 | 0.94 | 0.98 | 0.74 | 0.99 | 1 | 0.99 | 0.98 | 1 | 0.93 | 0.82 |
| CLE | 0.79 | 0.98 | 0.92 | 0.98 | 0.59 | 0.94 | 0.94 | 1 | 0.98 | 1 | 0.88 | 0.98 | 0.89 |
| CHU | 0.98 | 0.98 | 0.98 | 0.96 | 0.85 | 0.59 | 1 | 1 | 1 | 0.99 | 0.96 | 0.88 | 0.82 |
| CUL | 0.79 | 0.32 | 0.21 | 0.67 | 0.12 | 0.88 | 0.94 | 0.76 | 0.68 | 0.91 | 0.59 | 0.97 | 0.46 |
| DLI | 0.1 | 0.98 | 0.32 | 0.9 | 0.74 | 0.59 | 0.57 | 1 | 0.76 | 0.97 | 0.93 | 0.88 | 0.71 |
| DFL | 0.79 | 0.98 | 0.92 | 0.98 | 0.98 | 0.98 | 0.94 | 1 | 0.98 | 1 | 1 | 1 | 0.98 |
| EPU | 0.79 | 0.92 | 0.96 | 0.98 | 0.74 | 0.79 | 0.94 | 0.98 | 0.99 | 1 | 0.93 | 0.94 | 0.82 |
| ECV | 0.96 | 0.1 | 0.79 | 0.85 | 0.98 | 0.85 | 0.99 | 0.57 | 0.94 | 0.96 | 1 | 0.96 | 0.92 |
| ECW | 0.32 | 0.67 | 0.98 | 0.94 | 0.1 | 0.67 | 0.76 | 0.91 | 1 | 0.98 | 0.57 | 0.91 | 0.89 |
| ECZ | 0.21 | 0.1 | 0.67 | 0.94 | 0.21 | 0.59 | 0.68 | 0.57 | 0.91 | 0.98 | 0.68 | 0.88 | 0.82 |
| GSU | 0.5 | 0.96 | 0.32 | 0.96 | 0.67 | 0.59 | 0.84 | 0.99 | 0.76 | 0.99 | 0.91 | 0.88 | 0.23 |
| GTR | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.59 | 1 | 1 | 1 | 1 | 1 | 0.88 | 0.35 |
| HAR | 0.5 | 0.79 | 0.96 | 0.5 | 0.85 | 0.92 | 0.84 | 0.94 | 0.99 | 0.84 | 0.96 | 0.98 | 0.92 |
| HFR | 0.98 | 0.92 | 0.98 | 0.98 | 0.94 | 0.92 | 1 | 0.98 | 1 | 1 | 0.98 | 0.98 | 0.99 |
| IPA | 0.67 | 0.92 | 0.92 | 0.85 | 0.59 | 0.74 | 0.91 | 0.98 | 0.98 | 0.96 | 0.88 | 0.93 | 0.96 |
| IWB | 0.32 | 0.98 | 0.79 | 0.98 | 0.42 | 0.5 | 0.76 | 1 | 0.94 | 1 | 0.81 | 0.84 | 0.65 |
| KOR | 0.88 | 0.92 | 0.98 | 0.98 | 0.42 | 0.98 | 0.97 | 0.98 | 1 | 1 | 0.81 | 1 | 0.99 |
| MCP | 0.92 | 0.92 | 0.92 | 0.9 | 0.59 | 0.21 | 0.98 | 0.98 | 0.98 | 0.97 | 0.88 | 0.68 | 0.77 |
| MST | 0.21 | 0.07 | 0.04 | 0.5 | 0.42 | 0.15 | 0.68 | 0.51 | 0.46 | 0.84 | 0.81 | 0.62 | 0.82 |
| MOG | 0.32 | 0.07 | 0.96 | 0.5 | 0.1 | 0.21 | 0.76 | 0.51 | 0.99 | 0.84 | 0.57 | 0.68 | 0.32 |
| ODS | 0.32 | 0.67 | 0.1 | 0.32 | 0.59 | 0.02 | 0.76 | 0.91 | 0.57 | 0.76 | 0.88 | 0.37 | 0.5 |
| PEM | 0.98 | 0.5 | 0.92 | 0.98 | 0.94 | 0.96 | 1 | 0.84 | 0.98 | 1 | 0.98 | 0.99 | 0.99 |
| PRE | 0.79 | 0.5 | 0.5 | 0.85 | 0.12 | 0.21 | 0.94 | 0.84 | 0.84 | 0.96 | 0.59 | 0.68 | 0.65 |
| PRI | 0.79 | 0.92 | 0.32 | 0.42 | 0.98 | 0 | 0.94 | 0.98 | 0.76 | 0.81 | 1 | 0.17 | 0.99 |
| PWO | 0.98 | 0.96 | 0.88 | 0.79 | 0.88 | 0.98 | 1 | 0.99 | 0.97 | 0.94 | 0.97 | 1 | 0.99 |
| PLY | 0.32 | 0.92 | 0.5 | 0.79 | 0.85 | 0.59 | 0.76 | 0.98 | 0.84 | 0.94 | 0.96 | 0.88 | 0.35 |
| RMA | 0.5 | 0.94 | 0.88 | 0.79 | 0.42 | 0.01 | 0.84 | 0.98 | 0.97 | 0.94 | 0.81 | 0.32 | 0.99 |
| RNA | 0.96 | 0.92 | 0.98 | 0.98 | 0.88 | 0.15 | 0.99 | 0.98 | 1 | 1 | 0.97 | 0.62 | 0.99 |
| STW | 0.5 | 0.88 | 0.79 | 0.98 | 0.42 | 0.1 | 0.84 | 0.97 | 0.94 | 1 | 0.81 | 0.57 | 0.46 |
| STR | 0.5 | 0.92 | 0.98 | 0.9 | 0.92 | 0.85 | 0.84 | 0.98 | 1 | 0.97 | 0.98 | 0.96 | 0.92 |
| SSG | 0.32 | 0.79 | 0.21 | 0.9 | 0.32 | 0.42 | 0.76 | 0.94 | 0.68 | 0.97 | 0.76 | 0.81 | 0.1 |
| TGT | 0.67 | 0.21 | 0.92 | 0.85 | 0.42 | 0.67 | 0.91 | 0.68 | 0.98 | 0.96 | 0.81 | 0.91 | 0.77 |
| TOU | 0.1 | 0.92 | 0.92 | 0.94 | 0.32 | 0.67 | 0.57 | 0.98 | 0.98 | 0.98 | 0.76 | 0.91 | 0.82 |
| TPS | 0.92 | 0.67 | 0.92 | 0.96 | 0.85 | 0.98 | 0.98 | 0.91 | 0.98 | 0.99 | 0.96 | 1 | 0.94 |
| VEH | 0.98 | 0.98 | 0.98 | 0.98 | 0.92 | 0.98 | 1 | 1 | 1 | 1 | 0.98 | 1 | 0.95 |
| WEW | 0.98 | 0.98 | 0.88 | 0.98 | 0.98 | 0.98 | 1 | 1 | 0.97 | 1 | 1 | 1 | 0.99 |
| WHT | 0.88 | 0.98 | 0.98 | 0.98 | 0.74 | 0.74 | 0.97 | 1 | 1 | 1 | 0.93 | 0.93 | 0.99 |
| WIS | 0.21 | 0.21 | 0.67 | 0.25 | 0.59 | 0 | 0.68 | 0.68 | 0.91 | 0.71 | 0.88 | 0.26 | 0.32 |

With very strong causal conditions the necessity consistency level of sustainability opportunity search (SEA) drops from 0.94 to 0.88, not enough to discard very strong SEA

as a usually necessary condition based on consistency level only. However, very strong sustainability opportunity search is irrelevant in configurations A2+ and A4+ and absent in the configuration A6+. Although 7 cases moved to the upper triangular plot (17 in total) achieving a sufficiency consistency level of 0.87 (Plot A in Figure 4.9) I cannot sustain the argument of very strong SEA as sufficient but not necessary for the outcome SAC to occur. Solution Table 4.28 corroborates this argument in that it shows no single solution path with very strong SEA as sufficient condition for the outcome to occur; rather it presents a situation of complex causality and equifinality.

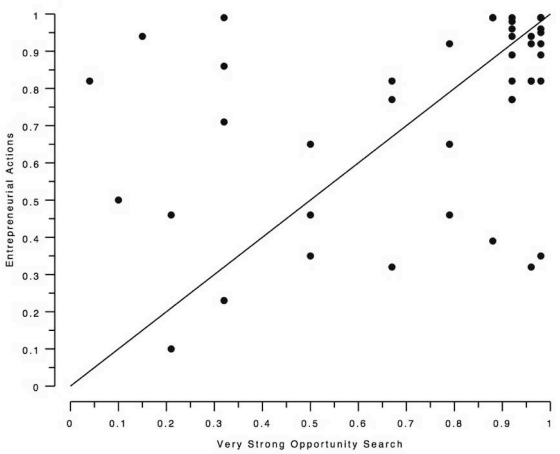
**Table 4.27 Analysis of necessary conditions for SAC**

| | Very strong causal conditions | | More or less strong causal conditions | | Strong causal conditions | |
|---|---|---|---|---|---|---|
| Condition | Consistency | Coverage | Consistency | Coverage | Consistency | Coverage |
| UND | 0.756 | 0.921 | 0.947 | 0.832 | 0.878 | 0.875 |
| PRO | 0.797 | 0.833 | 0.950 | 0.804 | 0.891 | 0.823 |
| SEA | 0.856 | 0.877 | 0.968 | 0.810 | 0.929 | 0.844 |
| ORI | 0.884 | 0.842 | 0.971 | 0.799 | 0.939 | 0.818 |
| EFF | 0.751 | 0.906 | 0.953 | 0.836 | 0.881 | 0.877 |
| CON | 0.740 | 0.912 | 0.923 | 0.841 | 0.854 | 0.882 |

With more or less strong causal conditions the consistency level of sustainability opportunity search (SEA) increases from 0.94 to 0.97. Although the fuzzy subset relationship between SAC and SEA is stronger under a higher degree of membership in the set of SEA, I cannot sustain the argument of full necessity for SAC. This is given by the facts that one configuration (A3-) in the solution table (Table 4.28) exhibits SEA as an irrelevant condition and that only four cases - out of ten - moved to the lower triangular plot (Plot B in Figure 4.9). Regarding sufficiency in the analysis with very strong causal conditions, although the consistency levels of the causal paths ($\geq$0.94) and the overall solution (0.95) are higher than the analysis with strong causal conditions (OSCon = 0.89), the coverage levels drop considerably, from 0.87 to 0.77 for the overall solution and below 0.65 for the individual causal paths, being 0.56 the highest coverage level. Individual raw coverage below 0.65 implies that the solution is empirically less relevant.

**Figure 4.9 Scatterplots of fuzzy subset relationships between SAC and SEA+ / SEA-**

Plot A. SAC and very strong SEA




Plot B. SAC and more or less strong SEA

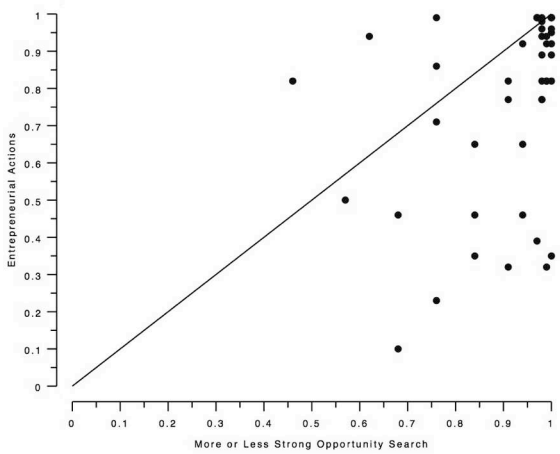



**Table 4.28 Sufficiency analyses results with very strong and more or less strong causal conditions**

| | Solutions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Conf.** | **A1+** | **A2+** | **A3+** | **A4+** | **A5+** | **A6+** | **A1-** | **A2-** | **A3-** |
| UND | ●$_2$ | ●$_2$ | - | - | ⊗ | - | ● | ● | ● |
| PRO | - | ● | - | ⊗$_5$ | ⊗$_5$ | ● | ● | ● | ● |
| SEA | ●$_1$ | - | ●$_1$ | - | ●$_3$ | ⊗ | ● | ● | - |
| ORI | ●$_1$ | ● | ●$_{1-6}$ | ●$_6$ | ⊗$_7$ | ⊗$_7$ | ● | - | ● |
| EFF | - | ●$_4$ | ⊗$_6$ | ⊗$_6$ | ●$_{3-7}$ | ●$_{4-7}$ | ● | ● | ● |
| CON | ● | ⊗$_4$ | ●$_6$ | ●$_6$ | - | ⊗$_4$ | - | ● | ● |
| Cons | 0.98 | 0.95 | 0.98 | 0.94 | 0.94 | 0.98 | 0.87 | 0.89 | 0.9 |
| RC | **0.56** | **0.26** | **0.26** | **0.16** | **0.12** | **0.11** | **0.87** | **0.83** | **0.83** |
| UC | 0.3 | 0.07 | 0.04 | 0.02 | 0.03 | 0.01 | 0.05 | 0.009 | 0.006 |
| OS Cons | | | 0.95 | | | | | 0.86 | |
| OS Cove | | | 0.77 | | | | | 0.88 | |

Configurations with (+) Very strong causal conditions / (-) More or less strong causal conditions

Regarding sufficiency in the analysis with more or less strong causal conditions, the solution consistency (0.86) is lower than for the analysis of SAC with strong causal conditions (0.89). Although there is an increment in the individual levels of consistency, the latter means that finding sufficiency with strong conditions is more effective that looking for sufficiency with more or less strong conditions. In the same vein, even though the empirical relevance of this solution is higher (coverage = 0.88), the solution suffers from limited diversity, as shown in the Truth Table 4.29 and cannot account for the heterogeneity and conceptual richness of the associated causal relationships.

**Table 4.29 Truth table for SAC with more or less strong causal conditions**

| UND- | PRO- | SEA- | ORI- | EFF- | CON- | N/cases | SAC | Consist. |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0.94321 |
| 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0.937107 |
| 1 | 1 | 1 | 1 | 1 | 0 | 4 | 1 | 0.928962 |
| 1 | 1 | 1 | 1 | 1 | 1 | 39 | 1 | 0.899743 |

This sensitivity analysis corroborates the robustness of the results presented in the configurational analysis of SAC.

### 4.3.5.3 Negate analysis

A different way of understanding the organization of sustainability-oriented entrepreneurial actions is by analysing the conditions or configurations of conditions that lead or partially lead to the opposite result, which is the non-integration of sustainability in the organization of entrepreneurial actions (~SAC). In doing so, I conducted a configurational analysis of conditions for ~SAC. Table 4.30 presents the truth table for ~SAC, with 14 configurations and 43 cases that are relevant for the outcome, with 7 cases above the minimum consistency, set at ≥0.8, and 36 cases below the cutoff line.

**Table 4.30 Truth table for absence sustainability-oriented entrepreneurial actions**

| Conditions | | | | | | | Outcome | |
|---|---|---|---|---|---|---|---|---|
| UND | PRO | SEA | ORI | EFF | CON | N/cases | ~SAC | consist. |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0.9403 |
| 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0.9177 |
| 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0.8756 |
| 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0.8183 |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0.8156 |
| 1 | 1 | 0 | 1 | 1 | 1 | 2 | 1 | 0.8026 |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0.7829 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0.7672 |
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0.7593 |
| 1 | 1 | 1 | 1 | 1 | 0 | 6 | 0 | 0.6720 |
| 0 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 0.6580 |
| 1 | 1 | 1 | 1 | 0 | 1 | 2 | 0 | 0.6546 |
| 1 | 0 | 1 | 1 | 1 | 1 | 2 | 0 | 0.5734 |
| 1 | 1 | 1 | 1 | 1 | 1 | 21 | 0 | 0.3262 |

Given that there are configurations exhibiting high levels of consistency, I conducted an fsQCA of the following model:

~SAC = f(UND, PRO, SEA, ORI, EFF, CON)

This provides an alternative path for the analysis of conditions for SAC, and sometimes can present a higher explanatory power. Table 4.31 presents consistency and coverage scores for each solution term and the solution as a whole.

As Table 4.31 shows, the solution's coverage (0.66) and consistency (0.75) levels are much lower than in the analysis of SAC (0.87, 0.89), meaning that finding sufficient conditions for the presence of sustainability-oriented entrepreneurial actions is more effective that looking for conditions for its absence. This negate analysis corroborates the robustness of the results presented in the configurational analysis of SAC.

**Table 4.31 Configurations for absence of sustainability-oriented entrepreneurial actions**

| | **Scores** | | |
|---|---|---|---|
| **Solution terms** | Consistency | Raw coverage | Unique coverage |
| U•S•A•e•c | 0.83 | 0.45 | 0.15 |
| U•P•s•A•C | 0.79 | 0.41 | 0.14 |
| u•p•s•A•E•c | 0.82 | 0.18 | 0.00 |
| u•P•S•a•e•C | 0.94 | 0.23 | 0.06 |
| **Overall solution consistency ~SAC** | **0.75** | | |
| **Overall solution coverage ~SAC** | **0.66** | | |
| Overall solution consistency SAC | 0.89 | | |
| Overall solution coverage SAC | 0.87 | | |

## 4.4 Explaining the formation of sustainability-driven exchange relationships

### 4.4.1 Fuzzy set membership scores and truth table

Table 4.32 presents the calibration table for the following outcome and causal conditions:

SER = f(UND, PRO, SEA, ORI, MOR, CON)

The table provides an overview of the condition and outcome values for each case after calibration. These values are the input for the construction of the truth table and the fuzzy-set analysis.

**Table 4.32 Calibration table - sustainability-driven exchange relationships**

| Case | Conditions | | | | | | Outcome |
|---|---|---|---|---|---|---|---|
| | **UND** | **PRO** | **SEA** | **ORI** | **MOR** | **CON** | **SER** |
| AWW | 0.71 | 0.82 | 0.71 | 0.89 | 0.82 | 0.46 | 0.29 |
| ACO | 0.57 | 0.57 | 0.57 | 0.92 | 0.95 | 0.82 | 0.46 |
| BTR | 0.98 | 0.82 | 0.99 | 0.98 | 0.71 | 0.99 | 0.57 |
| BGF | 0.82 | 0.71 | 0.82 | 0.5 | 0.89 | 0.94 | 0.97 |
| BCY | 0.39 | 0.99 | 0.94 | 0.03 | 0.39 | 0.99 | 0.06 |
| BST | 0.82 | 0.99 | 0.39 | 0.99 | 0.43 | 0.57 | 0.57 |
| BVG | 0.32 | 0.39 | 0.98 | 0.39 | 0.89 | 0.98 | 0.57 |
| CLI | 0.98 | 0.99 | 0.98 | 0.97 | 0.95 | 0.86 | 0.94 |
| CLE | 0.89 | 0.99 | 0.96 | 0.99 | 0.89 | 0.97 | 0.97 |
| CHU | 0.99 | 0.99 | 0.99 | 0.98 | 0.43 | 0.77 | 0.35 |
| CUL | 0.89 | 0.57 | 0.46 | 0.82 | 0.95 | 0.94 | 0.65 |
| DLI | 0.32 | 0.99 | 0.57 | 0.95 | 0.71 | 0.77 | 0.94 |
| DFL | 0.89 | 0.99 | 0.96 | 0.99 | 0.89 | 0.99 | 0.82 |
| EPU | 0.89 | 0.96 | 0.98 | 0.99 | 0.89 | 0.89 | 0.16 |
| ECV | 0.98 | 0.32 | 0.89 | 0.92 | 0.65 | 0.92 | 0.35 |
| ECW | 0.57 | 0.82 | 0.99 | 0.97 | 0.95 | 0.82 | 0.82 |
| ECZ | 0.46 | 0.32 | 0.82 | 0.97 | 0.95 | 0.77 | 0.86 |
| GSU | 0.71 | 0.98 | 0.57 | 0.98 | 0.39 | 0.77 | 0.46 |
| GTR | 0.99 | 0.99 | 0.99 | 0.99 | 0.82 | 0.77 | 0.86 |
| HAR | 0.71 | 0.89 | 0.98 | 0.71 | 0.5 | 0.96 | 0.1 |
| HFR | 0.99 | 0.96 | 0.99 | 0.99 | 0.71 | 0.96 | 0.82 |
| IPA | 0.82 | 0.96 | 0.96 | 0.92 | 0.89 | 0.86 | 0.77 |
| IWB | 0.57 | 0.99 | 0.89 | 0.99 | 0.82 | 0.71 | 0.43 |
| KOR | 0.94 | 0.96 | 0.99 | 0.99 | 0.95 | 0.99 | 0.94 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MCP | 0.96 | 0.96 | 0.96 | 0.95 | 0.5 | 0.46 | 0.23 |
| MST | 0.46 | 0.26 | 0.21 | 0.71 | 0.43 | 0.39 | 0.03 |
| MOG | 0.57 | 0.26 | 0.98 | 0.71 | 0.43 | 0.46 | 0.46 |
| ODS | 0.57 | 0.82 | 0.32 | 0.57 | 0.89 | 0.14 | 0.94 |
| PEM | 0.99 | 0.71 | 0.96 | 0.99 | 0.97 | 0.98 | 0.97 |
| PRE | 0.89 | 0.71 | 0.71 | 0.92 | 0.89 | 0.46 | 0.46 |
| PRI | 0.89 | 0.96 | 0.57 | 0.65 | 0.98 | 0.03 | 0.04 |
| PWO | 0.99 | 0.98 | 0.94 | 0.89 | 0.89 | 0.99 | 0.92 |
| PLY | 0.57 | 0.96 | 0.71 | 0.89 | 0.65 | 0.77 | 0.57 |
| RMA | 0.71 | 0.97 | 0.94 | 0.89 | 0.5 | 0.1 | 0.96 |
| RNA | 0.98 | 0.96 | 0.99 | 0.99 | 0.5 | 0.39 | 0.96 |
| STW | 0.71 | 0.94 | 0.89 | 0.99 | 0.89 | 0.32 | 0.14 |
| STR | 0.71 | 0.96 | 0.99 | 0.95 | 0.65 | 0.92 | 0.77 |
| SSG | 0.57 | 0.89 | 0.46 | 0.95 | 0.43 | 0.65 | 0.43 |
| TGT | 0.82 | 0.46 | 0.96 | 0.92 | 0.97 | 0.82 | 0.86 |
| TOU | 0.32 | 0.96 | 0.96 | 0.97 | 0.71 | 0.82 | 0.29 |
| TPS | 0.96 | 0.82 | 0.96 | 0.98 | 0.97 | 0.99 | 0.99 |
| VEH | 0.99 | 0.99 | 0.99 | 0.99 | 0.82 | 0.99 | 0.92 |
| WEW | 0.99 | 0.99 | 0.94 | 0.99 | 0.65 | 0.99 | 0.99 |
| WHT | 0.94 | 0.99 | 0.99 | 0.99 | 0.65 | 0.86 | 0.77 |
| WIS | 0.46 | 0.46 | 0.82 | 0.5 | 0.65 | 0.07 | 0.1 |

The 64 logically possible configurations ($2^6$) were reduced in line with the following conditions: frequency = 1, consistency = 0.8. Table 4.33 shows the truth table with the resulting 13 configurations and 39 cases that are relevant for the outcome (87% of the cases). 33 cases exceed the lowest acceptable consistency and 6 cases are below the consistency cutoff line. The consistency threshold of 0.8 corresponds to a gap observed in the distribution of consistency scores (Schneider et al. 2010).

There are 51 logically possible configurations lacking empirical evidence, these are the remainders to be excluded from the minimization process. I cannot infer sufficiency of a given combination of conditions for the formation of sustainability-driven exchange relationships (SER) based only on the fact that such combination is logically possible. However, the areas with missing evidence are relevant and considered in the counterfactual analysis.

**Table 4.33 Truth table for sustainability-driven exchange relationships**

| Conditions | | | | | | Outcome | | |
|---|---|---|---|---|---|---|---|---|
| **UND** | **PRO** | **SEA** | **ORI** | **MOR** | **CON** | **N/cases** | **SER** | **Consist.** |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0.957 |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.953 |
| 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 0.920 |
| 1 | 1 | 0 | 1 | 0 | 1 | 2 | 1 | 0.918 |
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0.915 |
| 1 | 1 | 1 | 1 | 1 | 1 | 20 | 1 | 0.891 |
| 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0.887 |
| 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0.872 |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0.854 |
| 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0.809 |
| 1 | 1 | 1 | 1 | 1 | 0 | 4 | 0 | 0.761 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0.715 |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0.687 |

### 4.4.2 Configurational analysis

Based on the Truth Table 4.33 and by using a counterfactual analysis of causal conditions (automated in fsQCA), I logically reduced the truth table to the following intermediate solution, which includes easy counterfactuals and comprises five simplified combinations of conditions:

SER= SEA • ORI • MOR • CON
+ UND • PRO • ORI • CON
+ UND • PRO • ~SEA • ORI • MOR
+ ~UND • ~PRO • SEA • MOR • CON
+ UND • ~PRO • SEA • ORI • ~MOR • ~CON

Each line represents a configuration of conditions associated with the formation of sustainability-driven exchange relationships (SER). Table 4.34 graphically reports the results of fuzzy set analysis for the integration of sustainability in the formation of exchange relationships. The solution table distinguishes core and peripheral conditions and shows single and overall degrees of consistency and coverage.

Results indicate that presence of sustainability understanding and absence of perceived moral intensity (UND•~MOR), presence of sustainability understanding and absence of sustainability opportunity search (UND•~SEA), presence of prospective

sustainability entrepreneur and absence of sustainability opportunity search (PRO•~SEA), absence of prospective sustainability entrepreneur and presence of sustainability opportunity search (~PRO•SEA), presence of sustainability orientation and presence of sustainability contribution belief (ORI•CON), and presence of perceived moral intensity and presence of sustainability contribution belief (MOR•CON) are combinations of conditions that exhibit a strong causal relationship with the outcome, whereas lack of sustainability understanding (~UND) and lack of sustainability contribution belief (~CON) are complementary conditions that present weaker causal relationships with the outcome SER.

Solutions or combination of conditions are numbered E1, E2, etc., and have been sorted by raw coverage and unique coverage. The assessment of coverage provides the solutions' relative empirical importance.

The solution table (below) shows that the set relation between configurations of conditions and the outcome is highly consistent, with individual results above 0.81, and an overall consistency of 0.81. A consistency of ≥0.80 indicates a strong set-theoretical relationship between each solution term, the overall solution and the outcome (Ragin 2006).

**Table 4.34 Configurations for the formation of sustainability-driven exchange relationships**

| | **Solutions** | | | | |
|---|---|---|---|---|---|
| **Configurations** | **E1** | **E2** | **E3** | **E4** | **E5** |
| UND | - | ● | ●$_{6}$ | ⊗ | ●$_{3}$ |
| PRO | - | ● | ●$_{5}$ | ⊗$_{4}$ | ⊗$_{4}$ |
| SEA | ● | - | $_{5}$⊗$_{6}$ | ●$_{4}$ | ●$_{4}$ |
| ORI | ●$_{2}$ | ●$_{2}$ | ● | - | ● |
| MOR | ●$_{1}$ | - | ● | ●$_{1}$ | ⊗$_{3}$ |
| CON | $_{1}$●$_{2}$ | ●$_{2}$ | - | ●$_{1}$ | ⊗ |
| Consistency | 0.87 | 0.85 | 0.89 | 0.95 | 0.81 |
| Raw coverage | 0.82 | 0.79 | 0.20 | 0.15 | 0.08 |
| Unique coverage | 0.05 | 0.04 | 0.02 | 0.006 | 0.001 |
| Overall solution consistency | | | 0.81 | | |
| Overall solution coverage | | | 0.88 | | |

Consistency threshold = 0.8 / Frequency threshold = 1

Table 4.35 presents the cases with set membership greater than 0.5 in each solution term and the outcome, as well as highlights (*) those cases with set membership greater than 0.5 in the solution term but lower than 0.5 in the set of entrepreneurs with strong integration of sustainability in the formation of exchange relationships (SER). Cases are classified in descending order based on their joint membership score in the solution term.

**Table 4.35 Cases with membership greater than 0.5 in each solution term - SER**

| Solution | Cases |
|---|---|
| E1 | TPS, PEM, KOR, CLE, PWO, DFL, EPU*, CLI, IPA, TGT, VEH, ECW, GTR, ECZ, HFR IWB*, BTR, TOU*, WEW, WTS |
| E2 | WEW, VEH, HFR, KOR, PWO, CLE, DFL, EPU*, WTS, CLI, BTR, IPA, TPS, GTR, CHU*, GSU*, HAR*, PEM, STR, ACO |
| E3 | ODS, CUL |
| E4 | BVG, ECZ |
| E5 | MOG* |

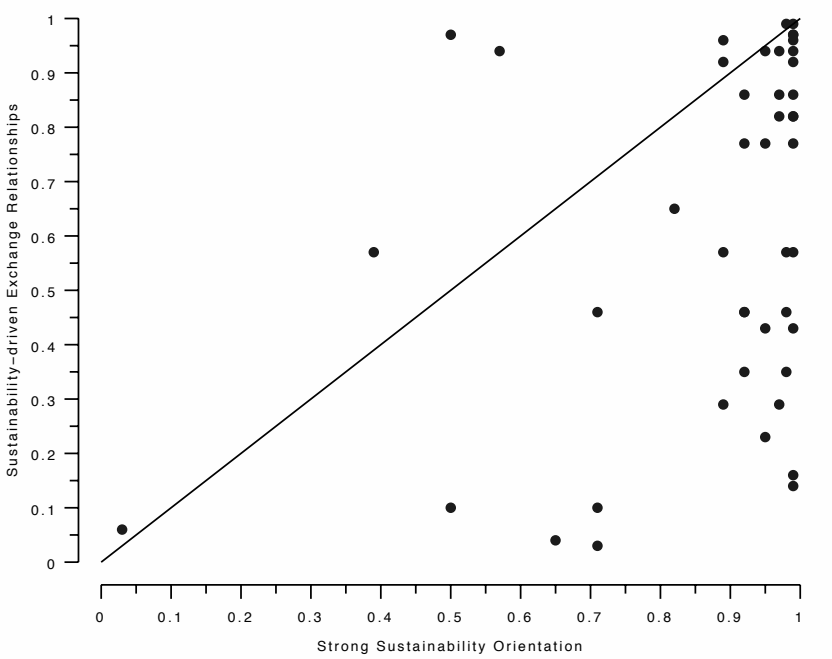
*Cases with membership lower than 0.5 in the outcome

### 4.4.3 Necessity analysis

Although there are several potential necessary conditions exhibiting a strong causal relationship with the outcome in empirically relevant solutions (e.g. perceived moral intensity and sustainability contribution belief), the necessity analysis found one usually necessary condition for high integration of sustainability in the formation of exchange relationships; this is the presence of strong sustainability orientation, ORI (consistency = 0.96). Figure 4.10 presents a scatterplot with the fuzzy subset relationship between the formation of sustainability-driven exchange relationships (SER) and the sustainability orientation (ORI) of the entrepreneur. The fact that membership in the outcome SER is almost always less or equal than membership in the cause ORI corroborates the argument of necessity.

Despite the high concentration of instances along the full membership in the set of entrepreneurs with strong sustainability orientation (ORI), the distribution of cases across the lower triangle shows that there is no set skewed towards high membership, eliminating the potential risk of trivialness of the necessary condition (Schneider and Wagemann 2012).

**Figure 4.10 Scatterplot of fuzzy subset relationship between SER and strong ORI**




The presence of cases in the lower triangular plot suggests that almost every time an entrepreneur is establishing sustainability-driven exchange relationships (SER) there is a clear consideration of the responsibilities and obligations of the venture in its social, environmental, economic and intergenerational dimensions. For instance, 95% of the entrepreneurs with strong membership in the set of sustainability-driven exchange relationships (≥0.8) exhibit high scores in recognizing the obligation to trade fairly with customers and suppliers (≥4.0) and to make a responsible use of natural resources (≥4.0). Likewise, they exhibit high scores in the recognition of the power of their businesses to help solving current sustainability problems (≥4.0).

In building exchange relationships with potential angel investors, HFR (0.99,0.82), for example, stresses the necessity of a rethinking of the new nature and direction of investment. The fact that the founder of HFR focuses his attention on the relevance of social or environmental values and the need for paradigm change of business reflects underlying values and principles closely related to sustainability. As he states during the interview:

> I said, wait a second. I've looked at your website. You don't make any mention of this (i.e. relevance of social or environmental values and the need for paradigm change), and I really think that for entrepreneurs like me this is not a direction we would spend time going in because we need conscious and patient capital

In this sense, he emphasizes the new role of investment and investors, and how these should operate facing sustainable entrepreneurs' business proposition:

> Conscious and patient capital means not sitting down and in the first five minutes starting to talk about three-to-five year exit strategies. It means talking about ten-to-twenty year dividend returns with heavy reinvestment of profits in not only the company but also in the triple-bottom line economy.

In a similar vein, PEM's founders build on their sustainability vision to promote and sell their Equitable Forestry model. The way they pose their venture facing potential clients reflects underlying attitudes and convictions regarding the positive role of their business in society. The following paragraph, extracted from PEM's marketing strategy, illustrates this point:

> An experienced investor was looking to diversify his portfolio. A young couple wanted to leverage their investment for social good. Grandparents wanted to save for a grandchild's college expenses. Each of these investors had different financial goals, but they all chose the Forest Investment to help get them there. The Forest Investment helps to mitigate tropical deforestation while creating jobs and opportunities for rural Panamanians. And it produces real financial benefits for investors. Through the Forest Investment, investors have the opportunity to do good while profiting.

They seek to generate these returns through their model, which entails the cultivation and selective harvesting of mixed-species timber plantations, managed in partnership with local communities in Panama.

RNA (0.99,0.96) also elaborates a similar tactic when building exchange relationships with potential business partners. They propose a comprehensive business approach that provides direct market access, organic agriculture training and educational programmes for hundreds of indigenous families in Ecuador. In the Press Kit 2011 the founders point out:

> While promoting cultural traditions, valuing small farmers and conserving the Amazon rainforest, RNA inspires people to live a stimulating life and se their energy and imagination to create a better world.

These stories provide evidence supporting the necessity relationship between sustainability orientation (ORI) and the integration of sustainability in the formation of exchange relationships (SER). The representative quotations have been extracted from sections of the interviews and specific documents where the entrepreneur describes the initial interactions with customers, suppliers and potential investors (Dimov 2011).

Stories and quotations reflect the presence of a particular discourse wherein the different aspects of sustainability permeate the way in which products and services, risks and broader benefits are positioned.

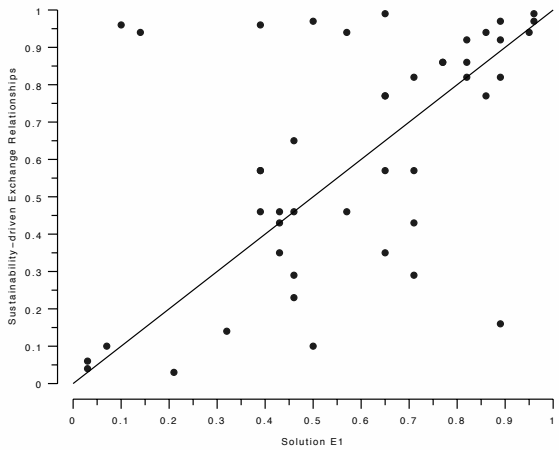
### 4.4.4 Sufficiency analysis

Sufficiency analysis found no single condition sufficient for the integration of sustainability in the formation of exchange relationships (SER). The results point out a situation of true equifinality, with five consistent paths to membership in the set of entrepreneurs with high integration of sustainability in the formation of exchange relationships (SER). These five quasi-sufficient combinations are understood as alternate paths for the outcome SER and they are logically equivalent or substitutable (Ragin 2006). The total coverage of the solution is 0.88 indicating that most of the outcome is covered or explained by the five causal paths and that the solution as a whole is empirically relevant.

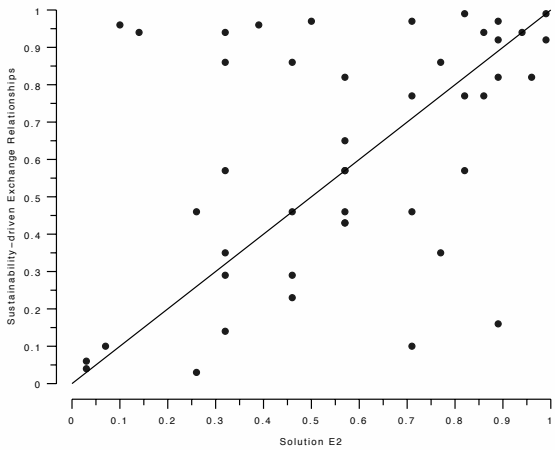
Among the five causal paths, there are two empirically dominant configurations: E1 (raw coverage = 0.82, unique coverage = 0.05) and E2 (raw coverage = 0.79, unique coverage = 0.04). Figure 4.11 presents the scatterplots of fuzzy subset relationship between the formation of sustainability-oriented exchange relationships (SER) and these two configurations.

**Figure 4.11 Scatterplots of fuzzy subset relationships between SER and solutions E1 and E2**

Plot A. SER and solution E1




Plot B. SER and solution E2




Solution E1 combines the core conditions of sustainability orientation (ORI), perceived moral intensity (MOR) and sustainability contribution belief (CON) with the

peripheral condition sustainability opportunity search (SEA). ORI, MOR and CON are present in both parsimonious and intermediate solutions, whereas SEA is only present in the intermediate solution. In E1, sustainability understanding (UND) and prospective sustainability entrepreneur (PRO) are irrelevant conditions.

The business model of PEM provides evidence to understanding how the core conditions in solution E1 interact to produce the sustainability-driven exchange relationships (SER). In explaining their 'Equitable Forestry Model', one of its founders indicates:

> We practice a more inclusive kind of forestry - one that strives to be more socially and environmentally beneficial (…) Our pioneering approach grew from a local need for more sustainable income-generating activities, and the need to slow deforestation in rural Panama. First implemented in 2007 through a 25 acre pilot project, the Equitable Forestry approach has been well received by our rural community forestry partners.

Jose Manuel, member of the 'UNDP-GEF Small Grants Program' reinforces the argument. In talking about how he perceives PEM he points out:

> PEM is creating an effective financial mechanism to combat deforestation through direct and indirect payments that people can feel, touch and show.

The case of TGT also illustrates this combination of conditions. I explaining their growth strategy, one of the founders emphasize and elaborate the business proposition around the notion of social justice. In this sense, any potential investor should reconsider the logic of investment, because the impact of the venture is broader and returns over investment usually takes more time that in traditional business venturing. As he explains in the interview:

> Well for me, I would say it boils down to fighting inequality and fighting this ever-growing gap between a small, small minority of people who have literally everything and all the rest of the people who have literally nothing (MOR) TGT's growth strategy is to grow slowly and organically and pick up interesting people as well as customers and partners along our journey in order to extend our tribe and reach even more impact (CON). TGT is a gathering of remarkable people; change makers and doers working with full dedication to create a happy planet (ORI).

Solution E2 combines two core conditions, sustainability orientation (ORI) and perceived moral intensity (MOR) with two peripheral conditions: sustainability understanding (UND) and prospective sustainability entrepreneur (PRO). Here,

sustainability opportunity search (SEA) and perceived moral intensity (MOR) are irrelevant conditions.

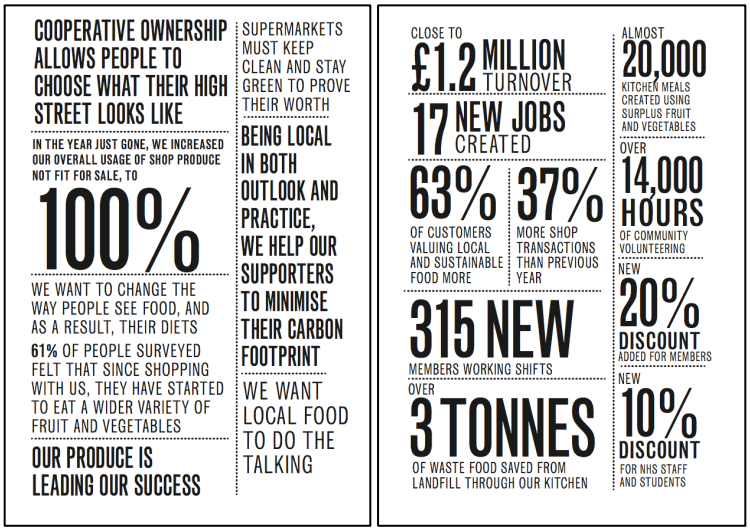
The case of BTR (0.82,0.57) exemplifies how the core conditions of ORI and CON combine to produce the outcome. Transparency, integrity and responsibility are central elements in the formation of exchange relationships with market structures. These are values embedded in the core of BTR's discourse, which has moved the firm away from the imperative of business as usual. For example, in a recent crowd funding campaign for developing a new product, they sell their venture as for-profit business with a non-for-profit heart. This in the sense that, unlike traditional ventures, money is not the central driver, however, the venture is highly profitable (CON) by putting into practice a strong sustainability orientation (ORI). As one of the founders explains in the interview:

> Our business is founded on never thinking profit or money is the driver. We always see it and talk about this all the time, and it becomes more critical as the team grows, but money always comes when you do amazing stuff. That's the easy part. As long as you stay focused to your values and what you believe in, and you're transparent with the people you're serving (ORI), in this case our customers, money comes (CON).

Table 4.36 provides evidence supporting the sufficiency relationship between the two empirically dominant configurations and the integration of sustainability in the formation of exchange relationships (SER).

**Table 4.36 Data supporting sufficiency relationships between relevant solutions and SER**

| Conf. | Conditions combined | Representative quotations |
|---|---|---|
| E1 | **MOR** | The UK has some of the best food retailers in the world. They employ a huge number of people; they sell food in extremely safe and hygienic conditions at low prices to the consumer. But all this comes at a hidden cost to the environment, to people's health and to the farmer - which all add up to a cost to society (…) So let's not worry about the environment, the carbon foot prints, the air-miles, the water shortages caused by intensive crop cultivation. As long as we can buy asparagus all year round (…)'British agriculture it's on its knees (…) we need to listen to the massive food companies, making massive profit and making decisions on food for profit. We have to listen to the future, to our grandchildren, who would look back at these times (…) we as a generation are so far advanced and we can do all kinds of things, but we are creating criminal levels of food waste, we are creating criminal levels of food poverty. TPS (0.96,0.99) |
| E1 | **ORI•MOR•CON** | Achievement: Social, Environmental and Commercial - Annual Report TPS (0.96,0.99) |




E1 **ORI•MOR•CON•**SEA During our time there (Panama) we saw the drastic environmental effects of unchecked deforestation: species depletion, soil erosion and the emission of tons of $CO_2$ into the atmosphere. Initially, it was frustrating knowing that our communities played a significant role in this. But as we spent more time "living the issues", we came to realize that tropical deforestation is more than an environmental issue. People depend on the rainforest for food, shelter and income. Preservation comes second to their needs (…) This is a long-term investment (…) we've dealt with a lot of different types of investors from those that are looking for that long-term opportunity, in order to build up their retirement fund, to more social impact investors, people who are more concerned about the impact we have on the communities and the environment. Then the profit motive is more of a secondary or tertiary kind of priority for them. You kind of make it more of an all-inclusive investment where there's an environmental aspect to it. There's a social aspect to it, there's a profit aspect to it. PEM (0.96,0.97)

E1 **ORI•MOR•CON•**SEA We founded KOR while living and farming on our off-the-grid permaculture farm and sustainability centre in the rainforest of Costa Rica (…) Not so far from this farm, low-flying airplanes spray highly toxic pesticides, herbicides and fungicides on banana plantations, and right onto farming workers in the field, as well as their families, their homes, playgrounds, schools and water supply. We witnessed the abusive labour practices that develop when large unsustainable agriculture has tremendous power and is the only source of income for people trying their best to feed their families (…) And so we were moved to create KOR, to share this naturally delicious pure and healthy food, and to support organic family farmers and their communities by connecting them with the growing market of people who care about the quality of the food they eat as well as the social and environmental conditions under which it is grown, produced and traded (…) In 2008 we launched our line of chocolate fruit treats, working with and supporting small sustainable farmers in countries all over the world. Our venture is taking off: every day more and more people like you discover and become loyal fans of KOR as well as the mission behind what we do. We are tremendously excited to continue to delight and have a positive impact on the health and lives of a rapidly growing number of fans, farming communities and on the ecosystems of the planet we all share. KOR (0.95,0.94)

E2 UND I find it very easy to communicate with people. Because, you have a shared understanding of the needs and the gravity of the situation, right now, you know, with regards to climate change and issues of sustainability. On the very crude level, some companies aren't going to be able to have any inputs because it's just going to be gone. So how

| | | |
|---|---|---|
| | | do we deal with those issues?. IPA (0.82,0.77) |
| E2 | **ORI•CON** | We work to blend our values with business sensibilities, and although we have wireless internet in the office, the whole site is powered by solar panels and heated with wood stoves. We like to think that this tangible connection to nature helps us focus on forward-thinking designs and earth-friendly construction. WHT (0.86,0.77) |
| E2 | **ORI•CON** | Sustainably we try to minimize resource use from end-to-end, so the bikes are the most visible things that we do but we also minimize water and energy use inside the facility, and chemical usage with our wash process. The cool thing about our industry is that just about every efficiency technique reduces both cost and environmental impact, so unlike a number of green industries, ours is an industry where you can be cheaper and be greener rather than having the environmental costs you did charge a premium. |

Overall, higher solution coverage and unbalanced coverage among alternative paths (i.e. E3, E4 and E5) suggest that causality underlying the formation of exchange relationships is less complex than causality underlying the development of sustainability-oriented venture ideas and the organization of sustainability-oriented entrepreneurial actions.

Solutions E3, E4 and E5 portray counterintuitive cases, demonstrating that the integration of sustainability in the formation of exchange relationships can occur even under conditions where, for example, entrepreneurs show no intention to search for holistic value creation (E3), no ability and willingness to pursue sustainability-oriented venture opportunities (E4 and E5) nor recognize the moral significance of the problem at stake (E5), although they might be exploring ideas with economic, social, environmental and intergenerational components (E4 and E5). These configurations of causal conditions and their respective cases are not errors; they are simply different recipes for the formation of sustainability-oriented exchange relationships.

This is the case of ODS in solution E3 where sustainability understanding (UND) and prospective sustainability entrepreneur (PRO) are core conditions, there is absence of sustainability opportunity search (SEA), and sustainability orientation (ORI) and sustainability contribution belief (CON) only reinforce the main attributes of UND and PRO. ODS is a technology venture that designs, manufactures, and distributes solar energy products in Kenya, Africa. By proving portable energy for lights, phones and radios the venture has helped improving health care, education, household productivity, commerce and communication in general. ODS began after his founder Gaurav spent years working in Liberia and Kenya leading energy and technology initiatives for the health sector. While doing so he realized that over 90% of the clinics in the area have no

electricity and are forced to close at sundown. He concluded that there was a critical need for community-based care, which was especially relevant during night-time emergency cases. In describing the context where his venture operates, he indicates:

> Health workers have to deliver newborns in almost total darkness with dim candlelight and kerosene fumes. (Indeed) Liberia had one of the worst maternal mortality rates in the world.

Seeing all of this and wanting to do something about it, he left his position in the health sector to develop a solution for clean and affordable hands-free lighting and phone charging for use by community health workers, small businesses and families. In developing his venture there was a clear understanding of the systemic problems Sub-Saharan Africa was facing and he showed a strong willingness to pursue a sustainability-oriented venture opportunity. However, there is no explicit consideration of the four dimensions of sustainability in exploring the business opportunity. For him sustainability is not about meeting carbon targets or being socially responsible, sustainability is part of the organic evolution of the business, which needs to be translated into building a better world. As he indicates during an interview:

> Business sustainability (in the marketing sense, as in reducing plastic or reducing emissions) is one of our lower priorities. Sustainability (in the philosophical sense) is what we do; it's part of the organic evolution of the business. Although our operations have an impact on the reduction of kerosene consumption and health systems, I don't look at what we do as 'ok, we are reducing carbon emissions', I look at that as 'ok, this family is better, they are saving money and sending their kids to school'. It depends on how you look at it, but that is for me sustainability.

On the other hand, the analysis also shows cases that although present a sufficient configuration of conditions, do not exhibit the outcome. The story of CHU in solution E2 (0.77, 0.35) illustrates this situation. This venture provides access to corporate social responsibility and sustainability ratings and information of companies from 135 industries in 82 countries. CHU's clients use its online database to benchmark company performance, learn how stakeholders evaluate company corporate social responsibility practices and 'seek ways to change the world'. As a certified B Corporation, CHU does use the power of the business to solve social and environmental problems. However, they do not do this directly, but rather by providing their clients with access to corporate sustainability information. The idea is to be an engine of transparency that encourages more consistent and actionable disclosure from all types of organizations.

When it comes to position its products and benefits, CHU's discourse does not explicitly integrate sustainability-related elements. This means that in forming exchange relationships with customers and potential investors, elements such as environmental protection and social justice are less relevant than for example highlighting its capacity to aggregate and normalize information from over 200 data sources and millions of detailed data points. They define themselves as a positive and progressive company, however the idea of changing the world, as they state in their discourse, depends on how its clients use the information to develop sustainable solutions. The description of the benefits of establishing a relationship with the venture is highly illustrative:

> There are five key benefits. (Our clients can) search 6.500+ company overall ratings, benchmark companies' sustainability in 12 sub-categories, rollback and view CSR ratings over time, export customized search results to excel and view companies' CSR sites and underlying data from many sources.

The stories and quotations accompanying the solutions seek to illustrate the conjunctural nature of the solutions. They provide evidence supporting the sufficiency relationship between the different configurations of conditions and the integration of sustainability in the formation of exchange relationships.

### 4.4.5 Robustness tests

#### 4.4.5.1 Frequency change

In order to assess the stability of the solutions, I replicated the analysis with a frequency threshold of 2. As the Truth Table 4.37 shows, there is change in the number of configurations. After the minimization process, it maintains those configurations with a high number of instances and eliminates those configurations (7) with less than 2 instances, which are treated as logical reminders.

Although this increases the limited diversity over 64 logically possible configurations, it allows for increasing the consistency and relevance of the solutions in that it uses configurations with a greater number of empirical instances.

**Table 4.37 Truth table for SER (f=2)**

| UND | PRO | SEA | ORI | MOR | CON | N/cases | SER | Consist. |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 0.920 |
| 1 | 1 | 0 | 1 | 0 | 1 | 2 | 1 | 0.918 |
| 1 | 1 | 1 | 1 | 1 | 1 | 20 | 1 | 0.891 |
| 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0.887 |
| 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0.872 |
| 1 | 1 | 1 | 1 | 1 | 0 | 4 | 0 | 0.761 |

As Table 4.38 shows, the most empirically relevant solutions remain. E3* maintains the same solution pattern as E2. Although the solution integrates the absence of perceived moral intensity (~MOR) as a condition, its causal relationship with the outcome is weak. E1* and E2* offer an extended view of E1; they combine the original configuration of E1 with either presence of sustainability understanding (UND) or presence of prospective sustainability entrepreneur (PRO), which appear as interchangeable conditions, i.e. (U+P)•S•A•M•C.

**Table 4.38 Configurations for sustainability-driven exchange relationships (f=2)**

| | **Solutions** | | |
|---|---|---|---|
| **Configurations** | **E1*** | **E2*** | **E3*** |
| UND | ● | - | ● |
| PRO | - | ● | ● |
| SEA | ● | ● | - |
| ORI | ● | ● | ● |
| MOR | ● | ● | ⊗ |
| CON | ● | ● | ● |
| Consistency | 0.88 | 0.87 | 0.86 |
| Raw coverage | **0.79** | **0.77** | **0.3** |
| Unique coverage | 0.04 | 0.02 | 0.01 |
| Overall solution consistency | | 0.85 | |
| Overall solution coverage | | 0.82 | |

Consistency threshold = 0.87 / Frequency threshold = 2

#### 4.4.5.2 Sensitivity analyses

The aim of the sensitivity analysis is to examine whether my findings, particularly those of necessity and sufficiency, are robust to the use of alternative specifications of causal conditions. For example, based on a deep knowledge of the cases one can argue that the relationship between strong sustainability orientation (ORI) and the formation of sustainability-driven exchange relationships (SER) is not strong enough to support the argument of necessity, and that the relationship of full necessity between ORI and SER emerges with a more or less strong sustainability orientation.

From another perspective, and based on substantive knowledge, one could expect that the relationship between ORI and SER to be not one of necessity, but one of sufficiency when there is a very strong ORI. This might mean that having a very strong sustainability orientation is sufficient but not necessary for the integration of sustainability in the formation of exchange relationships. This can a have major impact on the explanation of how opportunities develop in sustainability entrepreneurship, in that it can modify the number of causal paths and the explanation of the role of each causal condition.

This analysis is conducted by observing causal relationships under higher and lower degree of membership in the set of each relevant condition.

Squaring fuzzy set membership scores shifts causal conditions in a downward direction, creating sets of very strong sustainability understanding ($UND^2$), very strong prospective sustainability entrepreneur ($PRO^2$), very strong sustainability opportunity search ($SEA^2$), very strong sustainability orientation ($ORI^2$), very strong perceived moral intensity ($MOR^2$) and very strong sustainability contribution belief ($CON^2$). Likewise, taking the square root of membership scores shifts causal conditions in a upward direction, creating the sets of more or less strong sustainability understanding (√UND), more or less strong prospective sustainability entrepreneur (√PRO), more or less strong sustainability opportunity search (√SEA), more or less strong sustainability orientation (√ORI), more or less strong perceived moral intensity (√MOR) and more or less strong sustainability contribution belief (√CON).

Shifting membership scores in an upward or downward direction can shift points from one side to the other of the diagonal in the plot of an outcome against a causal condition (Ragin 2000). Indeed, the use of modifiers ($X_i^2$ and $\sqrt{X_i}$) can have a major impact on patterns of necessity, as revealed in Figure 4.10. Table 4.39 presents fuzzy-set

membership scores for sensitivity analysis after applying modifiers and Table 4.40 presents the results of the necessity analysis with very strong and more or less strong causal conditions contrasted to strong causal conditions.

**Table 4.39 Fuzzy-set membership scores for sensitivity analysis SER**

| Case | Conditions | | | | | | | | | | | | Outcome |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Very strong (n squared) | | | | | | More o less strong (n root squared) | | | | | | |
| | $UND^2$ | $PRO^2$ | $SEA^2$ | $ORI^2$ | $MOR^2$ | $CON^2$ | √UND | √PRO | √SEA | √ORI | √MOR | √CON | SER |
| AWW | 0.5 | 0.67 | 0.5 | 0.79 | 0.67 | 0.21 | 0.84 | 0.91 | 0.84 | 0.94 | 0.91 | 0.68 | 0.29 |
| ACO | 0.32 | 0.32 | 0.32 | 0.85 | 0.9 | 0.67 | 0.76 | 0.76 | 0.76 | 0.96 | 0.97 | 0.91 | 0.46 |
| BTR | 0.96 | 0.67 | 0.98 | 0.96 | 0.5 | 0.98 | 0.99 | 0.91 | 1 | 0.99 | 0.84 | 1 | 0.57 |
| BGF | 0.67 | 0.5 | 0.67 | 0.25 | 0.79 | 0.88 | 0.91 | 0.84 | 0.91 | 0.71 | 0.94 | 0.97 | 0.97 |
| BCY | 0.15 | 0.98 | 0.88 | 0 | 0.15 | 0.98 | 0.62 | 1 | 0.97 | 0.17 | 0.62 | 1 | 0.06 |
| BST | 0.67 | 0.98 | 0.15 | 0.98 | 0.18 | 0.32 | 0.91 | 1 | 0.62 | 1 | 0.66 | 0.76 | 0.57 |
| BVG | 0.1 | 0.15 | 0.96 | 0.15 | 0.79 | 0.96 | 0.57 | 0.62 | 0.99 | 0.62 | 0.94 | 0.99 | 0.57 |
| CLI | 0.96 | 0.98 | 0.96 | 0.94 | 0.9 | 0.74 | 0.99 | 1 | 0.99 | 0.98 | 0.97 | 0.93 | 0.94 |
| CLE | 0.79 | 0.98 | 0.92 | 0.98 | 0.79 | 0.94 | 0.94 | 1 | 0.98 | 1 | 0.94 | 0.98 | 0.97 |
| CHU | 0.98 | 0.98 | 0.98 | 0.96 | 0.18 | 0.59 | 1 | 1 | 1 | 0.99 | 0.66 | 0.88 | 0.35 |
| CUL | 0.79 | 0.32 | 0.21 | 0.67 | 0.9 | 0.88 | 0.94 | 0.76 | 0.68 | 0.91 | 0.97 | 0.97 | 0.65 |
| DLI | 0.1 | 0.98 | 0.32 | 0.9 | 0.5 | 0.59 | 0.57 | 1 | 0.76 | 0.97 | 0.84 | 0.88 | 0.94 |
| DFL | 0.79 | 0.98 | 0.92 | 0.98 | 0.79 | 0.98 | 0.94 | 1 | 0.98 | 1 | 0.94 | 1 | 0.82 |
| EPU | 0.79 | 0.92 | 0.96 | 0.98 | 0.79 | 0.79 | 0.94 | 0.98 | 0.99 | 1 | 0.94 | 0.94 | 0.16 |
| ECV | 0.96 | 0.1 | 0.79 | 0.85 | 0.42 | 0.85 | 0.99 | 0.57 | 0.94 | 0.96 | 0.81 | 0.96 | 0.35 |
| ECW | 0.32 | 0.67 | 0.98 | 0.94 | 0.9 | 0.67 | 0.76 | 0.91 | 1 | 0.98 | 0.97 | 0.91 | 0.82 |
| ECZ | 0.21 | 0.1 | 0.67 | 0.94 | 0.9 | 0.59 | 0.68 | 0.57 | 0.91 | 0.98 | 0.97 | 0.88 | 0.86 |
| GSU | 0.5 | 0.96 | 0.32 | 0.96 | 0.15 | 0.59 | 0.84 | 0.99 | 0.76 | 0.99 | 0.62 | 0.88 | 0.46 |
| GTR | 0.98 | 0.98 | 0.98 | 0.98 | 0.67 | 0.59 | 1 | 1 | 1 | 1 | 0.91 | 0.88 | 0.86 |
| HAR | 0.5 | 0.79 | 0.96 | 0.5 | 0.25 | 0.92 | 0.84 | 0.94 | 0.99 | 0.84 | 0.71 | 0.98 | 0.1 |
| HFR | 0.98 | 0.92 | 0.98 | 0.98 | 0.5 | 0.92 | 1 | 0.98 | 1 | 1 | 0.84 | 0.98 | 0.82 |
| IPA | 0.67 | 0.92 | 0.92 | 0.85 | 0.79 | 0.74 | 0.91 | 0.98 | 0.98 | 0.96 | 0.94 | 0.93 | 0.77 |
| IWB | 0.32 | 0.98 | 0.79 | 0.98 | 0.67 | 0.5 | 0.76 | 1 | 0.94 | 1 | 0.91 | 0.84 | 0.43 |
| KOR | 0.88 | 0.92 | 0.98 | 0.98 | 0.9 | 0.98 | 0.97 | 0.98 | 1 | 1 | 0.97 | 1 | 0.94 |
| MCP | 0.92 | 0.92 | 0.92 | 0.9 | 0.25 | 0.21 | 0.98 | 0.98 | 0.98 | 0.97 | 0.71 | 0.68 | 0.23 |
| MST | 0.21 | 0.07 | 0.04 | 0.5 | 0.18 | 0.15 | 0.68 | 0.51 | 0.46 | 0.84 | 0.66 | 0.62 | 0.03 |
| MOG | 0.32 | 0.07 | 0.96 | 0.5 | 0.18 | 0.21 | 0.76 | 0.51 | 0.99 | 0.84 | 0.66 | 0.68 | 0.46 |
| ODS | 0.32 | 0.67 | 0.1 | 0.32 | 0.79 | 0.02 | 0.76 | 0.91 | 0.57 | 0.76 | 0.94 | 0.37 | 0.94 |
| PEM | 0.98 | 0.5 | 0.92 | 0.98 | 0.94 | 0.96 | 1 | 0.84 | 0.98 | 1 | 0.98 | 0.99 | 0.97 |
| PRE | 0.79 | 0.5 | 0.5 | 0.85 | 0.79 | 0.21 | 0.94 | 0.84 | 0.84 | 0.96 | 0.94 | 0.68 | 0.46 |
| PRI | 0.79 | 0.92 | 0.32 | 0.42 | 0.96 | 0 | 0.94 | 0.98 | 0.76 | 0.81 | 0.99 | 0.17 | 0.04 |
| PWO | 0.98 | 0.96 | 0.88 | 0.79 | 0.79 | 0.98 | 1 | 0.99 | 0.97 | 0.94 | 0.94 | 1 | 0.92 |
| PLY | 0.32 | 0.92 | 0.5 | 0.79 | 0.42 | 0.59 | 0.76 | 0.98 | 0.84 | 0.94 | 0.81 | 0.88 | 0.57 |
| RMA | 0.5 | 0.94 | 0.88 | 0.79 | 0.25 | 0.01 | 0.84 | 0.98 | 0.97 | 0.94 | 0.71 | 0.32 | 0.96 |
| RNA | 0.96 | 0.92 | 0.98 | 0.98 | 0.25 | 0.15 | 0.99 | 0.98 | 1 | 1 | 0.71 | 0.62 | 0.96 |
| STW | 0.5 | 0.88 | 0.79 | 0.98 | 0.79 | 0.1 | 0.84 | 0.97 | 0.94 | 1 | 0.94 | 0.57 | 0.14 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STR | 0.5 | 0.92 | 0.98 | 0.9 | 0.42 | 0.85 | 0.84 | 0.98 | 1 | 0.97 | 0.81 | 0.96 | 0.77 |
| SSG | 0.32 | 0.79 | 0.21 | 0.9 | 0.18 | 0.42 | 0.76 | 0.94 | 0.68 | 0.97 | 0.66 | 0.81 | 0.43 |
| TGT | 0.67 | 0.21 | 0.92 | 0.85 | 0.94 | 0.67 | 0.91 | 0.68 | 0.98 | 0.96 | 0.98 | 0.91 | 0.86 |
| TOU | 0.1 | 0.92 | 0.92 | 0.94 | 0.5 | 0.67 | 0.57 | 0.98 | 0.98 | 0.98 | 0.84 | 0.91 | 0.29 |
| TPS | 0.92 | 0.67 | 0.92 | 0.96 | 0.94 | 0.98 | 0.98 | 0.91 | 0.98 | 0.99 | 0.98 | 1 | 0.99 |
| VEH | 0.98 | 0.98 | 0.98 | 0.98 | 0.67 | 0.98 | 1 | 1 | 1 | 1 | 0.91 | 1 | 0.92 |
| WEW | 0.98 | 0.98 | 0.88 | 0.98 | 0.42 | 0.98 | 1 | 1 | 0.97 | 1 | 0.81 | 1 | 0.99 |
| WHT | 0.88 | 0.98 | 0.98 | 0.98 | 0.42 | 0.74 | 0.97 | 1 | 1 | 1 | 0.81 | 0.93 | 0.77 |
| WIS | 0.21 | 0.21 | 0.67 | 0.25 | 0.42 | 0 | 0.68 | 0.68 | 0.91 | 0.71 | 0.81 | 0.26 | 0.1 |

**Table 4.40 Analysis of necessary conditions for SER**

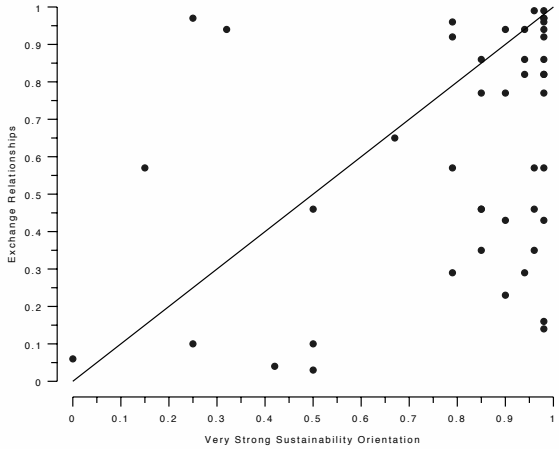
| | **Very strong causal conditions** | | **More or less strong causal conditions** | | **Strong causal conditions** | |
|---|---|---|---|---|---|---|
| Condition | Consistency | Coverage | Consistency | Coverage | Consistency | Coverage |
| UND | 0.793 | 0.778 | 0.963 | 0.682 | 0.909 | 0.731 |
| PRO | 0.828 | 0.698 | 0.969 | 0.661 | 0.919 | 0.684 |
| SEA | 0.862 | 0.712 | 0.976 | 0.659 | 0.939 | 0.687 |
| ORI | 0.919 | 0.705 | 0.983 | 0.651 | 0.958 | 0.673 |
| MOR | 0.769 | 0.800 | 0.968 | 0.694 | 0.910 | 0.749 |
| CON | 0.805 | 0.799 | 0.941 | 0.691 | 0.899 | 0.749 |

With very strong causal conditions the necessity consistency level of sustainability orientation (ORI) drops from 0.96 to 0.92, not enough to discard very strong ORI as a usually necessary condition based on consistency level only. However, very strong ORI is irrelevant in solution E5+ and absent in solution E6+. Although 2 cases moved to the upper triangular plot (9 in total) achieving a sufficiency consistency level of 0.7 (Plot A in Figure 4.12) I cannot sustain the argument of very strong sustainability orientation ($ORI^2$) as sufficient but not necessary for the outcome SER to occur. Solution Table 4.41 corroborates this argument. It shows no single solution path with very strong sustainability orientation ($ORI^2$) as sufficient condition for the outcome to occur; rather it presents a situation of complex causality and equifinality.

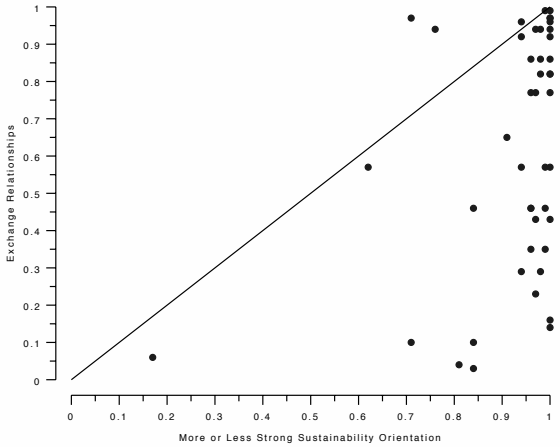
With more or less strong causal conditions the consistency level of sustainability orientation (ORI) increases from 0.96 to 0.98. Although the fuzzy subset relationship between SER and ORI is stronger under a higher degree of membership in the set of ORI, I cannot sustain the argument of full necessity for SER. This is given by the fact that three cases are still in the upper part of the triangular plot (Plot B in Figure 4.12).

**Figure 4.12 Scatterplots of fuzzy subset relationships between SER and ORI+ / ORI-**

Plot A. SER and very strong ORI




Plot B. SER and more or less strong ORI




Regarding sufficiency in the analysis with very strong causal conditions, although the consistency levels of the overall solution (0.85) IS higher than the analysis with strong causal conditions (OSCon = 0.81), the coverage levels drop considerably, from 0.88 to 0.79 for the overall solution and below 0.65 for the individual causal paths, being 0.63 the highest coverage level. Individual raw coverage below 0.65 implies that the solution is empirically irrelevant.

Regarding sufficiency in the analysis with more or less strong causal conditions, the solution consistency (0.78) is lower than for the analysis of SER with strong causal conditions (0.81), meaning that the set-theoretical relationship between the solution and the outcome is weaker (Ragin 2006). Alongside the latter, there is no evidence of a substantial increment in individual levels of consistency, which means that finding sufficiency with strong conditions is more effective that looking for sufficiency with more or less strong conditions.

In the same vein, even though the empirical relevance of this solution is slightly higher (coverage = 0.89), the solution suffers from limited diversity, as shown in the Truth Table 4.42, and cannot account for the heterogeneity and conceptual richness of the associated causal relationships.

**Table 4.41 Sufficiency analyses results with very strong and more or less strong causal conditions**

| | | | | | | | Solutions |
|---|---|---|---|---|---|---|---|
| **Conf.** | **E1+** | **E2+** | **E3+** | **E4+** | **E5+** | **E6+** | **E1-** |
| UND | - | - | ● | - | ⊗$_2$ | ⊗$_2$ | ● |
| PRO | ⊗ | - | - | ● | ⊗ | ● | ● |
| SEA | - | ● | ● | ⊗$_3$ | ● | ⊗ | - |
| ORI | ●$_1$ | ●$_1$ | ●$_1$ | ●$_3$ | - | ⊗ | ●$_1$ |
| MOR | ● | ● | - | ⊗ | ●$_2$ | ●$_2$ | ● |
| CON | ●$_1$ | ●$_1$ | ●$_1$ | ⊗ | ● | ⊗ | ●$_1$ |
| Cons | 0.93 | 0.94 | 0.88 | 0.91 | 0.93 | 0.91 | 0.78 |
| RC | **0.24** | **0.61** | **0.63** | **0.18** | **0.18** | **0.11** | **0.89** |
| UC | 0.02 | 0.03 | 0.06 | 0.03 | 0.02 | 0.02 | 0.89 |
| OS Cons | | | | 0.85 | | | 0.78 |
| OS Cove | | | | 0.79 | | | 0.89 |

Configurations with (+) very strong causal conditions / (-) more or less strong causal conditions

**Table 4.42 Truth table for SER with more or less strong causal conditions**

| **UND-** | **PRO-** | **SEA-** | **ORI-** | **MOR-** | **CON-** | **N/cases** | **SER** | **Consist.** |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0.849 |
| 1 | 1 | 1 | 1 | 1 | 1 | 39 | 1 | 0.788 |
| 1 | 1 | 1 | 1 | 1 | 0 | 4 | 0 | 0.719 |
| 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0.676 |

This sensitivity analysis corroborates the robustness of the results presented in the configurational analysis of SER.

### 4.4.5.3 Negate analysis

A different way of understanding the formation of sustainability-driven exchange relationships is by analysing the conditions or configurations of conditions that lead or partially lead to the opposite result, which is the non-integration of sustainability in the formation of exchange relationships (~SER). In doing so, I conducted a configurational analysis of conditions for ~SER. Table 4.43 presents the truth table for ~SER, with 13

configurations and 39 cases that are relevant for the outcome, with 17 cases above the minimum consistency, set at ≥0.8, and 22 cases below the cutoff line.

**Table 4.43 Truth table for absence of sustainability-driven exchange relationships**

| Conditions | | | | | | Outcome | | |
|---|---|---|---|---|---|---|---|---|
| **UND** | **PRO** | **SEA** | **ORI** | **MOR** | **CON** | **N/cases** | **~SER** | **consist.** |
| 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0.9700 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0.9614 |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0.9320 |
| 1 | 1 | 0 | 1 | 0 | 1 | 2 | 1 | 0.8558 |
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0.8444 |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0.8424 |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0.8392 |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8267 |
| 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0.8204 |
| 1 | 1 | 1 | 1 | 1 | 0 | 4 | 1 | 0.8184 |
| 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0.8070 |
| 1 | 0 | 1 | 1 | 1 | 1 | 2 | 0 | 0.7439 |
| 1 | 1 | 1 | 1 | 1 | 1 | 20 | 0 | 0.4688 |

Given that there are configurations exhibiting high levels of consistency, I conducted an fsQCA of the following model:

~SER = f(UND, PRO, SEA, ORI, MOR, CON)

This provides an alternative path for the analysis of conditions for SER, and sometimes can present a higher explanatory power. Table 4.44 presents consistency and coverage scores for each solution term and the solution as a whole.

As Table 4.44 shows, the solution's coverage (0.76) and consistency (0.75) levels are lower than in the analysis of SAC (0.88, 0.81), meaning that finding sufficient conditions for the presence of sustainability-driven exchange relationships (SER) is more effective that looking for conditions for its absence, although the overall consistency for ~SER surpasses the minimum acceptable consistency of ≥0.75. This negate analysis corroborates the robustness of the results presented in the configurational analysis of SER.

**Table 4.44 Configurations for absence of sustainability-driven exchange relationships**

| | Scores | | |
|---|---|---|---|
| **Solution terms** | Consistency | Raw coverage | Unique coverage |
| u•p•S•M•C | 0.79 | 0.19 | 0.002 |
| u•S•A•M•C | 0.8 | 0.39 | 0.04 |
| U•P•A•m•C | 0.80 | 0.43 | 0.09 |
| U•P•A•M•c | 0.80 | 0.44 | 0.07 |
| u•p•s•A•m•c | 0.96 | 0.11 | 0.02 |
| u•P•S•a•m•C | 0.93 | 0.16 | 0.03 |
| U•p•S•A•m•c | 0.97 | 0.14 | 0.006 |
| U•P•s•A•C | 0.83 | 0.27 | 0.0 |
| U•I•s•P•M | 0.8 | 0.29 | 0.0 |
| | | | |
| **Overall solution consistency ~SER** | **0.75** | | |
| **Overall solution coverage ~SER** | **0.76** | | |
| Overall solution consistency SER | 0.81 | | |
| Overall solution coverage SER | 0.88 | | |

# Chapter 5. Discussion and conclusion

## 5.1 Introduction

Despite the increasing scholarly attention to sustainability in the field of entrepreneurship (Hall et al. 2010; Shepherd and Patzelt 2011), limited progress has been made beyond defining and describing the phenomenon. So far, research in the field has not captured and explained, both conceptually and empirically, how and why particular individuals decide to pursue opportunities with social and environmental components concurrent with pursuing economic viability.

Furthermore, while the notion of sustainability entrepreneurship has strong theoretical appeal, its empirical application is not yet clear. Different streams of research have tried to tackle this issue, yet none of the factors covered by these studies can by themselves explain how and why particular individuals decide to pursue opportunities with social, environmental and intergenerational components concurrent with pursuing economic viability. This entails a challenging task, namely, the organization and study of the complex constellation of conditions that collectively explain the integration of sustainability in the opportunity process. A substantive account of the conditions that enable the unfolding of this process allows for theorizing about the pursuit of sustainability opportunities and establishing the distinctive nature of the phenomenon.

In understanding how opportunities for sustainability entrepreneurship develop, rather than viewing cross-case patterns through the lens of relationships between variables, I compared and contrasted configurations of conditions with both presence and absence of the outcomes of interest, which represent different empirical representations of the venturing process. In substantive terms, this research effort entails examining the combinations of factors that explain the simultaneous presence of economic, social, environmental and intergenerational considerations in the development of venture ideas, the organization of entrepreneurial actions and the formation of exchange relationships. Following the logic of diversity-oriented research, I therefore analysed the cases in terms of the aspects they combine respect to the outcomes of interest, rather than in terms of the individual effect of independent variables.

By accomplishing this task, this study respond to a central question posed by Hall, Daneke and Lenox in the Editorial of the Special Issue on Sustainable Development and Entrepreneurship (25:5) of the Journal of Business Venturing in 2010. In visualizing

further research in this emerging area, the authors emphasize the relevance of elucidating under what conditions do we expect to see entrepreneurs pursue sustainable ventures. They indicate that this has been, and will remain, one of the dominant questions in the field.

In the following sections I summarize the empirical findings of the study and discuss the contributions my research makes to our understanding of the sustainability entrepreneurship process in particular and to the study of processes and outcomes in entrepreneurship research in general. Then, I present the limitations of my research and outline directions for future research. Finally, I discuss implications for practice and education and provide concluding remarks.

## 5.2 Summary of empirical findings

By means of a systematic comparison of causal and outcome conditions, the configurational analysis facilitated the identification of mostly necessary conditions and the elaboration of a number of sufficient causal paths that individually produce the outcomes under examination. They provide evidence of causality and of the presence of causal mechanisms (Locke, 2007). Some of those causal paths are empirically relevant, explaining most of the outcome. These findings are summarized in Table 5.1.

**Table 5.1 Summary of empirical findings**

| Analysis | Condition | Venture ideas | | | Entrepreneurial actions | | Exchange relationships | |
|---|---|---|---|---|---|---|---|---|
| Necessary condition | | Sustainability orientation (ORI) | | | Sustainability Opportunity Search (SEA) | | Sustainability orientation (ORI) | |
| Sufficient configurations high relevance | UND | ● | ● | ▼ | ● | ▼ | - | ● |
| | PRO | ● | ● | ▼ | ● | ▼ | - | ● |
| | SEA | - | - | ● | ● | ● | ● | - |
| | ORI | ● | ● | ● | ● | ● | ● | ● |
| | MOR | - | ● | ● | | | ● | - |
| | EFF | ● | - | ● | - | ● | | |
| | CON | | | | - | ● | ● | ● |

In the analysis, I also distinguish additional, less relevant causal paths. They lack empirical power to explain the integration of sustainability in the opportunity process,

however they are not treated as errors because they enable visualizing how the outcomes are produced under odd conditions. An important benefit of considering counterintuitive solutions and outliers is the reduction of expectation bias, meaning that regardless of the presence of expectations, no causal path has been disbelieved, discarded, or downgraded.

In the first analysis, I found that the presence of a sustainability orientation is mostly necessary for the integration of sustainability in the development of venture ideas. This means that if there is no consideration of the responsibilities and obligations of the venture in its social, environmental, economic and intergenerational dimensions, there will be only few instances in which the entrepreneur is aware of the existence of an opportunity for sustainable development, and of the potential relationship between that opportunity and the development of a venture idea capable of responding to sustainability anomalies. In other words, if the condition is removed it is unlikely that sustainability will be part of the process of scanning the environment, searching for alternatives and making associations between relevant pieces of information regarding the idea under formation.

Despite its importance in producing the outcome, a sustainability orientation is not sufficient for the integration of sustainability in the development of venture ideas. When an entrepreneur integrates sustainability in the development of the venture idea, the sustainability orientation is generally accompanied by two core elements, which also need to present to produce the outcome.

In some situations, sustainability orientation is accompanied by the presence of the perception of high moral significance of the sustainability issue the entrepreneur is trying to solve; in some other situations it is accompanied by the presence of confidence in the knowledge and skills to successfully establishing a meaningful business; and in some other situations by both of them. In most of the cases, these three central elements are complemented by two peripheral conditions. When the aforementioned conditions combine, the entrepreneur exhibit an overall understanding of the economic, social and environmental problems we are currently facing as a society and the ability and willingness to pursue sustainability opportunities. These conditions are not essential and only make sense as contributing factors that reinforce the central features of the three core conditions. The identification of these conjunctural mechanisms represents a key contribution in the light of previous, mostly linear, variable-oriented models (Kuckertz and Wagner 2010). I discuss this issue in section 5.3.2, which examines the presence of equifinality in the development of sustainability opportunities.

In my second analysis, I found that the search for comprehensiveness in terms of the potential value of the opportunity under consideration is mostly necessary for the integration of sustainability in the organization of entrepreneurial actions, which ultimately enables the formalization of the sustainability-oriented venture idea. This means that if there is no search for holistic value creation – which combines at least three of the aspects of sustainable development - there will be only few instances in which the entrepreneur integrates sustainability in the process of setting up objectives for the business. In other words, if the condition is removed it is unlikely that sustainability will be part of the formalization of a sustainability venture idea.

Unlike the analysis of venture ideas, sustainability opportunity search is the only condition that exhibits a strong causal relationship with the outcome. Nevertheless, it is not sufficient for the integration of sustainability in the organization of entrepreneurial actions. Overall, three non-essential conditions reinforce the central features of the search for holistic value creation when producing the outcome. In most cases, this condition is accompanied by the presence of a general understanding of sustainability and of how its components work together, the presence of the ability and willingness to pursue sustainability opportunities, and the presence of sustainability-related attitudes and convictions regarding the role of the business in society.

In my third analysis, I found that the presence of a sustainability orientation is mostly necessary for the formation of sustainability-driven exchange relationships. This means that if there is no consideration of the responsibilities and obligations of the venture in its social, environmental, economic and intergenerational dimensions, there will be only few instances in which the entrepreneur integrates sustainability-related elements in the discourse that positions products, services, risks and benefits. In this sense, if the condition is removed it is unlikely that sustainability will be part of the formation of exchange relationships between the entrepreneur and market structures; meaning that no one may be aware of the sustainable nature of the venture idea and that the market interactions will be not be mediated by social, environmental and intergenerational considerations.

Despite its relevance in producing the outcome, a sustainability orientation is not sufficient for the integration of sustainability in the formation of exchange relationships. When an entrepreneur integrates sustainability in the interaction with market structures, the sustainability orientation is accompanied by two core elements, which also need to present to produce the outcome.

In all empirically relevant situations, the sustainability orientation needs the presence of the belief that integrating sustainability in the venture's principles and practices brings benefits to the business. In some cases, these two core elements (ORI and CON) need to be accompanied by a high moral intensity to produce the outcome. In such cases, understanding of sustainability and having and showing the capacity and willingness to create sustainable value in the future are irrelevant. Conversely, when the perception of high moral significance is irrelevant, understanding, ability and willingness emerge to reinforce the central features of sustainability orientation and sustainability contribution belief. This reinforces the key role of moral intensity in the formation of exchange relationships mediated by sustainability. When this is present, two elements, thought to be central in moving the opportunity forward, are irrelevant.

These results endorse the idea that sustainability entrepreneurship is not a subset of entrepreneurship or a particular form of entrepreneurship. It presents distinctive conditions, features and outcomes making the field important enough to be considered on its own merits.

## 5.3 Contributions

### 5.3.1 Necessity in the development of sustainability opportunities

My first contribution to literature on sustainability entrepreneurship lies in the identification of which individual factors may be necessary or mostly necessary for the integration of sustainability in the central components of the opportunity process, as well as those conditions that are unnecessary or trivial in the production of the outcomes. Drawing upon a set-theoretic approach, this permits deriving new theoretical insight and conceptualizing the complex nature of the phenomenon.

The exploratory analysis of necessity allows for testing subset relationships between a broad range of potentially necessary conditions and outcomes, and then for discriminating which of them are necessary, unnecessary, trivial and non-trivial conditions. The analysis shows that not all of the conditions discussed in the literature and then tested in the configurational analyses are necessary for the outcomes to occur. Actually, only a reduced number of the selected conditions appear as usually necessary for the integration of sustainability in the three components of the opportunity process.

As shown in the summary of empirical findings (section 5.2), among the six conditions selected for the configurational analysis, only sustainability orientation appears as mostly necessary for the development of venture ideas and the formation of exchange relationships, and sustainability opportunity search appears as mostly necessary for the organization of entrepreneurial actions. They not only exhibit the higher consistency levels in the necessity analysis but also are present in most of the solution paths leading to their respective outcomes.

The identification of unnecessary or trivial conditions extends current linear models, which assume necessary and sufficient effects for the variables under examination. For example, Meek et al. (2010) in their analysis of the impact of social norms on environmentally related entrepreneurial action, assume that state-sponsored incentives, environmental consumption norms, and norms of family interdependence are related to (therefore necessary for) new firm entry in solar energy sector. They demonstrate a positive relationship between environmental consumption norms and firm founding rates in the solar sector, however, in light of other conditions, social norms appear as unnecessary and trivial in influencing the creation of new (environmentally and socially-responsible) firms.

The following sections focus on the two mostly necessary conditions captured by the analysis. In these sections, I describe the nature and main features of each condition, elaborate on their role as central causal components, and explain how they unfold in the production of the outcomes.

#### 5.3.1.1 Sustainability orientation as a necessary condition

Among all conditions, the entrepreneur's vision regarding the role of its business in society emerges as instrumental in the development of sustainability opportunities, in particular in the integration of sustainability in generation of venture ideas and the formation of exchange relationships. Using qualitative data that reflect the expression of the entrepreneurs' sustainability orientation, I discuss the relevance of its necessity for the opportunity process in light of its philosophical and sociological roots, and subsequently explain how this extends our current knowledge at the intersection of sustainability and entrepreneurship. Specifically, I focus on how a sustainability orientation of this kind, characterized by a reinterpretation of modern values, leads to particular venture ideas and

market interactions, and consequently redefines the nature, value and contribution of entrepreneurship.

One clarification needs to be made before proceeding with this discussion. Based on the assumed philosophy of entrepreneurial action, it is possible to postulate that there is a tautology in the argument of necessity of sustainability orientation for sustainability entrepreneurship. Given that entrepreneurial action partially consists of intentional behaviour (McMullen and Shepherd 2006) and entrepreneurial orientation (Lumpkin and Dees 1996), one may argue that sustainability entrepreneurship partially consists of sustainability orientation.

Following McMullen and Shepherd (2006), I avoid tautology by working with the strength of the sustainability orientation, to subsequently establish whether this orientation produces the different empirical units that represent the entrepreneurial opportunity. As the authors indicate, this approach permits examining the composition of the entrepreneur's orientation as it materializes, and then defining whether subsequent behaviour occurs.

Further, an examination of the multiple conjunctures presented in the solution tables also helps avoiding tautology in the empirical findings. The presence of counterintuitive cases and outliers, where the presence of sustainability orientation leads to the absence of the outcomes (SVI and SER) or the absence of sustainability orientation still produces the outcomes (SVI and SER), corroborates the implausibility of circular arguments or self-reinforcing statements.

Following with the discussion of sustainability orientation as a necessary condition. These entrepreneurs embrace the ideas of having an obligation to society that extends beyond making money, and of being responsible for their impact on the well-being of human and non-human species. This provides support to the suggestion that sustainability entrepreneurship might be a new approach to entrepreneurial value creation (Parrish, 2010), which regardless of the nature and industry of the business will aim to sustain, restore and regenerate life (Tilley and Young 2009).

Their orientation entails a new understanding of the role of entrepreneurship in influencing the flow and return time of investments (e.g. through the opening of spaces for slow and impact investment), redefining the logic and dimensionality of expansion, and redressing the distribution of wealth. Arguably, no entrepreneur operating on economic principles alone would settle for a business approach like the one chosen by

these entrepreneurs, in the name of serving the community and the environment. In other words, this particular form of business activity would not exist under a logic that defines opportunities as the situations in which revenues simply exceed costs (Eckhardt and Shane 2003).

This challenges the assumption of entrepreneurial-intentions literature that all prospective entrepreneurs have similar growth aspirations (Douglas, In Press). In a conventional growth-based economy, whose logic informs most of entrepreneurship research (Kirzner 1997), an entrepreneurial sustainability orientation of this kind is undesirable and potentially catastrophic (Jackson 2009). However, as Jackson (2009) indicates, in an economy geared towards providing capabilities for flourishing this is a considerable bonus. One of interviewees illustrates this point when asked about perceived differences between sustainable and traditional entrepreneurs:

> The bottom line comes out to test your value, how much you care about (…) I think I'd be much, much more likely to accept the idea of making 7.000 in salary and having a huge impact than having 5 million in salary and having zero impact. Most tech people (referring to the Silicon Valley logic) would say: money and deal with that later, I really can't separate myself from having that sustainable impact.

Building on the principles of sustainability (Dresner 2008), the latter means that their sustainability orientation proposes a revaluation and reinterpretation of the ideas and utilitarian moral principles that have inspired western culture's optimism about science and progress. For most of the participants, for example, the idea of scaling is over-rated and the notion of growth as expressed in GDP is flawed. In their view, neither GDP is the road to progress nor scaling is the road to success, meaning that rising prosperity is not the same thing as economic growth. Indeed, they reject the idea that without growth our ability to flourish diminishes substantially.

In developing the business idea, sustainability entrepreneurs perceive issues of distributive justice within and between generations, in the sense that we are acting wrongly and unjustly in relation to other human and non-human species (Barry 1999), and that, as a result, future generations might be condemned to lower standards of living (Beckerman 1999). In doing so, they prove capable of embodying deeply rooted sustainability values (Leiserowitz et al. 2006), such as protection, justice, fairness and equitable development (Dresner 2008). These values, which are understood as beliefs pertaining to desirable end states or modes of conduct that transcend specific situations

(Schwartz 1999), are central to our understanding of the phenomenon and thus fundamental for developing the field of sustainability entrepreneurship (Shepherd and Patzelt 2011). This, because values such as equality, respect for nature, and shared responsibility direct the entrepreneurs' goals, frame their attitudes, and, more importantly, provide standards against which entrepreneurs' behaviour can be judged (Leiserowitz et al. 2006). The identification of values as part of the sustainability orientation of the entrepreneur extends the work of Shepherd et al. (2009), in that it offers a more fine-grained account of how specific values underlying sustainability relate to entrepreneurial action.

In addition, the simultaneous presence of these values are relevant to our discussion of sustainability orientation as a necessary condition, because they are capable of combining the interests of economists, ecologists and sociologists in a balanced way. This resolves Young and Tilley's (2006) conundrum, in that it offers a way of incorporating and addressing all elements of sustainable development, not just eco- or socio-efficiency.

Entrepreneurs behave and act in ways consistent with their identities, and imprint their self-concepts onto the venture idea and the way they interact with market structures (Fauchart and Gruber 2011). In developing their ventures, they seem to be compelled to judge and choose a course of action that is morally right, and accept responsibility for the impacts of the selected action. For example, PEM's sustainable forestry model is not a mere reaction to an environmentally relevant market imperfection, as Cohen and Winn, (2007) suggest in their explanation of the opportunity process in sustainable entrepreneurship, but rather emerges as a business imperative that seeks to provide a future to subsistence farmers.

In this vein, entrepreneurial efforts do not follow just personal self-interest but rather the intention of bringing benefits to (present and future) social, economic and environmental actors, without harming others. The quote below from one of TGT's founders illustrates this point:

> This is my way and our way to contribute to this new kind of society. We have this vision of creating a zero-waste society. Because we think a zero-waste society is a better society, is a good society as it is more equal than today and there are no negative social and environmental impacts.

Incorporating the ideas of fairness, social justice and intergenerational equity in the equation of business venturing means for them considering the possible consequences of

their actions, and what they ought to do to foster our development without compromising the development of others (Barry, 1999). In this sense, their sustainability orientation is based on moral obligations towards present and future generations (Beckerman 1999). One of PEM's founders illustrates this point when talking about the process of developing their strategic orientation:

> (In creating our business model, we question ourselves) how can we sustainably raise the standard of living without harming the resources that our communities have and creating a long-term strategy where they'll be able to keep those resources, keep the land, and be able to replicate what they're doing so their kids will actually be able to benefit from it as well?

As shown in the necessity analysis for the development of sustainability venture ideas, the cognitive linguistic processes of sustainable entrepreneurs are not only intended to make sense of markets or opportunities for commercial exploitation (Hill and Levenhagen 1995), but also of issues affecting human and non-human species, which differs from their traditional counterparts. Therefore, the process of developing sustainability opportunities does not simply entail having the appropriate knowledge to recognize environmentally or socially relevant market failures, as several authors suggest (Cohen and Winn, 2007; Dean and McMullen, 2007; Shepherd and Patzelt, 2010). It rather involves a particular sensemaking process, whereby these entrepreneurs visualize potential venture opportunities in line with the nature of the business they are trying to create, which is in concordance with the dimensions and logic of sustainability.

This also challenges a seminal argument in entrepreneurship research that the discrepancies that the entrepreneur notices appear in the form of profit opportunities (Kirzner, 2008). In sustainability entrepreneurship such discrepancies are broader, in the sense that the opportunities are enacted not only in the name of profit but also in the name of the well-being of present and future generations. Consequently, what drives the market towards new equilibrium configurations is not the grasping of profit opportunities, but the decision to use the power of entrepreneurial opportunities to tackle one or more of the social and environmental problems we are currently facing, which emerges regardless of the nature of the business. This calls for a broader view of entrepreneurial returns, through which profit is replaced by balanced prosperity, and the impact of entrepreneurial activity is measured not in terms of rate and time of economic returns, but in terms of amount of well-being creation.

Following this line of reasoning and drawing upon the philosophy of sustainability (Dresner, 2008), one could argue that sustainability entrepreneurs' orientation combine much of the social optimism of the enlightenment with the disillusion about the means by which its goals are being pursued. They believe in business and in the values of modernism, yet they are sceptic of the idea that maximizing the total or average amount of wealth is the solution.

Deepening this logic, for these entrepreneurs the role of entrepreneurship in society is not one of maximizing utility, but rather one of increasing fairness. In their perspective, firms should aim to replace current practices and institutions with ones that promise to maintain a certain level of human welfare indefinitely (Holland 1999). The idea of contributing to bring about equality of welfare over time in the most inclusive sense is based on a combination of economic and moral concerns. This entails taking into account material welfare, as well as natural and spiritual welfare, i.e. the possibility of living a worthwhile life. As evidenced in the following quote from TGT, the latter is at the basis of their sustainability orientation:

> We are just looking for the right thing to do. I'm trying to find ways – it's okay, I'm okay with making money and I'm okay if other people have more money than I have. I am not jealous at all. I don't care. I have a good life. I'm satisfied with what I have, but there are so many people who don't have anything and who are not as happy and as lucky as I am. I would like to help and to contribute that they also can have a better life, and a life that is worth living.

Despite their disagreement with current approaches to welfare production, they do not embrace eco-centric perspectives (Katz et al. 2000), such as Deep Ecology (Devall and Sessions 1985). These radical approaches understand sustainability as fundamentally contrary to the values of modernity, which need to be replaced with profound green lifestyles and localism (Geels et al. 2008). Conversely, as evidenced in the description he ventures (Table 7.4 in Appendix C) and the data from the follow-up interviews, these entrepreneurs articulate a comprehensive approach capable of combining liberalism with the building of a sustainable society. These entrepreneurs act in recognition of the limits to growth (Meadows et al. 2005) and proactively decide to utilize market forces and other market actors to foster the changes mentioned above.

The explanation of how sustainability orientation unfolds in the process of opportunity development extends Kuckertz and Wagner's (2010) examination of the influence of such orientation on entrepreneurial intentions. In their account, the authors

fail to explain the nature and philosophical underpinnings of individuals' attitudes and beliefs regarding environmental protection and social responsibility.

The process of establishing sustainability-driven exchange relationships is social, systemic and complex (Weick et al. 2005). Given that entrepreneurs create meaning about events through their interactions with others, the reinterpretation of modernism that emerges from their discourse is the result of the interplay between the entrepreneur's moral obligation (Beckerman 1999) and perception of the world, and the collective understanding of the nature and severity of the sustainability issues under consideration. By connecting the concrete, idiosyncratic, and personal with the abstract and impersonal (Weick et al. 2005), sustainability entrepreneurs place unexpected environmental stimuli, e.g. financial crisis and environmental degradation, within a new framework. Subsequently, they assign meaning, and act according to these new meanings through interactions with others (Weick et al. 2005).

This finding extends the work of Parrish (2010), in that it explains how a sustainability orientation, as a manifestation of values and beliefs, operates differently in the particular stages of the opportunity process. This condition is necessary for the development of venture ideas and the formation of exchange relationships, yet it only plays a peripheral role in the organization of entrepreneurial actions. The consistent presence of sustainability orientation along the opportunity process also expands the conceptualization of Shepherd and Patzelt (2011), in that sustainability-related values influence not only the motivation to act entrepreneurially on opportunities that both 'sustain and develop', but also the perceived feasibility of acting on such an opportunity.

#### 5.3.1.2 Sustainability opportunity search as a necessary condition

In the same way that choosing a course of action (Hastie 2001) based on the discovery of an opportunity for profit (Shane and Venkataraman 2000) is a necessary but insufficient condition for the occurrence of entrepreneurship (McMullen and Shepherd, 2006), the decision of dealing with issues that are central to the development in the world (Wiklund et al. 2011), such as environmental protection and social justice, is a necessary but insufficient condition for the occurrence of sustainability entrepreneurship. Subsequent to the development of a sustainability venture idea, an aspiring entrepreneur must decide to pursue the opportunity (Shane and Venkataraman 2000), in other words, exercise the chosen course of action (Hastie 2001).

This sustainability logic is formalized in missions and strategies that guide the focus of the entrepreneur (De Clercq and Voronov 2011). These missions and strategies reflect the objectives of venture, which emerge from the understanding that the venture is systemic unit in constant search for a holistic and multiple value creation. They mobilize and promote business practices, such as energy conservation and waste reduction, which are not seen as constraints to business but as part of an integrated system.

The search for holistic value creation entails three central values that permeate social, economic and environmental dimensions; these are transparency, integrity and responsibility. These are key elements in the articulation of sustainability throughout the process of venture emergence, especially in the formalization of venture ideas. These elements emerge as values embedded in the core of the business and move firms away from the imperative of business as usual. This quotation provided by the founder of BTR clarifies this point:

> Sustainability to us, it's to be transparent and proud of what you're doing in business (…) our business is founded on never thinking profit or money is the driver. We always see it and talk about this all the time, and it becomes more critical as the team grows, but money always comes when you do amazing stuff. As long as you stay focused to your values and what you believe in, and you're transparent with the people you're serving, in this case our customers, money comes.

By focusing on the search for holistic value creation as driver of actions, we can better understand how sustainability entrepreneurs build legitimacy in the face of market structures. Contrary to De Clercq and Voronov (2011), who theorize that legitimacy in sustainability entrepreneurship is derived from adhering to the field-prescribed balance between sustainability and profitability, I argue that legitimacy derives from situating the search for social, environmental and economic value in a business framework that relies on the aforementioned transparency, integrity and responsibility.

In embedding sustainability into the core of the business (i.e. its central purpose and objectives), they set moral standards that are later on translated into fair trade agreements, promotion of sustainable consumption, implementation of responsible employment practices, practices for preservation of natural resources, among others. These standards operate as the means through which resources and targets are linked (Wempe 2005).

Consequently, they embrace an integrated view of business sustainability that effectively brings into existence the notions of eco- and socio-effectiveness, as well as

sufficiency (Dyllick and Hockerts 2002). In these entrepreneurs' view, long-term prosperity depends not on the efficiency of a fundamentally destructive system, but on the effectiveness of processes designed to be healthy and renewable in the first place. The argument can be supported by the fact that the objectives their business solutions pursue are indeed life sustaining, restorative and regenerative in addition to being efficient. This extends the elaborations of Young and Tilley (2006, 2009), in the sense that sustainability entrepreneurship can indeed move the logics of social, environmental and economic responsibility beyond the business case for sustainability. By demonstrating this, I can argue that, contrary to the authors' belief, it is possible to go beyond a narrow entrepreneurial financial scope towards a broader, more radical definition of wealth.

The latter invites us to revisit the notion that entrepreneurial action is a sub-class of human action motivated by profit, or simply the manner by which profit is sought (Companys and McMullen, 2007). The necessity of a search for holistic value creation suggests that entrepreneurship research should reconsider within its theoretical inquiry the "what, where and when" of entrepreneurial action, originally understood as a situation in which an aspiring entrepreneur attempts to profit by creating new goods or services (Casson, 1982; Shane and Venkataraman, 2000; Companys and McMullen, 2007). Economic sustainability alone is no sufficient condition for the overall sustainability of the venture (Dyllick and Hockerts, 2002). Therefore, the development of new means–ends relationships (Kirzner, 1997) is not meant to produce only economic value for the entrepreneur and its shareholders, but rather an intertwined set of values (Leiserowitz et al. 2006), comprising also economic value for relevant stakeholders, social justice, environmental protection and intergenerational equity.

The rise of search for holistic value creation in the middle of the opportunity process defies Parrish's (2010) inferences. The notion of perpetual reasoning may be a distinguishing feature of sustainability entrepreneurs, yet it is not equally relevant throughout the venturing process. The organizing of tensions between social, economic and environmental factors fluctuates and relies not only on values and motives. The distinct cognitive patterns described by Parrish are less predominant in the process of formalizing the idea for the business. When formalizing the venture idea by means of setting up objectives for the business, the cognitive resources of the entrepreneur focus more on increasing the comprehensiveness of the value of the opportunity under consideration rather than on the obligations of the business towards society.

#### 5.3.1.3 Discarded conditions: mostly unnecessary and trivial

In terms of the discarded conditions - mostly unnecessary or trivial - the results for mindfulness, entrepreneurial experience and prior knowledge are important, whereby the overall understanding of the systemic nature of sustainability seems to replace the effect of alertness (Kizner, 1997) and human capital (Kuckertz and Wagner, 2010; Patzelt and Shepherd, 2010) in the pursuit of opportunities; factors derived from studying traditional entrepreneurs. Given the low consistency levels of formal training and work experience, the understanding of sustainability necessary stems from a combination of life changing experiences, informal education and systemic thinking. Given the heterogeneity of the sample (demographics, geographical location and educational background) there is no indication that the relatively less importance of mindfulness, experience and prior knowledge are due to inherent, skewed features of the selected sample.

Equally relevant are the low consistency and coverage levels of institutional conditions. The fact that both formal and informal institutions are neither necessary nor sufficient for the integration of sustainability in the opportunity process challenges current explanations based on institutional theory (e.g. O'Neill et al. 2009; De Clercq and Voronov, 2011; Meek et al. 2010; Pacheco et al. 2010). Findings suggest that sustainability-oriented new ventures will exist regardless of the attributes of the institutional environment, meaning that decision-making of sustainability entrepreneurs is not contingent on group-level values or fostered by state-sponsored institutions. This defies conclusions on the role of contextual influences (Dimov, 2007a) and social norms (Meek et al. 2010). Culture, social norms and regulation may promote socially and environmentally responsible behaviours, but do not substantially affect the generation and shaping of ideas and thus do not impact the creation of sustainable new ventures.

This does not suggest returning to the single-person, single-insight attribution that permeates entrepreneurship research (Dimov, 2007a), but the findings are clear in terms of that individual factors, such as values, attitudes and convictions, are more decisive causes in the development of sustainability opportunities than the effect of contextual conditions. Data from the follow-up activities corroborate this finding. Given the logic of current institutional arrangements, which reward profit-oriented behaviours over sustainability-oriented behaviours (Pacheco et al. 2010), sustainability entrepreneurs perceive contextual variables as less relevant in the development of the venture. For them, the salience and urgency of sustainability issues call for sustainable entrepreneurial

action, regardless of whether the institutional setting offers favourable or unfavourable conditions. In this sense, sustainable entrepreneurial value will be created anyway.

It can be argued that certain factors inherent to the composition of the sample may affect these results, in particular in terms of the potential homogeneity of the institutional setting. I discuss this issue in section 5.4.2, limitations related to the sample.

The logic behind the irrelevance and consequent removal of start-up motivation as a potential cause is different. Analysing the responses to other indicators that assess intention and motives for starting a sustainable business, for example in the definition of the parameters for the measurement of moral intensity (Table 7.7 in Appendix D) or the measure for prospective sustainability entrepreneurship (Table 7.6 in Appendix D), I can conclude that unsophisticated measures that only capture an overall intention to solve sustainability problems cannot deal with the complexity of the motivational structure of sustainability entrepreneurs. It seems easier for these entrepreneurs recognize drivers when the question addresses specific sustainability-related reasons for starting a new business (e.g. unfair trading, social exclusion, inefficient use of energy) or sustainability-related intentions (e.g. I am constantly seeking business ideas with the potential of making contributions beyond making money), than when the question is framed in general terms (e.g. to solve environmental problems).

Future studies aimed at capturing motivation and intention in the context of sustainability entrepreneurship need to incorporate more refined measures and avoid shallow adaptations from studies that observe traditional entrepreneurial activity, such as the Panel of Entrepreneurial Dynamics (Reynolds, 2000).

### 5.3.2 Multiple conjunctural causality in the development of sustainability opportunities

Drawing on the operationalization of a configurational comparative method, my second contribution to entrepreneurship literature lies in unravelling the conjunctural and equifinal nature of the causal relationships in the development process of sustainability-oriented venture opportunities. Alongside proving explanation to how the opportunity process unfolds in sustainability entrepreneurship, this represents an important contribution to entrepreneurship research in general, where equifinality or multiple-

conjunctural causation is rarely considered and discussed. I examine this contribution in section 5.3.3.

Consistent with the idea that none of the examined elements are by themselves distinguishing features of sustainability entrepreneurship, no single characteristic has been found sufficient for the integration of sustainability in the different stages of the opportunity process. Based on the estimation of joint memberships, the analysis demonstrates that the development of sustainability opportunities can follow different sufficient solutions or combinations of conditions, which establish different causal relationship with the outcome in respect of configurational logic, consistency and empirical importance. Although they may differ in terms of explanatory power, the presence of a diverse range of causal conjunctures for the integration of sustainability in the pursuit of opportunities points out a situation of causal complexity and true equifinality – a situation where a system can reach the same final state, from different initial conditions and by a variety of different paths (Fiss, 2007).

The relevance of these causal paths stems from the explanatory power of the aspects they combine in the development of venture ideas, the organization of entrepreneurial actions and the formation of exchange relationships. An examination of the most empirically relevant causal paths allows for identifying patterns of combinations, which are present in all or almost all solutions leading to the outcome of interest.

The following sections focus on the central aspects of the most relevant sufficient solutions. In these sections I describe the nature and main features of each combination of conditions, elaborate on the complexity of their role as fundamental causal components, and explain how conditions combine and unfold in the production of the outcomes.

#### 5.3.2.1 The combination of sustainability orientation, moral intensity and self-efficacy in the development of venture ideas

The findings support the claim that sustainability entrepreneurship is the result of a particular orientation that is present throughout the opportunity process (Tilley and Young, 2009; Parrish, 2010), triggering particularly the development of venture ideas and the formation of exchange relationships. However, a sustainability orientation is not sufficient by itself to produce those outcomes. In driving sustainability opportunities

forward, the entrepreneur's orientation combines most of the times with the perception of high moral significance.

Drawing on literature on ethical-decision making, this implies that the development of venture ideas involves moral cognitive processes. In other words, entrepreneurial responses to social or environmental issues are influenced to a great extent by moral reasoning patterns (Trevino, 1992), which are different than the traditional protocols driven by utility and optimization (Dresner, 2008). This involves, in its first stages, the recognition of moral or ethical issues linked to such problems (Rest, 1986), and the evaluation of the potential positive or negative consequences that the new venture – emerging as a solution to such problems - has for the well-being of others.

These moral cognitive processes are also sensitive to the nature and severity of the sustainability problem at stake (Morris, 1995). However, while moral intensity can predict the likelihood of choosing a socially responsible alternative (Jaffe, 2006), it is not sufficient by itself to transform the possibility of creating a better future into a particular business idea that can actually push in that direction.

The emergence of this conjuncture signifies that entrepreneurial ethical decisions, which are rooted in the entrepreneur's orientation, are primarily contingent upon the perceived characteristics of the sustainability issue in question, which necessarily requires the collective assessment of those characteristics (Jones, 1991). Thus, the development of a business opportunity that leads to building a more sustainable society is contingent on the nature and moral significance of the sustainability problem under consideration (Singhapakdi et al. 1996). Sustainability issues of high moral significance are likely to be perceived as requiring higher levels of ethical interpretation as compared to issues of low significance (Bhal and Dadhich, 2011). Following Jones's (1991) statement that the issues of substantial importance are the ones that inspire people's best moral behaviour, one could argue that the sustainability issues of substantial importance are the ones that inspire entrepreneurs' best sustainability-oriented venture ideas.

The presence of moral intensity as a driving force has several implications for our understanding of the opportunity process, in particular for traditional notions based on alertness, prior knowledge and information asymmetries (Kirzner, 1997; Shane, 2000; Eckhardt and Shane, 2003).

Based on current conceptions of opportunity recognition (e.g. Patzelt and Shepherd, 2010), one could argue that people with similar experience and prior knowledge would

react in relatively similar ways regardless of the nature and magnitude of the sustainability issue at hand, for example the difference between someone throwing a plastic bottle into the ocean or an oil company spilling thousands of barrels into the ocean. Awareness and prior knowledge of ecological and social environments may be necessary to trigger perceptions of opportunity, but such perceptions by themselves do not warrant entrepreneurial pursuit.

Results suggest that conceptions based on prior knowledge (Larson, 2000; Patzelt and Shepherd, 2010) overlook the nature and magnitude of the sustainability issue in question. Although scholars recognize the relationship between the presence of entrepreneurial opportunities in environmentally relevant market failures and the magnitude of those environmental problems (Dean and McMullen, 2007), they do not elaborate on the role that the variance in magnitude play in the recognition and intention of pursuing such opportunities, nor indicate the means by which the magnitude is perceived by potential entrepreneurs.

Awareness and prior knowledge of ecological and social environments, which can be understood as understanding of sustainability, may be necessary to trigger perceptions of opportunity, but they alone are not sufficient to inspire entrepreneurial action in pursuit of such opportunities. While prior work has established that prior knowledge needs to be complemented by financial rewards or certain cognitive processes to produce opportunity insight and intention (Corbett, 2007; Dimov, 2007b; Shepherd and DeTienne, 2005), the results highlight the importance of moral considerations in inspiring commitment to opportunities that entrepreneurs may face. Such considerations have lied at the boundary of current research because this work has dealt mostly with traditional entrepreneurs oriented towards economic returns.

Sustainability problems vary in intensity and individuals' perception of such problems varies accordingly, leading them to recognize different levels of severity in the threats to ecological and social environments. This intensity plays an instrumental role in guiding perceptions and inspiring action (May and Pauli, 2002); especially when it comes to decide what is the right thing to do - or the right opportunity to pursue - when the magnitude of the problem is high and when the magnitude of the problem is low. Given the moral components involved in decisions regarding sustainability issues (Dresner, 2008), how individuals respond to different problems can be explained by the salience and vividness of the sustainability issues at stake, which can dominate the entrepreneurs' attention and evaluative reasoning (May and Pauli, 2002).

The effect of moral intensity in moving sustainability opportunities forward can be illustrated with the case of the destruction caused by Chilean Salmon Farms in 2010, which is the environmental disaster that triggered the idea for one of the ventures of this study.

The practice of aquaculture in the south of Chile is legally carried out on a massive scale. In the last decade, the operations of the Chilean salmon farms have had devastating impacts on the southern region's entire ecosystem. The Atlantic salmon is an alien species in Chile, which together with the use of medication on the farms and the waste they produce, introduced diseases and risks to already threatened native species.

The scale of the threat posed by salmon farms to the fauna and national parks of the Aysén region of southern Chile was disastrous (Vester et al. 2010). The ISA virus emerged and spread causing not only the death of most of the salmons but also the economic decline of the industry and thus of the local economy. Indeed, almost all salmon farms in the north of Aysén, region that concentrates most of the activity of this 2 billion dollars industry, were shut down and abandoned due to the virus (*magnitude of consequences*). There is an extensive agreement within the scientific community on the negative effects and aftermath of the lack of control in the growth of the salmon industry in southern Chile (*social consensus*), as evidenced in a number of academic papers (e.g. Vester and Timme, 2010) and reports.

The environmental scandal caused by the salmon farms (i.e. pollution and spread of diseases) is certain to affect not only the subsistence of marine ecosystems, but also the health and wealth of people who live along the coast of Chile's southern region, particularly of those living in the north of the province of Aysén (*probability of effect*). The effects on marine ecosystems were felt quickly. In few months the medication, pesticides, excess of feed, and floating faeces caused the death of the surrounding natural environment (*temporal immediacy*). In fact, measurements taken by researchers from the University of Göttingen proved that no forms of life now exist in direct proximity to the farms (*moral proximity*). Studies conducted by the Max Planck Institute for Dynamics and Self-Organization (Vester and Timme, 2010) uncovered additional, unexpected damage to other already threatened species. Results indicate that the pollution and noise from the salmon farms drove some threatened marine mammals, for example blue, humpback and sei whales, and Peale's and Chilean dolphins, away from their natural environment and disrupted their communication in the ramified fjords and channels (*concentration of effect*).

Based on the description above, disaggregated using Jones's (1991) six components of moral intensity, the moral imperative of the impacts produced by the Chilean salmon farms on coastal ecosystem would be perceived as higher than other similar, yet less severe situations. Individuals' perceptions of moral intensity impact their recognition of issues as posing moral dilemmas and also affect ethical judgments and behavioural intentions regarding such issues (Barnett, 2001). An entrepreneur's reaction to sustainability problems is therefore triggered to a great extent by the moral components involved in such reaction, comprising its sensitivity to the moral significance of the problem, moral reasoning and volition, and ultimately a personal and collective evaluation of the consequences of pursuing a particular venture opportunity.

In this example, one could expect that the moral imperative of the salmon disaster affects and triggers the intention of entrepreneurs in Chile and around the world towards mobilizing efforts and developing new ventures in the name of sustainability; who together with taking responsibility for (e.g.) cleaning up the ocean, recovering affected species or restoring the economy of the local community, will seek to obtain monetary benefits.

As important as the conjuncture of moral intensity and sustainability orientation in producing sustainability venture ideas, is the combination of these two elements with the entrepreneur's belief that he or she is capable of successfully performing the various roles and tasks of entrepreneurship (Chen et al. 1998). As explained in section 2.4.2, entrepreneurial self-efficacy is recognized as a key determinant of entrepreneurial activity (Dronvaek, 2010), in the sense that the entrepreneur's confidence in its knowledge and abilities determine not only the strength of entrepreneurial intentions but also the likelihood that those intentions will result in entrepreneurial actions (Boyd et al. 1994).

In the realm of sustainability, however, the evaluation of one's knowledge and skills to exploit an opportunity appears different than when the opportunity under consideration involves simply personal economic gain.

This has two components. The first one gives support to Shepherd and Patzelt's (2011) suggestions, in that the knowledge and skills requirements are indeed higher for sustainability opportunities than for profit opportunities. The entrepreneur not only requires knowledge of market needs and skills aimed at providing solutions to those needs, but also knowledge and skills to address social or ecological problems by developing a new business that, as Jackson (2009) indicates, contributes positively to

flourishing, provides decent livelihoods and utilizes low material and energy throughput. This means that, in the pursuit of sustainability opportunities, the confidence of sustainability entrepreneurs in their skills to successfully establish a new venture overlaps with their confidence to successfully solve sustainability problems and improve with this social and environmental conditions. In other words, in enhancing the feasibility of sustainability opportunities, two complementary sets of skills are needed.

The second component relates to conjunctural mechanisms. Entrepreneurial self-efficacy is conducive to sustainability entrepreneurship only in situations where additional conditions are present. This means that entrepreneurial self-efficacy is neither necessary nor sufficient for a sustainability opportunity to be articulated as a sustainability-oriented venture idea. This has several implications for our understanding of the opportunity process.

In order to produce a sustainability-oriented venture idea it is not only the self-efficacy-based alertness of the prospective entrepreneur that needs to exceed a certain level, as Ardichvili et al. (2003) explain. The salience of the social or environmental issue under consideration also needs to exceed a particular threshold to trigger a moral intent and mobilize entrepreneurial action already rooted in sustainability values. In the case of the venture that emerged as a response to the Chilean marine disaster, the conception of the idea is the result of conjunctural mechanisms. It occurred in the moment when the entrepreneur's confidence and orientation met a situation of high moral significance, like the one described above.

This conjuncture extends the work of Kuckertz and Wagner (2010). In their study, the authors examine the effect of sustainability-related attitudes and convictions on entrepreneurial intentions. Although their findings support the positive relationship between these variables, they do not provide a satisfactory explanation of why a sustainability orientation does not influence certain groups of individuals, in other words what else can account for this variance. They recognize the complexity inherent to sustainability opportunities, but studies based on linear multiple regression can only explain the outcome to some degree. My results allow for understanding the complex constellation of factors that accompany a sustainability orientation in the development of a sustainability-oriented venture idea.

In sum, if one sorts the relevant solutions for the development of venture ideas according to the central component of the recipe, i.e. the respondents' orientation; those

entrepreneurs that have a strong sustainability orientation have the easiest time integrating sustainability in the development of venture ideas. All that is required, from a configurational point of view, is the perception that the sustainability problem under consideration is highly significant and a strong confidence in the capacity to successfully establish a meaningful business.

#### 5.3.2.2 The combination of contribution belief, sustainability orientation and moral intensity in the formation of exchange relationships

Although sustainability orientation is a necessary condition and appears as a central factor throughout the solutions, it is not sufficient for the formation of sustainability-driven exchange relationships. The integration of sustainability in the entrepreneurial discourse depends to a great extent on the entrepreneur's vision regarding the role of its business in society combined with the belief in strategic returns, which is in some instances accompanied by the moral significance of the sustainability issue.

If the promise of financial rewards has an effect on the ability of traditional entrepreneurs to recognize opportunities (Shepherd and DeTienne, 2005), one might infer that the promise of broader benefits - social, environmental and economic - has a similar effect on sustainability entrepreneurs. However, the potential contribution of sustainability is relatively less significant in the first stages of the opportunity process and becomes highly relevant when it comes to positioning products, risks and benefits and building exchange relationships. This defies current premises regarding the role of rewards in the development of entrepreneurial opportunities (Shepherd and DeTienne, 2005). Although people are willing to pay a premium for 'saving the planet' (Ginsberg and Bloom, 2004), this is not as important as other factors in the recognition of sustainability opportunities and the formalization of sustainability-oriented venture ideas.

The belief in strategic returns emerges as part of the configurations for sustainability exchange relationships in the context of the creation of competitive advantage. A sustainable market orientation (Mitchell et al. 2010) built upon, for example, 'Green Marketing Strategies', (Ginsberg and Bloom, 2004) help improving the firm's reputation, customer relationships and employees engagement (Vagasi, 2004). This resolves the conceptual ambiguity of sustainability and makes tangible the goals of environmental protection, social justice and intergenerational equity.

Sustainability orientation and the belief in strategic returns are present in all empirically relevant configurations for the formation of exchange relationships. Moral intensity is relevant only in one of the two relevant solutions. In a general revision of the instances corresponding to each solution term, there is no clear pattern to establish why moral intensity is irrelevant in some of the instances. Neither the market to which the venture attends nor the nature of the sustainability problem can explain this variance.

A deeper revision of the qualitative data, however, permits to identify one particular factor that differentiates the cases. In establishing exchange relationship, the cases from the solution terms that include moral intensity as a core condition provide more details of the sustainability problem they are dealing with, and better relate this problem with the purpose of the business. The cases in the other solution terms only provide general statements about the sustainability problem they are tackling. The intensity of the problem increases the degree of attention to details, which are later on included in the discourse that set the terms of interaction.

The founders of KOR have spent most of their lives in the rainforest of Costa Rica, experiencing first hand the effect of toxic pesticides, herbicides and fungicides on banana plantations. In the proposition they make to potential investors, they fabricate a detailed narrative, inviting stakeholders to invest and support farming communities and families from Central America. These are specific problems and specific actors to whom the entrepreneurial efforts and resources are directed. The other cases (where moral intensity is less relevant) refer to sustainability in more general terms, and do not provide further details on the qualities of the problem or the actors involved. The STR's mission statement illustrates this point:

> We provide high-quality renewable, non-toxic and biodegradable industrial lubricants so that our industrial systems can transition to a clean, post-petroleum economy.

The relevance of the solution path that combines sustainability orientation, sustainability contribution beliefs and moral intensity invites us to rethink the notion of market interactions as the ultimate realization of the venture idea (Dimov, 2011). In the case of sustainability entrepreneurship, it is not the venture idea that propels the formation of a particular exchange relationship, but rather the complexity of the sustainability anomaly to which the business idea is responding. This invites us to rethink the relationship between situational and social influences and the entrepreneur's

knowledge of the developing sustainability opportunity. This, in terms of that the social, learning process whereby ideas become instituted in market structures (Dimov, 2007a) rests on the sense of urgency and commitment to the perceived sustainability issue, which shape and refine the opportunity when facing market structures.

In sum, if one sorts the different recipes for the formation of exchange relationships according to the central component of the recipe, i.e. the respondents' orientation, those entrepreneurs that have a strong sustainability orientation have the easiest time integrating sustainability in their interactions with market structures. All that is required, from a configurational point of view, is a strong belief in the contribution sustainability brings to the business and sometimes the perception that the sustainability issue at stake has a high moral intensity.

The formation of exchange relationships pertains the selling of the opportunity (Dimov, 2011) to relevant market actors such as customers, suppliers and investors. Among these actors, the function of the latter as potential source of financial resources is instrumental in the entrepreneur's assessment of whether a sustainability opportunity is feasible. In this vein, the conjunctural mechanism that produces sustainability-driven market interactions extends the propositions of Shepherd and Patzelt (2011), in that the process of raising capital for the exploitation of sustainability opportunities is indeed different than when the opportunity under consideration simply involves economic gain for the entrepreneur.

#### 5.3.2.3 The reinforcing role of sustainability understanding and intention in the development of sustainability opportunities

Sustainability understanding and intention to pursue sustainability-oriented venture opportunities are causal ingredients that are also present in the cases that consistently display the outcome. However, in order to be removed from the solutions, it is required the use of difficult counterfactuals. This would entail assuming that these causes are redundant and that the reduced configurations would still produce the outcome (Ragin and Sonnett, 2005).

These factors act as complementary conditions in all stages of the opportunity process, and only make sense in the context of the decisive causal ingredients that distinguish one configuration from the other. In this context, my results challenge the

premise that entrepreneurial intention (Dimov, 2007b; Kuckertz and Wagner, 2010) and understanding of the context (Patzelt and Shepherd, 2010) are essential in the development of (all kinds of) venture opportunities.

Despite lacking centrality in the production of sustainability entrepreneurship, these factors are not at odds with existing knowledge of entrepreneurial processes and outcomes. Rather, they are important contributing factors in the integration of sustainability in the development of venture ideas, the organization of entrepreneurial actions and the formation of exchange relationships.

The emergence of sustainability understanding is relevant to our appreciation of the opportunity process in the sense that it invites a rethinking of what current literature considers are the central components of knowledge in triggering entrepreneurial action.

Drawing on entrepreneurship literature, it can be argued that the knowledge that precede the attention to social and natural environments emerge from either overall education and life experience, or education and experience specific to a particular activity or context (Dimov, 2010b). However, if we contrast traditional approaches derived from Austrian Economics (Kirzner, 1997; Shane, 2000) and entrepreneurial cognition (Krueger, 2000) to the psychology (Kurz, 2002) and philosophy (Dresner, 2008) of sustainable behaviour, the structure of prior knowledge appears more complex than in traditional entrepreneurship. In triggering sustainability-oriented entrepreneurial action, more relevant than the knowledge of specific social and natural problems is the systemic and holistic understanding of how sustainable and unsustainable human activity (in this case entrepreneurial activity) affect the world of today and world of tomorrow.

In order to develop sustainability opportunities, far from simply requiring the knowledge of specific sustainability issues, entrepreneurs need to understand that their ventures operate in a wider complex adaptive system, which comprises interconnected and dynamic social, environmental and economic systems within which the new venture is embedded as agent (Metcalf and Benn, 2012).

The fact that it is the systemic understanding of sustainability, and not specific prior knowledge, the condition that provides support to the opportunity process demonstrates that current approaches are insufficient to explain how opportunities develop in sustainability entrepreneurship. A new holistic social-ecological thinking framework, such as the one I articulate in the construction of the measure for sustainability

understanding, is needed to comprehend how knowledge, in a broader sense, impacts decision-making and the entrepreneur's attitudes, intention and behaviour.

By highlighting the difference between specific knowledge and holistic understanding of sustainability, this study answers to the need of further research aimed at exploring the types and mixes of prior knowledge (Shepherd and Patzelt, 2011) that allow some people to pursue sustainability opportunities while others are unable to do so.

Clarifying the role of the combination of understanding and intention also contributes to a better understanding of the formation of third- and first-person opportunity beliefs (McMullen and Shepherd, 2006) in sustainability entrepreneurship. In this sense, this study responds to the need of deeper examination of the factors that allow some people to discover third-person opportunities that sustain and develop, and also helps elucidating the question of, given the formation of such third-person opportunity belief, why do some individuals act on this opportunity while others do not (Shepherd and Patzelt, 2011).

### 5.3.3 Contributions to entrepreneurship research

> Opportunities are the foundation for developing fascinating research questions in part because they are transient, difficult to detect or create, and some people are more successful at exploiting them than others. Further progress towards understanding the nature of opportunities, their causes, and their effects will be made to the extent that studies include designs that facilitate causal inferences, analytical techniques that allow for the testing of dynamic processes, and more complex theory building and empirical modelling (Short et al. 2009:62)

The logic and analytical approach I use for the examination of conditions not only help enhance our understanding of the phenomenon of sustainability entrepreneurship, but also contribute to gain greater insight into complex causal processes in entrepreneurship research in general. Central to the latter is the fact that, rather than viewing causal relationships at the level of the individual variables, I take a holistic approach and examine cases as configurations of factors.

As mentioned above, alongside providing explanation to how the opportunity process unfolds in sustainability entrepreneurship, the finding of multiple conjunctural mechanisms represents an important contribution to entrepreneurship research in general, where equifinality is rarely considered and discussed. Indeed, a broad search in academic

databases (Web of Knowledge, Google Scholar and Scopus) found only five articles that contain in their title, abstract or keywords the terms entrepreneurship and equifinality / conjunctural causality (i.e. Murphy et al. 1996; Jennings and Hindle, 2004; McKelvey, 2004; Harms et al. 2009; Raymond and St-Pierre, 2013).

The operationalization of an analytical technique capable of dealing with conjuncture of causal mechanisms and multiplicity of causal paths leading to the development of entrepreneurial opportunities allows for overcoming the limitations of traditional linear methods (Aus, 2009), which so far has dominated entrepreneurship research (Neergaard and Parm Ulhoi, 2006; Davidsson, 2013). In this sense, Gartner and Birley (2002) point out that there is something missing in entrepreneurship research, in that some questions simply do not get asked, or cannot be asked, when undertaking quantitative studies. As Dimov (2011) indicates:

> The analysis of such higher-order configurations in a traditional multivariate setting poses significant problems in terms of model specification, statistical power, and interpretation of individual effects (74)

By embracing diversity and a substantive approach to entrepreneurial opportunities, I developed an analytical device capable of resolving the divide between quantitative and qualitative traditions in entrepreneurship research. In materializing this middle path, I introduce a way of bridging complexity and generality, maintaining the rigor of variable-oriented research and the appreciation of complexity inherent to case-oriented research (Dimov, 2011). Following this logic, future entrepreneurship research can overcome the limited external validity of a case-study research and the limited internal validity of quantitative studies.

In this sense, my results are important because they confirm that the causal conditions linked to the development of entrepreneurial opportunities are combinatorial in nature, and that it is possible to distinguish the relevant solutions paths or decisive combinations of causal ingredients when cases are viewed as configurations (Ragin, 2008b). This reinforces Dimov's (2011) argument that opportunities are holistic, contextually situated cases rather than a temporal collection of variables.

Alongside finding decisive combinations of causes, the analysis opens up opportunities for uncovering counterintuitive solutions and outliers. The case sensitivity of the present study allows for discovering all possible explanations, whether frequent or not.

First, it shows solution paths that seem empirically impossible in producing the integration of sustainability in the different stages of the process. The empirical relevance of such configurations is low; yet they show that the outcomes can be produced even under odd conditions. The sufficient relation shown by these counterintuitive cases can be understood as proof that a path that was thought to be empirically impossible, at least from the perspective of theory, in fact is not (Ragin, 2008b).

Second, the analysis presents cases that, despite exhibiting a sufficient configuration of conditions, do not produce the outcome. Evidence that there are instances in which the causal combination is not followed by the outcome may challenge the claim of sufficiency (Ragin, 1999). However, when they are examined in depth, these instances can be explained without affecting the pattern of results uncovered by the configurational analysis. Actually, far from rising doubts about the validity of the study, the examination of these instances enriches the explanation of the phenomenon and allows for reinforcing the arguments of causal complexity in the development of sustainability venture opportunities.

The examination of counterintuitive causality represents an empirical and theoretical challenge. So far, entrepreneurship research has skilfully examined the causes of entrepreneurial intention and behaviour, however it has not yet started treating less empirically relevant, alternative explanations as what they actually are. These configurations of causal conditions and their respective cases are not errors; they are simply different recipes for entrepreneurial action. The examination of these cases may be seen as dawdling in that we cannot make broader inferences from outliers. Remarkably, as evidenced in my analysis, the revision of counterintuitive causal paths not only enriches the explanation of the phenomenon, but also opens up opportunities for grappling with the complexity of what actually entrepreneurs do, regardless of whether this is propelled by social, environmental or commercial aspirations.

## 5.4 Limitations and future research

### 5.4.1 Limitations related to Qualitative Comparative Analysis

There are a number of limitations in regard to the data analysis I have conducted as part of this thesis. I will discuss these limitations in the context of three central concerns when using the Fuzzy-set variance of Qualitative Comparative Analysis, these are:

calibration thresholds, false necessity and misuse of logical reminders (Schneider and Wagemann, 2012).

#### 5.4.1.1 Calibration thresholds

A central issues in fsQCA is the logic and procedures used in setting up thresholds for the calibration of measures. In this sense, the mechanistic application of calibration techniques is particularly problematic, because it leads to the under-appreciation of the importance of standards for imposing thresholds external to the data (Schneider and Wagemann, 2012). In other words, calibration becomes a threat when qualitative anchors are not based on theoretical and substantive knowledge, but rather on simplistic formulas, for example, the use of the mean score as the point of maximum ambiguity with no further justification. If we lack relevant theory to define calibration thresholds, the knowledge of cases provides support for the set of calibration anchors.

Alongside the justification provided in section 3.6.1, I corroborated the appropriateness of the calibration procedure by conducting several robustness checks. Here, it is particular important to test the sensitivity of the results by adjusting the calibration thresholds. If one follows the central principles of calibration, results and parameters of fit will not vary in meaningful ways and will remain robust. In this regard, this study ensures a high reliability and validity.

#### 5.4.1.2 False necessity

Another important issue is the misconception of claiming the presence of a necessary condition based on the results of the configurational analysis, when in fact there is no necessary condition (Schneider and Wagemann, 2012). For example, inferring the necessity of sustainability orientation for the development of venture ideas based only on the merits of its presence in most of the solution paths is analytically inadequate. Some truth table rows may be inconsistent and only coincidently those inconsistencies were not included in the logical minimization due to their low raw consistency values. Therefore, the presence of inconsistent rows might not be reflected in the sufficiency analysis, leading to error. If this is the case, the claim of necessary condition needs to be rejected.

One mechanism to avoid the risk of declaring a false necessary condition is the use of a direct test of necessity. In consequence, I prevented this threat by conducting an exploratory analysis of necessity. By doing so, I tested in advance the subset relationships between the outcomes and causal factors under evaluation, and subsequently assessed the degree to which instances of an outcome agree in displaying the causal condition thought to be necessary and the empirical relevance of each causal condition. This permits, prior to the configurational analysis, defining which individual conditions may be necessary or mostly necessary for the outcomes to occur, as well as which individual conditions are unnecessary or trivial in the production of the outcomes under consideration.

#### 5.4.1.3 Limited diversity and the misuse of logical reminders

A third potential threat to the validity of the study is the misuse of logical remainders in the processes of counterfactual analysis and logical minimization. Most studies need to make distinctions in the use of counterfactuals, which needs to be performed to draw a line between plausible and non-plausible logical reminders. As explained in section 3.6.3, given the exploratory nature of my study I do not make assumptions regarding the presence or absence of conditions in the delineation of counterfactuals, meaning that all positive and negative expressions, thus all truth table rows, are considered plausible. In other words, all logical reminders are considered good counterfactuals.

This type of enhanced standard analysis (Schneider and Wagemann, 2012) allows for extending the range of acceptable solutions and capturing the complexity the phenomenon without compromising significantly the parsimony of the results. Ignoring some logical remainders or entire truth table rows can have a detrimental effect for instance on the identification of counterintuitive solutions and outliers.

### 5.4.2 Limitations related to the sample

There are a number of limitations in regard to the sample selection procedure and data collection I have conducted as part of this thesis, which affect the generalizability of the results. I will discuss these limitations in the context of three central concerns that relate to the sample and the entrepreneurs' responses, these are: the use of retrospective

self-reports, the use of sustainable business competitions as a conceptual domain and the concentration of actors in a geographical location.

#### 5.4.2.1 Retrospective self-reports

A major concern that potentially limits the validity of the empirical findings is the use of retrospective self-reports as source of primary data. Retrospective self-reported measures are largely used in empirical research, in particular as part of survey studies. A central reason for using this technique is because abstract levels, such as sensing and responding to sustainability anomalies or mindfulness (Brown and Ryan, 2003), cannot be observed and must be assessed by self-reports (Bird et al. 2012).

Despite their predominance, retrospective self-reporting can potentially introduce several biases (Podsakoff and Organ, 1986). First, a problem of common-method bias in which a bias in the source might contaminate all measures in the same direction (Baum et al. 2011). Second, a problem of retrospective bias in which motivation, perceptual and cognitive limitations or lack of information regarding facts, attitudes, beliefs, activities, and motives related to venture formation may induce entrepreneurs to provide inaccurate or biased data (Schjoedt and Shaver, 2005).

These methodological issues pose a fundamental challenge for research on opportunity development (Gregoire et al. 2010). I reduced the problem of self-reporting by conducting, at the pre-survey stage, a careful and thorough process of case selection, and by doing, at the post-survey stage, data and method triangulation (Jick, 1979). To minimize potential problems of validity derived from retrospective bias, I compared the entrepreneurs' recollections with data from documents of the venture available at the time the responses were provided. Entrepreneurial events typically occur only once, early in the life of the firm, thus the use of contemporaneous records is beneficial to reduce this threat (Schjoedt and Shaver, 2005). As explained in section 3.5.1.3, situating the survey in a specific context and time frame by continuously providing situational stimulus (e.g. by asking the participant to recall information about the sustainability problem the venture was trying to solve before measuring perceived moral intensity) also contributed to minimize validity problems related to retrospective bias.

One important element needs to be taken into account in discussing the risk of using retrospective self-reports. Given the reduced number of observations, no statistical test can be applied to identify whether a systematic error existed in the data.

#### 5.4.2.2 Definition of conceptual domain

A second concern related to the sample, that can potentially limit the validity of the empirical findings, is the use of sustainable business competitions to delineate the population for the study. It can be argue that given that all participants of sustainable business competitions have a favourable inclination towards sustainability, the assessment of the opportunity process will be unable to capture variance.

As mentioned in section 3.4.1, this is not an issue in this diversity-oriented comparative study (Collier, 1995). Given that fsQCA requires, first, participants with similar background characteristics (i.e. an area of homogeneity), the sampling strategy was aimed at recruiting entrepreneurs that identify and select themselves into the group of sustainability entrepreneurs. As with other QCA studies (e.g. organization research, Fiss, 2011), the central focus of this research is not on entrepreneurs in general, but on those who present a clear orientation to sustainability. As evidenced in the results, and in line with fsQCA requirements, these similar cases do exhibit variance, i.e. positive and negative outcomes and conditions. This means that, within the defined conceptual domain, a maximum heterogeneity over the minimum number of cases is in fact achieved (Rihoux and Ragin, 2008). This eliminates risks to validity, traditionally related to studies that require random sampling.

#### 5.4.2.3 Geographical location

Another concern regarding possible limitations of this study refers to the geographical location of the sample. The fact that most of the cases are based in the United States can affect the generalizability of the results. There are, however, some elements in the sample strategy that minimizes this risk. Although most of the cases are based in the United States, they belong to 17 different sectors and are spread out across the country (i.e. 15 different states), in regions that it has been demonstrated present significant fine-grained cultural and psychological differences (Henrich et al. 2010). In this regard, a cultural difference does not have to be big to be important because these

fine-grained cultural differences do affect thinking patterns. Authors indicate that, for example, the fact that Bostonians' internal sense of self-worth is more dependent on community status and financial and educational achievement than San Franciscans is relevant enough to produce variance in responses.

In addition, the fact that 13 of these cases operate in markets outside US soil, such as Sub-Saharan Africa and India, helps reducing the risk of homogeneity of institutional setting and consequently of a biased perception regarding the role of institutional conditions. Complementarily, a revision of the responses of the seven cases that are based outside the United States regarding their perception of influence of institutional conditions shows no significant difference compared to the US-based cases, this also minimizes the risk of sample bias.

### 5.4.3 Further analyses and future research

In order to deepen our understanding of the opportunity development process, I suggest two avenues for moving forward research in this field. One avenue relates to further possible analyses based on the results presented in this study, and other avenue relates to future research.

#### 5.4.3.1 Further analyses

The first possible analysis relates to temporal causality within configurations of conditions. In the same way ideas, objectives, and discourse do not occur simultaneously and can be causally linked; the examined conditions can also be connected in a temporal sequence. For example, using the causal notation / for a logical THEN (Caren and Panofsky, 2005; Ragin and Strand, 2008; Schneider and Wagemann, 2012), one could argue that while UND/MOR/ORI/EFF/SEA is sufficient for the development of sustainability venture ideas (SVI), SEA/EFF/ORI/MOR/UND is not. In fact, if we understand that these conditions are connected in sequence, the latter configuration appears to be causally implausible.

A second, related analysis relates to the modelling of the process of opportunity development by causally connecting the most relevant solutions for the sequence of outcomes outlined herein. If one considers that opportunity development is inherently a

learning process linked to the dynamics of experience (Dimov, 2007a), one can make the case that these snapshots (i.e. venture ideas, entrepreneurial actions and market interactions) constitute a sequence of events, instead of different representations of the opportunity distributed across time.

Drawing upon my findings, these causal links can also be explored as set relations, by which configurations are connected based on arguments of necessity or sufficiency. Based on this logic, one could causally connect relevant solution paths for the development of sustainability venture ideas (SVI) to relevant solution paths for the organization of sustainability entrepreneurial actions (SAC) and then to relevant solution paths for the formation of sustainability exchange relationships (SER), arguing that particular configurations are more consistently necessary than others for the next event to occur. For example, by selecting the two solution paths with higher coverage per outcome, it is possible to elaborate an equifinal model of opportunity development with ($2^3$) eight causal chains that connect ideas with objectives with discourse. Similar to solution paths, there will be consistent and inconsistent causal chains, some of them with several empirical instances (high empirical relevance) and some others with very few empirical instances (low empirical relevance).

A third potential extension relates to the development of a polythetic empirical typology, which can be formed from different combinations of values on the attributes of interest. Typology development is a strong form of theory development in that it tends to ensure greater parsimony (Fiss, 2011). The development of interrelated sets of ideal types (Doty et al. 1994) permits to reconcile prior efforts aimed at characterizing social (e.g. Zahra et al. 2009; Mair et al. 2012) and environmental (e.g. Isaak, 2002; Walley and Taylor, 2002; Gibbs, 2009) entrepreneurs; and move forward research at the intersection of entrepreneurship and sustainability. Using the logic of qualitative comparison and conjunctural causality allows for organizing the potential heterogeneity of sustainable entrepreneurship into a coherent typology that can facilitate further understanding and theorizing on this topic.

#### 5.4.3.2 Future research

The first possible avenue for future research relates to impact investment decisions. Future studies can address the other side of sustainability opportunities, which entails analysing how like-minded investors think, act and interact with entrepreneurs when

facing new venture opportunities that seek to create present value for the economy, society and the environment while contributing to the well-being of future generations.

Future research could also explore how sustainability entrepreneurs overcome uncertainty and providing a deeper understanding of the formation of third- and first-person opportunity beliefs in sustainability entrepreneurship. The present study outlines conditions for the development of sustainability opportunities, however, further examination is needed to elucidate what third- and first-person opportunities look like in sustainability entrepreneurship. Knowledge and motivation certainly play a role in transforming possibilities into sustainable ventures, yet there is an opportunity to open up the model and integrate some combinations of factors absent in commercial entrepreneurship. Perhaps, the willingness to bear uncertainty, fuelled by knowledge and motivation, may be necessary but not sufficient to form the belief that the third-person opportunity at hand is valuable and feasible, and is achievable by the aspiring entrepreneur, and not just by others.

A third avenue relates to the components of moral intensity. The moral significance of the sustainability issue the entrepreneur is trying to solve has proved central in mobilizing entrepreneurial intention. However, we still know little about the independent effect of each of the factors, which may increase or decrease the perception of importance of the sustainability problem at stake. Given that moral intensity triggers moral intent and behaviour, a better understanding of the relative strength of MI's components may provide a better understanding of sustainability-driven entrepreneurial action.

## 5.5 Practical implications

There are several implications for practice raised by this study. They suggest ways to foster and nurture the development of sustainability opportunities within extant socioeconomic structures, as well as to increase the effectiveness of aspiring sustainability entrepreneurs and entrepreneurship educators.

Complex causality in the opportunity development process can have a major impact on education, policy and support mechanisms for sustainability entrepreneurship. For instance, the exposure to sustainability issues of high moral significance combined with a new holistic approach to business sustainability (i.e. life sustaining, restorative and regenerative), that transcends the dominant approaches driven by eco- and socio-

efficiency, is most of the time sufficient for the recognition of sustainability opportunities and the subsequent development of venture ideas.

Given this combination of factors, bringing sustainability to entrepreneurship may require a different approach, which needs to depart from the traditional logics of environmental-industrial capitalism, ecological modernization or environmental economics. They have focused on efficiency and on regulatory intervention as primary solutions to socially and environmentally relevant market failures. A new approach to entrepreneurship support and education should be framed in a way that ideological struggles and pressing problems are experienced, and then understood as part of a system that expects from businesses more than CSR and environmental management.

## 5.6 Conclusion

In The Ecology of Commerce, Paul Hawken reflects on the idea that business is the only mechanism on the planet today powerful enough to produce the changes necessary to reverse global environments and social degradation. So far, businesses have partially reduced the pressure over social and ecological environments, thus major transformations are still required to move our society forward and achieve sustainable development.

It seems that what it used to be considered as the cause of environmental degradation and social inequality, now is the solution. A new breed of entrepreneurs, determined to drive social and environmental problems to zero, have emerged and are currently attracting the attention of the entrepreneurship research community. They have demonstrated that entrepreneurial action can indeed address current sustainability issues and operate as a central force in the development of an ecologically and socially sustainable economy. *The People's Supermarket* and the other 44 cases show us that sustainability entrepreneurship is an attractive and feasible form of entrepreneurial value creation, and an essential element to tackle the exciting task of creating sustainable future.

Despite its relevance and scholarly attention, how the sustainability-oriented entrepreneurial process comes about was a pending issue. Perhaps, the focus on entrepreneurial action as a situation in which an aspiring entrepreneur pursues possible opportunities for profit has blurred our view of the phenomenon. As seen, the development of entrepreneurial opportunities is also a mechanism whereby certain individuals can protect, and further, improve natural and social environments.

Given the intricate nature of sustainability, studying this form of entrepreneurship involved contemplating and examining the phenomenon in its complexity. This represented a conceptual and methodological challenge, yet a necessary step to advance our understanding of how this opportunity process unfolds.

Undertaking this task allowed me to identify necessary conditions, and to elaborate sufficient causal paths that collectively explain the integration of sustainability in the opportunity process. In explaining the conditions under which entrepreneurs pursue sustainable ventures, this study theorizes about the pursuit of sustainability opportunities and establishes the distinctive nature of the phenomenon, responding to what Hall, Daneke and Lenox (2010) has defined as one of the dominant questions in the field.

I aimed to provide substantive and theoretical basis for stimulating scholarly thought and improving the understanding of sustainability entrepreneurship as an important field within entrepreneurship research. This field of research is in its beginnings and I hope that this thesis will help advance its development.

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# Chapter 7. Appendices

## 7.1 Appendix A. Descriptive statistics and correlation

**Table 7.1 Descriptive statistics and correlations SVI** (N=45)

| Variable | Mean | Std. Dev. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1. UND | 0.761 | 0.217 | | | | | | |
| 2. PRO | 0.822 | 0.232 | .329* | | | | | |
| 3. SEA | 0.836 | 0.213 | .347* | 0.226 | | | | |
| 4. ORI | 0.871 | 0.200 | .482** | .310* | 0.166 | | | |
| 5. MOR | 0.743 | 0.199 | 0.186 | -0.073 | 0.147 | 0.159 | | |
| 6. EFF | 0.763 | 0.222 | .451** | .365* | 0.197 | 0.166 | -0.012 | |
| 7. SVI | 0.716 | 0.262 | 0.247 | -0.053 | .310* | .317* | 0.124 | 0.102 |

* $p \leq .05$ ** $p \leq .01$

**Table 7.2 Descriptive statistics and correlation SAC** (N=45)

| Variable | Mean | Std. Dev. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1. UND | 0.761 | 0.217 | | | | | | |
| 2. PRO | 0.822 | 0.232 | .329* | | | | | |
| 3. SEA | 0.836 | 0.213 | .347* | 0.226 | | | | |
| 4. ORI | 0.871 | 0.200 | .482** | .310* | 0.166 | | | |
| 5. EFF | 0.763 | 0.222 | .451** | .365* | 0.197 | 0.166 | | |
| 6. CON | 0.735 | 0.282 | 0.237 | 0.127 | .430** | 0.177 | 0.163 | |
| 7. SAC | 0.759 | 0.253 | .406** | 0.129 | .379* | 0.275 | .378* | .311* |

* $p \leq .05$ ** $p \leq .01$

**Table 7.3 Descriptive statistics and correlation SER** (N=45)

| Variable | Mean | Std. Dev. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1. UND | 0.761 | 0.217 | | | | | | |
| 2. PRO | 0.822 | 0.232 | .329* | | | | | |
| 3. SEA | 0.836 | 0.213 | .347* | 0.226 | | | | |
| 4. ORI | 0.871 | 0.200 | .482** | .310* | 0.166 | | | |
| 5. MOR | 0.743 | 0.199 | 0.186 | -0.073 | 0.147 | 0.159 | | |
| 6. CON | 0.735 | 0.282 | 0.237 | 0.127 | .430** | 0.177 | 0.217 | |
| 7. SER | 0.612 | 0.320 | .342* | 0.186 | 0.247 | .357* | .383** | .358* |

* $p \leq .05$ ** $p \leq .01$

## 7.2 Appendix B. Survey: Introduction text

This survey is part of a PhD research currently being conducted at Newcastle University Business School in the UK. The main objectives of this research are to understand the way in which entrepreneurs recognize, evaluate and exploit business opportunities, and how this process relates to the current state of the company regarding its sustainability orientation.

During the survey I will be asking you about your present situation and the present situation of your company, and also about the past. For example, what happened when you started thinking about this business, your initial steps and how did you tell the story about this new idea. I'm aware that recalling information about something that has happened more than a year ago is not an easy task for the respondent but please make the effort, I'm sure that reviving the amazing process of transforming an idea into an actual business will be an incredible experience.

I strongly believe that the improvement of our current understanding of the way in which you recognize, evaluate and exploit business opportunities not only opens up the discussion for developing new and improved supporting mechanisms for this kind of entrepreneurial activity, but also contributes to building a better and more sustainable society.

Your responses are completely confidential and will be used only for the purposes of this research. I'm using Survey Monkey's SSL encryption and the data will be stored on their secure server. This same type of encryption is used for online banking and is in compliance with HIPAA standards.

You can skip questions or leave the survey whenever you want. If you decide to do so, there is always a chance to come back later, review your answers and complete the survey. Survey Monkey saves your answers, so you will not waste your time doing everything again.

If you decide to participate now, thank you so. If this is a bad moment for you, this link will be available until January 15th, 2012. This means that you have nearly two months for doing it.

## 7.3 Appendix C. Description of cases

**Table 7.4 Description of cases**

| Case | Description |
|---|---|
| AWW | AWW is a recycling firm that operates in Washington DC through two sectors. The first area sells refurbished, repurposed, imported and artisanal household items. It transforms unwanted furniture, clothing, books, kitchen goods, and found materials into affordable, usable, durable works of art. The second area provides green organizing and de-cluttering services. It focuses on organizing attics, garages, and basements and recycling or repurposing unwanted items. |
| ACO | ACO is a project management, development and consulting company for real estate holders dedicated to ecological and economic sustainability. It helps farms and forestlands of rural Cascadia in land use, strategic planning and design. |
| BTR | BTR is a sustainable urban mushroom farm**.** It makes daily collections of the coffee ground waste generated from local coffee shops, transports the waste to an urban warehouse just miles away, and transforms it into the substrate for gourmet pearl oyster mushrooms and grow-it-at-home mushroom kits. As a certified B Corporation, BTR seeks to serve as a standard bearer of innovation and responsibility in its community in order to inspire others to work towards a more sustainable future. |
| BGF | BGF is a cleantech venture that addresses the needs for cleaner domestic fuels and clean water. It provides technology, equipment, and professional services that enable its clients to harvest renewable energy and other bio products from wastewater streams, creating profitable assets from pollution liabilities. These solutions not only create environmentally responsible revenue, but also improve the lifespan and performance of existing infrastructure investments. |
| BCY | BCY is a company that builds custom electric motorcycles. It provides zero emissions vehicles that are recycled from junkyards. After completing a full gas-powered life of service, BCY rescues them from the grave and resurrect them to ride again but with new, clean, American-made, proven technology. Every bike is one of a kind and made under the same philosophy: resurrected and recycled motorcycles. |
| BST | BST is a company that produces new green surface material made of 80% post-consumer recycled glass. It provides a green alternative to stone slabs offering the same warm aesthetics of natural stone materials. It is a breakthrough in ceramic and recycling technologies, combining the virtues of high-recycled content, zero emissions, and low embodied energy. |
| BVG | BVG is an urban general store offering locally, sustainably and ethically sourced meats, gifts and cheeses. Their aim is to bridge the gap between producer and consumers, letting its clients know where the products come from. |
| CLI | CLI is a venture that enables companies, educational institutions, and other organizations to profitably eliminate their carbon footprints. It bundles four engineering services: efficiency, demand response, renewable energy, and carbon allowances. |
| CLE | CLE is company committed to promoting sustainably produced, authentic artisan seafood. It seeks to provide consumers with top quality fish that are sustainably farmed and caught and hopes to spark a return back to healthy oceans and regenerative ecosystems. They based their work on the idea that network of artisans are stewards of their fisheries, and CLE is a steward of the artisans' stories as it connects producers to chefs and consumers in a celebration of sustainably produced fish. |
| CHU | CHU is a web-based service that provides corporate social responsibility and sustainability ratings to corporations and non-governmental organizations. As a certified Bcorp, CHU ratings reflect environmental, employee, community and governance performance information from more than 90 sources on around 5,000 of the world's largest publicly traded companies. |
| CUL | CUL is a technology provider that enables the large-scale production of carbon-neutral, domestically produced algae biomass. CUL enables its customers to produce fuels, nutraceuticals, cosmetics and proteins from algae at cost competitive levels without subsidies. |
| DLI | DLI is an international consumer products company serving people without access to reliable electricity. It seeks to help the developing world snuff out its kerosene-burning lamps and |

replace them with cheap, solar-powered LEDs and compact fluorescents.

DFL DFL is a benefit corporation that seeks to change the world through energy efficiency programmes. By providing provide demand-side management DFL helps communities and disadvantaged schools to reduce pollution, save electrical costs. They are commitment to education, behaviour modification and community programs.

EPU EPU is an online social network for food that creates social media tools to connect local farms, distributors, restaurants, markets, CSAs, schools, people and foods. They believe these tools can help us all develop a more sustainable relationship with ourselves, our community and ultimately, our planet.

ECV ECV is a company that provides creative, competitively priced, environmentally friendly packaging. Through their products (pizza boxes, wing boxes, hoagie boxes, donut boxes, coffee caddies and take-away bags), they add utility, utilize sustainable materials, reduce carbon footprints and divert waste from landfills.

ECW ECW is a company that provides customers with healthy on-the-go refreshments via waste-free vending kiosks. It seeks to revolutionize the vending experience by giving the consumers complete control over their beverage choice while maintaining a healthy and waste-free environment ECW's vending system allows users to fill their own reusable containers.

ECZ ECZ designs, manufactures, and sells durable and cost-effective clean cookstoves. As a for-profit, certified B Corporation, ECZ makes clean cookstoves accessible and affordable in developing countries. They work to empower local workforces, economies and women while creating financially sustainable markets.

GSU GSU is sustainability consultancy venture that promotes cooperation at all levels of society. It organizes sustainability-related projects and programmes that make social actors come together to promote sustainable behaviours in the community. Though its initiatives, GSU focuses on reducing poverty and on closing the gap between the rich and the poor.

GTR GTR is a sustainable venture that offers consultancy and project development in sustainability-related areas. GTR is a gathering of remarkable people working to create real change in the world. They define themselves as doers devoted to financial, social and environmental change.

HAR HAR is a venture selects an assortment of fresh, seasonal fruits, vegetables and herbs from sustainable local farms and delivers it directly to its clients' homes or offices.

HFR HFR is a global impact digital media company delivering content, social networking and complementary web-based products and services that focus on sustainability issues. HFR builds on an innovative hybrid of professional storytelling and citizen journalism on global environmental and social justice issues.

IPA IPA is an equity fund of majority women-owned companies reinforced by consulting services. They provide their customers with products and services to develop and accomplish sustainability projects. IPA provides tools and strengthens ties for all members to enable their activity and the development of the sustainability enterprise economy. Membership in IPA represents an individual and an organizational commitment to integrating sustainable value creation into every aspect of their clients' behaviour.

IWB IWB is a web-based marketplace that offers return-focused, social-impact investment opportunities in West Africa. It connects individuals across the globe with opportunities to invest directly in small to medium sized enterprises in developing countries.

KOR KOR is a mission-driven company that brings naturally nourishing, and healthful food produced in the most fair, compassionate, and sustainable ways possible. It connects small organic farmers with the growing market of shoppers who care where their food comes from and how it is grown.

MCP MCP is a company that develops and produces solid-state hydrogen storage batteries for renewable energy and industrial gas storage.

MST MST is a community interest company that delivers accredited workshops, promoting education and creativity in media and the arts. It works with educational facilities and smaller marginalised/disenfranchised groups, offering unique opportunities not previously available to them.

MOG MOG is a venture that focuses on building a healthy living soil, incorporating herbs and flowers to attract beneficial insects, planting seeds that have been open-pollinated to preserve biodiversity, and using methods such as crop rotation and cover crops to maximize the return of nutrients to the soil.

ODS ODS designs, manufactures, and distributes solar energy products that improve access to power and connectivity in Africa. As affordable energy and communication improves health care, education, household productivity, and commerce, ODS energizes households and small businesses that require power for lights, smartphones, radios and other electronic devices.

PEM PEM is a socially and environmentally beneficial forestry company. It works with Panamanian farmers living on deforested land to re-forest and generate sustainable income. It seeks to practice tropical forestry in a way that empowers local communities in Panama to profit sustainably from their natural resources.

PRE PRE is a mission-driven venture that offers a low-cost, portable, wireless electronic screening and diagnostic test of cervical cancer, which is accessible in both high and low income countries. This venture intends to transform the diagnosis and treatment process so that women are able to make informed decisions based on non-subjective information that they can monitor over time. PRE's premise is that sophisticated technology for examining cervical tissue can produce the highest quality results in worldwide settings, independently of existing infrastructure.

PRI PRI is a venture that helps building resilient small businesses that are the foundation of communities. They seek to enhance the safety and security of small businesses and their communities by mitigating risks, thereby reducing demands on government resources for post-disaster relief. By doing so, they bring entrepreneurship within reach of disadvantaged communities by making commercial insurance more affordable.

PWO PWO produces packaging products and consumer items made from moulded fibre. Their process transforms post-consumer wastepaper into valuable products that can be used and reused before being composted or recycled again. PWO build on the 100-year legacy of moulded pulp production by improving existing manufacturing technology and introducing new printing capabilities that produce the highest quality packaging available.

PLY PLY is a sustainable venture that uses the latest advances in semiconductor and nanotechnology to solve the world's emerging water purification problems, with 100% water utilization, low energy, and environmentally sound products.

RMA RMA connects waste streams and under-valued resources with potential users of the resources to help create new revenues and savings for participating companies while at the same time positively impact on the environment. Their goal is to create an industrial ecosystem in which the use of energy and materials is optimized, waste is minimized, and there is an economically viable role for every product of a manufacturing process.

RNA RNA produces and markets beverages made from the naturally caffeinated leaves of the Amazonian guayusa tree. RNA offers an attractive and differentiated line of organic and fairly traded tea and ready-to-drink beverage products to eco-friendly and health-conscious consumers.

STW STW is a sustainable venture that offers a network of comfortable, connected, professional office and workspace centres in community commercial districts. They seek to help companies reduce facility costs, reduce attrition and absenteeism and meet environmental goals; and to benefit communities, through avoided commutes (gridlocked roads and emissions) while increasing activity to local coffee shops, restaurants and stores.

STR STR develops and produces sustainable, environmentally friendly, and cost-effective plant- and algae- based industrial lubricants and greases. The STR lubricant is bio-based and can be used in a variety of industry applications.

SSG SSG empowers people from around the world to become social and environmental innovators. By connecting sustainable entrepreneurs with the financial and intellectual capital SSG seeks to transform ideas for improving the world into reality.

TGT TGT is a social venture that offers innovative tools to raise awareness and create passion for a Zero Waste society. It offers innovative projects, workshops, seminars and conferences that engage and empower people in businesses, governmental institutions and NGOs to passionately create change.

| | |
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| TOU | TOU is an environmentally driven venture that collaborates with emerging designers in creating hand-made products, rather than mass-produced. Their goal is not only to make products that are beautiful, but good for the environment and those who make them. |
| TPS | TPS is a sustainable community supermarket that seeks to achieve its growth and profitability targets whilst operating within values based on community development and cohesion. Their intent is to offer an alternative food-buying network, by connecting an urban community with the local farming community. |
| VEH | VEH is a sustainable venture that develops vertical hydroponic greenhouses. They are focused on producing fresh, local, fruits and vegetables that are planted, cared for, and sold to the public by employees with developmental and physical disabilities. With this, they seek to become an agricultural, social, and architectural model for communities around the world. |
| WEW | WEW is a mission-driven venture that offers water transportation tools in Africa. Their wheel water transportation tool, which can collect 20 gallons of water- five times the amount possible using traditional methods, is designed to alleviate the problems associated with lack of easy access to water. WEW's water transportation system operates also as an income-generating tool to lift their families out of poverty. |
| WHT | WHT is a sustainable venture that offers arquitectural services. By substituting round timber for steel and concrete in non-residential construction, WHT seeks to grow prosperous relationships between forests and communities. |
| WIS | WIS is sustainable venture that develops wind farms. Using proprietary atmospheric modelling software WIS identifies suitable regions and conduct detailed site assessment. |

## 7.4 Appendix D. Measurement details

**Table 7.5 Outcome measures**

| Construct | Scale - scores | Indicators |
|---|---|---|
| **Sustainability-oriented venture ideas**<br>**(SVI)**<br>Sense and response to anomalies | Reflective<br>$\alpha$=0.9<br>8-items likert<br>6 points scale<br>1=Completely disagree<br>2=Mostly disagree<br>3=Disagree<br>4=Agree<br>5=Mostly agree<br>6= Completely agree | **Q. Please think about your awareness or attention to what was occurring by the time you were exploring possible ideas for this business. In this context, to what extent do you agree or disagree with the following statements?**<br>I was fully aware of the sustainability problem(s) I was trying to solve<br>I was conscious of the existence of a number of business opportunities that might have been useful for solving the sustainability problem<br>I was fully aware of the business opportunity I was pursuing<br>I spent enough time gathering information about the business opportunity<br>I was conscious of the relation between the business idea and my willingness to solve some sustainability problem<br>All of my ideas and concerns were consciously considered in the business evaluation<br>I considered the potential economic, social and environmental impacts<br>I knew that pursuing this business idea implied more than just making money |
| **Sustainability-oriented entrepreneurial actions**<br>**(SAC)**<br>Momentary aspirations | Reflective<br>$\alpha$=0.84<br>8-items likert<br>5 points scale<br>1=Very unimportant<br>5= Very important | **Q. The following objectives can be present in any organization. Please indicate how important these objectives were in starting this new business**<br>Improving health and well-being<br>Creating and distributing economic value amongst all stakeholders<br>Improving the quality of life in a particular community<br>Creating employment opportunities<br>Protecting or restoring the natural environment<br>Creating ethical and fair products<br>Establishing fair trading with suppliers<br>Promoting democratic business models |
| **Sustainability-driven exchange relationships**<br>**(SER)**<br>Entrepreneur's position statement | Reflective<br>$\alpha$=0.92<br>7-items likert<br>5 points scale<br>1=Not at all<br>5= To a great extent | **Q [intro sustainability] Based on this definition and the information provided, please indicate the extent to which these statements apply to the firm in question**<br>The firm clearly states the sustainability problem or challenge is trying to address<br>There is a clear intention to tackle sustainability issues (mission statement, value proposition)<br>The firm frames the business opportunity in the context of sustainability |

| | | |
|---|---|---|
| | | The firms seeks to build relationship with the broader audience based on a sustainability logic |
| | | The firm presents its products/business model in connection to sustainability |
| | | The firm communicates its commitment to sustainable business practices |
| | | The firms' language and images reflects sustainability |

**Table 7.6 Independent measures**

| Construct | Scale - scores | Indicators |
|---|---|---|
| **Dispositional mindfulness (MIN)** | Reflective<br>α=0.88<br>7-items likert<br>6 points scale<br>1=Almost never<br>6= Almost always | **Q. Below is a collection of statements about your everyday experience. Please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be** |
| | | I could be experiencing some emotion and not be conscious of it until some time later |
| | | I find it difficult to stay focused on what's happening in the present |
| | | It seems I am running on automatic without much awareness of what I'm doing |
| | | I rush through activities without being really attentive to them |
| | | I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there |
| | | I do jobs or tasks automatically, without being aware of what I'm doing |
| | | I find myself preoccupied with the future or the past |
| **Sustainability understanding (UND)** | Reflective<br>α=0.71<br>5-items likert<br>5 points scale<br>1=very poor<br>5=very well | **Q. The following statements can be used to describe some people. How well would they describe you?** |
| | | I can understand the economic problems we are facing as a society |
| | | I can understand the social problems we are facing as a society |
| | | I can understand the environmental problems we are facing as a society |
| | | I can understand the problems new generations will be facing in the future |
| | | It is easy for me to understand current world's issues and how these issues relate to each other |
| **Prospective Sustainability Entrepreneur (PRO)** | Reflective<br>α=0.8<br>5-items likert<br>5 points scale<br>1=very poor<br>5=very well | **Q. The following statements can be used to describe some people. How well would they describe you?** |
| | | I am able to find solutions to current challenges and problems |
| | | I am regularly coming up with new ideas on how to create a better world |
| | | I like taking ideas and make something important of them |
| | | I am constantly seeking business ideas with the potential of making |

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| | | contributions beyond making money |
| | | I do what it takes to create value for others |
| **Sustainability opportunity search** **(SEA)** | Formative<br>4-items likert<br>5 points scale<br>1=Not at all<br>5=To a great extent | **Q. In exploring the idea for the business, please indicate the extent to which the following statements apply to you. I was exploring business opportunities or ideas that have potential…** |
| | | Economic value |
| | | Social value |
| | | Ecological value |
| | | Value for future generations |
| **Prior knowledge** **(KNO)** Formal training or work experience | Formative<br>6 items<br>3 points scale<br>0=no training, no experience<br>1=training or experience<br>2=training and experience | **Q. Do you have any formal training / previous work experience in the following areas?** |
| | | Corporate sustainability |
| | | Corporate social responsibility |
| | | Environmental management |
| | | Socio-economic development |
| | | Renewable energy |
| | | Earth and environment |
| **Sustainability orientation** **(ORI)** | Reflective<br>$\alpha$=0.71<br>6-items likert<br>5 points scale<br>1=Not at all<br>5=To a great extent | **Q. The following statements describe considerations that any entrepreneur can have during the process of development of business ideas, please indicate the extent to which these apply to you?** |
| | | I strongly believe in the power of my business in contributing to solve many of the problems we have as a society |
| | | My firm has an obligation to society that extends beyond making money |
| | | My firm has to give back to society since it derive its profits from society |
| | | Regardless of the nature of my business, it has to trade fairly with customers and suppliers |
| | | Regardless of the nature of my business, it has to make a responsible use of natural resources |
| | | When I was choosing between the business ideas I had in mind, I always chose the one that contributed to building a better society |
| **Moral Intensity** **(MOR)** | Formative<br>6-items likert<br>5 points scale<br>1= Strongly disagree<br>5= Strongly agree | **Q. Regarding the challenge(s) or problem(s) you selected in the previous question (see control question 3), please indicate the extent to which you agree or disagree with the following statements** |
| | | If I don't act to solve this challenge or problem, it might have very severe consequences |
| | | Regarding this problem, everyone agrees that something is wrong |
| | | The negative outcome of this problem is certain to occur |
| | | The negative outcome of this problem will not occur in the |

| | | |
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| | | immediate future (R) |
| | | The problem has a concentrated effect on a small number of individuals (R) |
| | | The problem affects people I know |
| **Entrepreneurial self-efficacy (EFF)** | Reflective<br>$\alpha$=0.8<br>7-items likert<br>5 points scale<br>1=very poor<br>5=very well | **Q. The following statements can be used to describe some people. How well would they describe you?** |
| | | If I work hard, I can successfully start a business |
| | | Overall, my skills and abilities will help me start a business |
| | | My past experience will be very valuable in starting a business |
| | | There is no limit as to how long I would give maximum effort to establish my business |
| | | When I make plans I am almost certain to make them work |
| | | My solid business ethic will help me to develop a meaningful business |
| | | I can persuade others about the importance of my ideas |
| **Sustainability contribution belief (CON)** | Reflective<br>$\alpha$=0.89<br>9-items likert<br>5 points scale<br>1= Strongly disagree<br>5= Strongly agree | **Q. The sustainability orientation of this business** |
| | | Gives [the venture] a competitive advantage |
| | | Helps [the venture] be valued by its customers |
| | | Affects the purchase decisions of the [the venture]'s customers |
| | | Helps [the venture] sell products and/or services |
| | | Helps [the venture] recruit employees |
| | | Helps [the venture] retain employees |
| | | Helps [the venture] to be valued by potential investors |
| | | Helps [the venture] establish meaningful relationships with the community |
| | | Helps [the venture] establish meaningful relationships with suppliers |
| **Entrepreneurial experience (EXP)** | 3=Yes, only one<br>5= Yes, more than one<br>0=No | **Q1. Have you, alone or with others, started a business different than [Q2] in the last 10 years?** |
| | | Yes, only one |
| | | Yes, more than one |
| | | No |
| | Yes, similar purpose or objectives +1<br>Yes, the same industry +1<br>Yes, similar purpose and industry +2<br>No, it was/is different than [the | **Q2. (If yes) Was/is this business of similar nature as [the venture]? Here, similar nature refers to having similar objectives or purpose or being part of the same industry. If you have started more than one business before [the venture], please consider the most important one for you.** |
| | | Yes, similar purpose or objectives |
| | | Yes, the same industry |
| | | Yes, similar purpose and industry |
| | | No, it was/is different than [the venture] |

| | | |
|---|---|---|
| | venture] +0 | |
| **Start-up motivation** **(MOT)** Sustainability-related drivers only | Formative<br>Multiple selection<br>5 items | **Q. Why did you want to start this new business?**<br>To solve environmental problems<br>To solve social problems<br>To help others<br>To create and distribute economic wealth<br>To help in the socio-economic development of my community/region |
| **Sustainability entrepreneurs hip support - social norms and culture** **(SNC)** | Reflective<br>$\alpha$=0.88<br>4-items likert<br>5 points scale<br>1= Strongly disagree<br>5= Strongly agree | **Q1. With regards to the community where [the venture] was created (including friends and family). Please indicate the extent to which you agree or disagree with the following statements.**<br>**The social norms and culture of your community...**<br>Encourage sustainable behaviors<br>Emphasize the responsibility that the individual has in contributing to address community issues<br>Promote environmental responsibility<br>Encourage young people to be independent and start their own businesses |
| **Sustainability entrepreneurs hip support - state and local governments** **(SLG)** | Reflective<br>$\alpha$=0.94<br>4-items likert<br>5 points scale<br>1= Strongly disagree<br>5= Strongly agree | **Q2. With regards to the state and local government. Please indicate the extent to which you agree or disagree with the following statements.**<br>**State and local governments...**<br>Provide good support for those starting new businesses<br>Promote sustainable business practices<br>Provide good support for those developing a socially responsible business<br>Provide good support for those developing an environmentally responsible business |
| **Start-up motivation** **(MOT-P)** Personal drivers only | Formative<br>Multiple selection<br>5 items | **Q. Why did you want to start this new business?**<br>To make an income or to make money<br>To do more fulfilling work<br>To do something important<br>To have a better life<br>It was a personal challenge |
| **Start-up motivation** **(MOT- E)** External drivers only | Formative<br>Multiple selection | **Q. Why did you want to start this new business?**<br>To leave business/money to children<br>To take advantage of a business opportunity<br>There was a market opportunity |

**Table 7.7 Screening and confirmatory questions**

| Construct | Scale - scores | Indicators |
|---|---|---|
| **1. Screening: Self identification** | Binary | **Q. Sustainability entrepreneurship is focused on pursuing business opportunities to bring into existence future products, processes, and services, while contributing to improve the development of society, the economy and the environment. Do you consider yourself a sustainability entrepreneur?**<br>Yes<br>No |
| **2. Screening: Involvement** | Binary | **Q1. Were you actively involved in the creation of [the venture]?**<br>Yes<br>No<br>**Q2. Are you actively involved in running [the venture]? By actively involved in running the organization, we mean providing regular assistance or advice with day-to-day operations of the organization rather than providing only money or occasional operating assistance.**<br>Yes<br>No |
| **3. Screening: Balance of objectives** | 3-items likert<br>5 points scale<br>1=Very unimportant<br>5= Very important | **Q1. How important are these goals in your organization?**<br>Financial goals<br>Social goals<br>Environmental goals<br>**Q2. Please consider ONLY the objectives that you selected as important or very important in the previous question. In general, would you say that [the venture] is currently allocating the appropriate amount of resources (such as human resources, monetary resources and equipment) to accomplishing these objectives?**<br>Yes, it is the appropriate amount of resources<br>Yes, but we could do better<br>No, but we are thinking of allocating the relevant resources<br>No<br>Don't know |
| **4. Moral Intensity: Identification of the sustainability challenge / problem**<br>Defines the parameters for the measurement of | Multiple selection | **Q. In exploring possible business ideas, which of the following better describe the challenge or problem that you were trying to solve? (click all that apply)**<br>Unfair distribution of economic wealth<br>Unsustainable consumption<br>Unfair trading<br>Lack of / unequal distribution of opportunities in the community |

| | | |
|---|---|---|
| Moral Intensity | | Social exclusion |
| | | Poor quality of life (e.g. health, housing, education, employment, safety) |
| | | Disadvantaged communities with poor access to resources (e.g. water, energy) |
| | | Carbon emissions |
| | | Inefficient use of energy |
| | | Environmental degradation |
| | | Waste-related problems |
| | | Unsustainable farming |
| | | Pollution (e.g. air, water, noise) |
| | | Transportation problems (e.g. congestion) |
| | | Future generations won't have the same opportunities we've had |
| | | Decreasing availability of resources for future generations |
| | | |
| **5. Venture variables: Mission Statement** | Open-ended question | **Q. A mission statement presents the purpose of a company or organization. It should guide the actions of the organization, spell out its overall goal, provide a path, and guide decision-making. Could you please copy and paste in the text box below your current mission statement?** |
| **6. Venture variables: Sources of revenue** | Likert-type scale | **Q1. Based on your current sources of revenue, how important are the following sources for your organization today?** |
| | 5 points | Grants or core funding from public sector bodies |
| | 5=very important, 1=very unimportant | Other grants or core funding (e.g. foundations, trusts) |
| | | Earned income from trading with the public sector |
| | | Earned income from trading with the private sector |
| | | Earned income from trading with social enterprises |
| | | Earned income from trading with the general public |
| | | Donations |
| | | Other (specify) |
| **7. Venture variables: Competitive advantage** | Q1. Dichotomous | **Q1. Organizations often have to compete with other organizations. A competitive advantage is something unique or distinctive a organization provides that gives it an advantage compared to competitors. Does [the venture] have competitive advantages over its competitors?** |
| | Yes | |
| | No | |
| | | Yes |
| | | No |
| | | Don’t know |
| | Q2. Multiple Selection | **Q2. If you answered “yes” in the previous questions, which of the following better describe your competitive advantage? (click all that apply)** |
| | | Novelty or uniqueness of products or services |
| | | Novelty or uniqueness of business model |

| | | |
|---|---|---|
| | | Relevance of your value proposition |
| | | The sustainability orientation of [the venture] |
| | | Low prices |
| | | Environmental mission of [the venture] |
| | | Social mission of [the venture] |
| | | Customer service |
| | | Emotional connection with the brand |
| **8. Venture variables: Industry and clients characteristics** | Q1-Q2<br>Single selection | **Q1. Which of the following now best describes this (new) business?**<br>Would you say it is… (PSEDII) |
| | | A retail store |
| | | A restaurant, tavern or bar |
| | | Customer or consumer service |
| | | Health, education or social service |
| | | Manufacturing |
| | | Construction |
| | | Agriculture |
| | | Mining |
| | | Wholesale distribution |
| | | Transportation |
| | | Utilities, communications |
| | | Finance |
| | | Insurance |
| | | Real estate |
| | | Some type of business consulting or service |
| | | Other (specify) |
| | Q3-Q4<br>Open-ended questions | **Q2. Which of the following now best describes the business of your main client? Would you say it is…?**<br>Same list as Q1 |
| | Numerical | **Q3. Approximately, how long has your organization been trading?**<br>(_____ Years) |
| | | **Q4. Including you, how many employees and voluntaries work in [the venture]?**<br>(_____ Employees) (_____ Volunteers) |
| | Q5<br>Single selection | **Q5. What kind of organization is [the venture]?**<br>Private sector organization |
| | | Cooperative |
| | | Social/civic organization |
| | | Charity |
| | | Other not-for-profit organization |

| | | |
|---|---|---|
| | | Other (TB specify) |
| **9. Measurement of Sustainability Impacts** | Dichotomous<br>Yes<br>No | **Think about what your business is currently doing in terms of formalizing some sustainable business practices. These are simple that give your business the opportunity to demonstrate that it is following a strong path towards sustainability.**<br>**Q1. In general, have you...?**<br>Developed or taken steps to develop a sustainability strategy<br>Adopted or implemented sustainable business practices<br>**Q2. In terms of energy and emissions, have you...?**<br>Taken steps to reduce your energy consumption<br>Integrated or taken steps to integrate renewable energy into your business<br>Taken steps to reduce your carbon emissions<br>Opted to measure your carbon emissions or carbon footprint<br>Taken steps to set publicly available your carbon emission targets<br>**Q3. In terms of material efficiency, have you...?**<br>Introduced or taken steps to introduce sustainable methods of production<br>Taken steps to reduce the amount of solid waste generated from your facilities<br>Taken steps to set publicly available solid waste generation targets<br>Taken steps to set publicly available your water consumption targets<br>Taken steps to set publicly available your energy consumption targets<br>**Q4. In terms of the resources you use, have you...?**<br>Integrated or taken steps to integrate input factors from local and regional partners<br>Taken steps to use process materials coming from reusable or recyclable sources<br>Established sustainability purchasing guidelines for your direct suppliers that address issues such as environmental compliance, employment practices, and product/ingredient safety<br>Taken steps to know where the materials and components you use come from and how they were produced<br>Taken actions to obtain sustainability-related certifications for any of the products that you sell or any of your business processes<br>**Q5. In terms of the people and community, have you ...?**<br>Taken steps to set social and environmental responsibilities to your managerial team<br>Taken steps to develop corporate equality actions plans<br>Provided or taken steps to provide sustainability related education or training available to your employees<br>Promoted or have taken actions to promote sustainable consumption behaviours amongst your clients<br>Evaluated or taken steps to evaluate the quality of production and |

| | | |
|---|---|---|
| | | sustainability orientation of the organizations you have established relationships with |
| | | Taken steps to develop processes for managing social compliance |
| | | Invested or taken steps to invest in community development activities in the markets you source from and/or operate within |
| **10. Respondent's education and experience** | Q1-Q2<br>Open-ended questions<br>Numerical | **Q1. Please select the number of years of work experience you have in the following types of organizations** |
| | | Public sector or government organization |
| | | Private sector organization |
| | | Cooperative |
| | | Social/civic organization |
| | | Charity |
| | | Other not-for-profit organization |
| | | **Q2. Please select the number of years of work experience you have in the following areas** |
| | | Sales or marketing management |
| | | Accounting, financial control |
| | | Production, plant management |
| | | Personnel, human resource management |
| | | Corporate social responsibility |
| | | Corporate sustainability |
| | | Transportation, distribution, inventory management |
| | | Financial and capital management |
| | | Technological and innovation management |
| | | Public administration |
| | Q3-Q5<br>Single selection | **Q3. What was the last grade in school you completed? (PSED2)** |
| | | $8^{th}$ or less |
| | | High School incomplete |
| | | High School complete |
| | | Assoc. Degree |
| | | Bachelor's degree |
| | | Professional Degree |
| | | Master's degree |
| | | MBA |
| | | Doctoral degree |
| | | **Q4. Which of the following better represent your discipline or field of study?** |
| | | Agriculture, forestry |
| | | Architecture, design, urban planning |
| | | Arts, humanities and social sciences (e.g. performing arts, sociology, social work, psychology) |

| | | |
|---|---|---|
| | | Business, administration, economics |
| | | Education |
| | | Engineering |
| | | Health (e.g. medicine, rehabilitation services) |
| | | Law, legal studies |
| | | Science (e.g. computer science, mathematics, life sciences, physical sciences) |
| | | Veterinary sciences |
| | | **Q5. If you are a business graduate, which of the following better represent your area of study?** |
| | | Accounting and Finance |
| | | Business Management |
| | | Marketing/branding/communications |
| | | Business Economics |
| | | Human resources |
| | | Operation management |
| | | Innovation / Technology management |
| | | Information systems |
| **11. Demographics** | Q1 | **Q1. Sex** |
| | Single selection | **Q2. Age** |
| | Q2-Q3 | **Q3. Contact details** |

## 7.5 Appendix E. Summary of scores

**Table 7.8 Summary of scores**

| | Conditions tested | | | | | | | | | | | | Outcomes | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Case** | **MIN** | **UND** | **PRO** | **SEA** | **KNO** | **ORI** | **MOR** | **EFF** | **CON** | **EXP** | **MOT** | **SNC** | **SLG** | **SVI** | **SAC** | **SER** |
| AWW | 3.7 | 3.8 | 4.0 | 3.8 | 4.0 | 4.2 | 4.0 | 3.7 | 3.4 | 0.0 | 3.0 | 4.0 | 3.0 | 5.5 | 3.4 | 2.9 |
| ACO | 3.6 | 3.6 | 3.6 | 3.6 | 9.0 | 4.3 | 4.5 | 3.0 | 4.0 | 5.0 | 4.0 | 1.5 | 1.3 | 3.9 | 4.1 | 3.4 |
| BTR | 4.1 | 4.8 | 4.0 | 5.0 | 2.0 | 4.8 | 3.8 | 3.7 | 5.0 | 3.0 | 4.0 | 4.0 | 3.0 | 6.0 | 4.6 | 3.6 |
| BGF | 4.6 | 4.0 | 3.8 | 4.0 | 6.0 | 3.5 | 4.2 | 4.7 | 4.4 | 0.0 | 2.0 | 4.5 | 4.0 | 3.9 | 3.9 | 4.7 |
| BCY | 2.6 | 3.2 | 5.0 | 4.4 | 0.0 | 1.2 | 3.2 | 3.1 | 5.0 | 0.0 | 3.0 | 4.8 | 3.0 | 3.6 | 3.2 | 1.7 |
| BST | 5.4 | 4.0 | 5.0 | 3.2 | 0.0 | 5.0 | 3.3 | 4.9 | 3.6 | 0.0 | 3.0 | 5.0 | 5.0 | 4.4 | 4.4 | 3.6 |
| BVG | 3.4 | 3.0 | 3.2 | 4.8 | 0.0 | 3.2 | 4.2 | 4.6 | 4.8 | 3.0 | 1.0 | 4.3 | 4.0 | 5.8 | 4.4 | 3.6 |
| CLI | 3.4 | 4.8 | 5.0 | 4.8 | 2.0 | 4.7 | 4.5 | 5.0 | 4.1 | 4.0 | 3.0 | 4.0 | 2.5 | 5.1 | 4.0 | 4.4 |
| CLE | 4.1 | 4.2 | 5.0 | 4.6 | 8.0 | 5.0 | 4.2 | 3.9 | 4.7 | 6.0 | 3.0 | 2.0 | 2.8 | 3.1 | 4.2 | 4.7 |
| CHU | 4.9 | 5.0 | 5.0 | 5.0 | 4.0 | 4.8 | 3.3 | 4.3 | 3.9 | 3.0 | 5.0 | 4.5 | 2.0 | 5.0 | 4.0 | 3.1 |
| CUL | 2.7 | 4.2 | 3.6 | 3.4 | 4.0 | 4.0 | 4.5 | 3.1 | 4.4 | 4.0 | 1.0 | 3.0 | 2.0 | 5.5 | 3.4 | 3.7 |
| DLI | 3.4 | 3.0 | 5.0 | 3.6 | 1.0 | 4.5 | 3.8 | 4.1 | 3.9 | 5.0 | 3.0 | 4.0 | 2.5 | 5.5 | 3.8 | 4.4 |
| DFL | 4.6 | 4.2 | 5.0 | 4.6 | 7.0 | 5.0 | 4.2 | 5.0 | 5.0 | 5.0 | 4.0 | 2.8 | 1.0 | 6.0 | 4.8 | 4.0 |
| EPU | 4.3 | 4.2 | 4.6 | 4.8 | 0.0 | 5.0 | 4.2 | 4.1 | 4.2 | 5.0 | 3.0 | 3.8 | 2.0 | 5.9 | 4.0 | 2.4 |
| ECV | 2.4 | 4.8 | 3.0 | 4.2 | 0.0 | 4.3 | 3.7 | 4.9 | 4.3 | 0.0 | 2.0 | 5.0 | 1.0 | 5.9 | 4.3 | 3.1 |
| ECW | 5.9 | 3.6 | 4.0 | 5.0 | 4.0 | 4.7 | 4.5 | 3.0 | 4.0 | 0.0 | 5.0 | 2.5 | 3.0 | 5.5 | 4.2 | 4.0 |
| ECZ | 3.4 | 3.4 | 3.0 | 4.0 | 1.0 | 4.7 | 4.5 | 3.4 | 3.9 | 0.0 | 3.0 | 3.5 | 2.0 | 4.1 | 4.0 | 4.1 |
| GSU | 4.1 | 3.8 | 4.8 | 3.6 | 7.0 | 4.8 | 3.2 | 4.0 | 3.9 | 4.0 | 3.0 | 1.3 | 2.5 | 3.8 | 2.7 | 3.4 |
| GTR | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.9 | 3.9 | 6.0 | 4.0 | 1.5 | 1.0 | 3.3 | 3.1 | 4.1 |
| HAR | 3.0 | 3.8 | 4.2 | 4.8 | 4.0 | 3.8 | 3.5 | 4.3 | 4.6 | 7.0 | 1.0 | 4.3 | 3.5 | 3.5 | 4.3 | 2.0 |
| HFR | 4.1 | 5.0 | 4.6 | 5.0 | 10.0 | 5.0 | 3.8 | 4.7 | 4.6 | 5.0 | 5.0 | 3.0 | 1.3 | 5.5 | 5.0 | 4.0 |
| IPA | 4.0 | 4.0 | 4.6 | 4.6 | 9.0 | 4.3 | 4.2 | 3.9 | 4.1 | 5.0 | 5.0 | 2.0 | 3.5 | 4.9 | 4.6 | 3.9 |
| IWB | 4.0 | 3.6 | 5.0 | 4.2 | 7.0 | 5.0 | 4.0 | 3.7 | 3.8 | 3.0 | 3.0 | 3.0 | 2.0 | 5.9 | 3.7 | 3.3 |
| KOR | 3.6 | 4.4 | 4.6 | 5.0 | 0.0 | 5.0 | 4.5 | 3.7 | 4.9 | 5.0 | 3.0 | 2.5 | 2.0 | 4.1 | 4.9 | 4.4 |
| MCP | 4.4 | 4.6 | 4.6 | 4.6 | 7.0 | 4.5 | 3.5 | 3.9 | 3.4 | 3.0 | 2.0 | 4.5 | 2.0 | 4.8 | 3.9 | 2.7 |
| MST | 4.6 | 3.4 | 2.8 | 2.6 | 0.0 | 3.8 | 3.3 | 3.7 | 3.2 | 5.0 | 3.0 | 2.0 | 2.5 | 4.3 | 4.0 | 1.1 |
| MOG | 4.0 | 3.6 | 2.8 | 4.8 | 1.0 | 3.8 | 3.3 | 3.0 | 3.4 | 0.0 | 1.0 | 4.0 | 2.0 | 5.3 | 3.0 | 3.4 |
| ODS | 4.3 | 3.6 | 4.0 | 3.0 | 1.0 | 3.6 | 4.2 | 3.9 | 2.3 | 0.0 | 2.0 | 2.5 | 2.5 | 3.0 | 3.5 | 4.4 |
| PEM | 4.3 | 5.0 | 3.8 | 4.6 | 10.0 | 5.0 | 4.7 | 4.7 | 4.8 | 0.0 | 5.0 | 5.0 | 3.3 | 5.8 | 5.0 | 4.7 |
| PRE | 4.1 | 4.2 | 3.8 | 3.8 | 0.0 | 4.3 | 4.2 | 3.1 | 3.4 | 0.0 | 2.0 | 4.5 | 3.5 | 3.8 | 3.7 | 3.4 |
| PRI | 3.4 | 4.2 | 4.6 | 3.6 | 1.0 | 3.7 | 4.8 | 5.0 | 1.2 | 3.0 | 4.0 | 5.0 | 1.0 | 4.0 | 5.0 | 1.3 |
| PWO | 4.4 | 5.0 | 4.8 | 4.4 | 5.0 | 4.2 | 4.2 | 4.4 | 5.0 | 3.0 | 4.0 | 2.8 | 4.0 | 5.9 | 4.9 | 4.3 |
| PLY | 4.7 | 3.6 | 4.6 | 3.8 | 2.0 | 4.2 | 3.7 | 4.3 | 3.9 | 5.0 | 2.0 | 3.5 | 2.0 | 4.1 | 3.1 | 3.6 |
| RMA | 5.0 | 3.8 | 4.7 | 4.4 | 3.0 | 4.2 | 3.5 | 3.7 | 2.0 | 0.0 | 1.0 | 1.3 | 1.5 | 5.4 | 5.0 | 4.6 |
| RNA | 3.9 | 4.8 | 4.6 | 5.0 | 6.0 | 5.0 | 3.5 | 4.4 | 3.2 | 0.0 | 3.0 | 5.0 | 2.0 | 5.0 | 5.0 | 4.6 |
| STW | 4.6 | 3.8 | 4.4 | 4.2 | 5.0 | 5.0 | 4.2 | 3.7 | 3.0 | 5.0 | 4.0 | 4.0 | 2.8 | 4.9 | 3.4 | 2.3 |
| STR | 3.9 | 3.8 | 4.6 | 5.0 | 10.0 | 4.5 | 3.7 | 4.6 | 4.3 | 5.0 | 4.0 | 4.3 | 4.5 | 3.9 | 4.3 | 3.9 |
| SSG | 2.6 | 3.6 | 4.2 | 3.4 | 1.0 | 4.5 | 3.3 | 3.6 | 3.7 | 0.0 | 2.0 | 4.5 | 2.0 | 3.9 | 2.0 | 3.3 |
| TGT | 4.4 | 4.0 | 3.4 | 4.6 | 2.0 | 4.3 | 4.7 | 3.7 | 4.0 | 0.0 | 3.0 | 2.3 | 1.5 | 4.6 | 3.9 | 4.1 |
| TOU | 4.9 | 3.0 | 4.6 | 4.6 | 0.0 | 4.7 | 3.8 | 3.6 | 4.0 | 0.0 | 1.0 | 5.0 | 3.0 | 4.0 | 4.0 | 2.9 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TPS | 5.3 | 4.6 | 4.0 | 4.6 | 0.0 | 4.8 | 4.7 | 4.3 | 4.9 | 5.0 | 4.0 | 3.0 | 1.0 | 5.4 | 4.4 | 4.9 |
| VEH | 5.3 | 5.0 | 5.0 | 5.0 | 6.0 | 5.0 | 4.0 | 4.6 | 5.0 | 0.0 | 3.0 | 4.5 | 4.3 | 5.6 | 4.5 | 4.3 |
| WEW | 3.9 | 5.0 | 5.0 | 4.4 | 10.0 | 5.0 | 3.7 | 5.0 | 5.0 | 0.0 | 3.0 | 5.0 | 1.0 | 3.9 | 5.0 | 4.9 |
| WHT | 5.3 | 4.4 | 5.0 | 5.0 | 8.0 | 5.0 | 3.7 | 4.1 | 4.1 | 0.0 | 5.0 | 4.0 | 3.5 | 5.9 | 4.9 | 3.9 |
| WIS | 3.6 | 3.4 | 3.4 | 4.0 | 2.0 | 3.5 | 3.7 | 3.9 | 1.8 | 0.0 | 1.0 | 4.0 | 3.0 | 3.9 | 3.0 | 2.0 |

## 7.6 Appendix F. Summary of fuzzy-set membership scores (conditions)

**Table 7.9 Summary of fuzzy-set membership scores**

| | Conditions tested | | | | | | | | | | | | | Outcomes | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Case** | **MIN** | **UND** | **PRO** | **SEA** | **KNO** | **ORI** | **MOR** | **EFF** | **CON** | **EXP** | **MOT** | **SNC** | **SLG** | **SVI** | **SAC** | **SER** |
| AWW | 0.55 | 0.71 | 0.82 | 0.71 | 0.27 | 0.89 | 0.82 | 0.65 | 0.46 | 0.01 | 0.5 | 0.95 | 0.5 | 0.95 | 0.46 | 0.29 |
| ACO | 0.5 | 0.57 | 0.57 | 0.57 | 0.92 | 0.92 | 0.95 | 0.32 | 0.82 | 0.95 | 0.95 | 0.01 | 0.01 | 0.46 | 0.86 | 0.46 |
| BTR | 0.74 | 0.98 | 0.82 | 0.99 | 0.05 | 0.98 | 0.71 | 0.65 | 0.99 | 0.5 | 0.95 | 0.95 | 0.5 | 0.98 | 0.96 | 0.57 |
| BGF | 0.89 | 0.82 | 0.71 | 0.82 | 0.65 | 0.5 | 0.89 | 0.97 | 0.94 | 0.01 | 0.05 | 0.99 | 0.95 | 0.46 | 0.77 | 0.97 |
| BCY | 0.13 | 0.39 | 0.99 | 0.94 | 0.01 | 0.03 | 0.39 | 0.35 | 0.99 | 0.01 | 0.5 | 1 | 0.5 | 0.35 | 0.39 | 0.06 |
| BST | 0.98 | 0.82 | 0.99 | 0.39 | 0.01 | 0.99 | 0.43 | 0.99 | 0.57 | 0.01 | 0.5 | 1 | 1 | 0.69 | 0.94 | 0.57 |
| BVG | 0.41 | 0.32 | 0.39 | 0.98 | 0.01 | 0.39 | 0.89 | 0.96 | 0.98 | 0.5 | 0 | 0.98 | 0.95 | 0.97 | 0.94 | 0.57 |
| CLI | 0.41 | 0.98 | 0.99 | 0.98 | 0.05 | 0.97 | 0.95 | 0.99 | 0.86 | 0.82 | 0.5 | 0.95 | 0.18 | 0.9 | 0.82 | 0.94 |
| CLE | 0.74 | 0.89 | 0.99 | 0.96 | 0.86 | 0.99 | 0.89 | 0.77 | 0.97 | 0.99 | 0.5 | 0.05 | 0.35 | 0.21 | 0.89 | 0.97 |
| CHU | 0.94 | 0.99 | 0.99 | 0.99 | 0.27 | 0.98 | 0.43 | 0.92 | 0.77 | 0.5 | 1 | 0.99 | 0.05 | 0.88 | 0.82 | 0.35 |
| CUL | 0.16 | 0.89 | 0.57 | 0.46 | 0.27 | 0.82 | 0.95 | 0.35 | 0.94 | 0.82 | 0 | 0.5 | 0.05 | 0.95 | 0.46 | 0.65 |
| DLI | 0.41 | 0.32 | 0.99 | 0.57 | 0.02 | 0.95 | 0.71 | 0.86 | 0.77 | 0.95 | 0.5 | 0.95 | 0.18 | 0.95 | 0.71 | 0.94 |
| DFL | 0.89 | 0.89 | 0.99 | 0.96 | 0.77 | 0.99 | 0.89 | 0.99 | 0.99 | 0.95 | 0.95 | 0.35 | 0 | 0.98 | 0.98 | 0.82 |
| EPU | 0.82 | 0.89 | 0.96 | 0.98 | 0.01 | 0.99 | 0.89 | 0.86 | 0.89 | 0.95 | 0.5 | 0.92 | 0.05 | 0.98 | 0.82 | 0.16 |
| ECV | 0.1 | 0.98 | 0.32 | 0.89 | 0.01 | 0.92 | 0.65 | 0.99 | 0.92 | 0.01 | 0.05 | 1 | 0 | 0.98 | 0.92 | 0.35 |
| ECW | 0.99 | 0.57 | 0.82 | 0.99 | 0.27 | 0.97 | 0.95 | 0.32 | 0.82 | 0.01 | 1 | 0.18 | 0.5 | 0.95 | 0.89 | 0.82 |
| ECZ | 0.41 | 0.46 | 0.32 | 0.82 | 0.02 | 0.97 | 0.95 | 0.46 | 0.77 | 0.01 | 0.5 | 0.82 | 0.05 | 0.55 | 0.82 | 0.86 |
| GSU | 0.74 | 0.71 | 0.98 | 0.57 | 0.77 | 0.98 | 0.39 | 0.82 | 0.77 | 0.82 | 0.5 | 0.01 | 0.18 | 0.43 | 0.23 | 0.46 |
| GTR | 0.95 | 0.99 | 0.99 | 0.99 | 0.5 | 0.99 | 0.82 | 0.99 | 0.77 | 0.99 | 0.95 | 0.01 | 0 | 0.26 | 0.35 | 0.86 |
| HAR | 0.25 | 0.71 | 0.89 | 0.98 | 0.27 | 0.71 | 0.5 | 0.92 | 0.96 | 1 | 0 | 0.98 | 0.82 | 0.32 | 0.92 | 0.1 |
| HFR | 0.74 | 0.99 | 0.96 | 0.99 | 0.95 | 0.99 | 0.71 | 0.97 | 0.96 | 0.95 | 1 | 0.5 | 0.01 | 0.95 | 0.99 | 0.82 |
| IPA | 0.7 | 0.82 | 0.96 | 0.96 | 0.92 | 0.92 | 0.89 | 0.77 | 0.86 | 0.95 | 1 | 0.05 | 0.82 | 0.86 | 0.96 | 0.77 |
| IWB | 0.7 | 0.57 | 0.99 | 0.89 | 0.77 | 0.99 | 0.82 | 0.65 | 0.71 | 0.5 | 0.5 | 0.5 | 0.05 | 0.98 | 0.65 | 0.43 |
| KOR | 0.5 | 0.94 | 0.96 | 0.99 | 0.01 | 0.99 | 0.95 | 0.65 | 0.99 | 0.95 | 0.5 | 0.18 | 0.05 | 0.55 | 0.99 | 0.94 |
| MCP | 0.85 | 0.96 | 0.96 | 0.96 | 0.77 | 0.95 | 0.5 | 0.77 | 0.46 | 0.5 | 0.05 | 0.99 | 0.05 | 0.83 | 0.77 | 0.23 |
| MST | 0.89 | 0.46 | 0.26 | 0.21 | 0.01 | 0.71 | 0.43 | 0.65 | 0.39 | 0.95 | 0.5 | 0.05 | 0.18 | 0.65 | 0.82 | 0.03 |
| MOG | 0.7 | 0.57 | 0.26 | 0.98 | 0.02 | 0.71 | 0.43 | 0.32 | 0.46 | 0.01 | 0 | 0.95 | 0.05 | 0.93 | 0.32 | 0.46 |
| ODS | 0.82 | 0.57 | 0.82 | 0.32 | 0.02 | 0.57 | 0.89 | 0.77 | 0.14 | 0.01 | 0.05 | 0.18 | 0.18 | 0.18 | 0.5 | 0.94 |
| PEM | 0.82 | 0.99 | 0.71 | 0.96 | 0.95 | 0.99 | 0.97 | 0.97 | 0.98 | 0.01 | 1 | 1 | 0.71 | 0.97 | 0.99 | 0.97 |
| PRE | 0.74 | 0.89 | 0.71 | 0.71 | 0.01 | 0.92 | 0.89 | 0.35 | 0.46 | 0.01 | 0.05 | 0.99 | 0.82 | 0.43 | 0.65 | 0.46 |
| PRI | 0.41 | 0.89 | 0.96 | 0.57 | 0.02 | 0.65 | 0.98 | 0.99 | 0.03 | 0.5 | 0.95 | 1 | 0 | 0.5 | 0.99 | 0.04 |
| PWO | 0.85 | 0.99 | 0.98 | 0.94 | 0.5 | 0.89 | 0.89 | 0.94 | 0.99 | 0.5 | 0.95 | 0.35 | 0.95 | 0.98 | 0.99 | 0.92 |
| PLY | 0.91 | 0.57 | 0.96 | 0.71 | 0.05 | 0.89 | 0.65 | 0.92 | 0.77 | 0.95 | 0.05 | 0.82 | 0.05 | 0.55 | 0.35 | 0.57 |
| RMA | 0.95 | 0.71 | 0.97 | 0.94 | 0.12 | 0.89 | 0.5 | 0.65 | 0.1 | 0.01 | 0 | 0.01 | 0.01 | 0.94 | 0.99 | 0.96 |
| RNA | 0.66 | 0.98 | 0.96 | 0.99 | 0.65 | 0.99 | 0.5 | 0.94 | 0.39 | 0.01 | 0.5 | 1 | 0.05 | 0.88 | 0.99 | 0.96 |
| STW | 0.89 | 0.71 | 0.94 | 0.89 | 0.5 | 0.99 | 0.89 | 0.65 | 0.32 | 0.95 | 0.95 | 0.95 | 0.35 | 0.86 | 0.46 | 0.14 |
| STR | 0.66 | 0.71 | 0.96 | 0.99 | 0.95 | 0.95 | 0.65 | 0.96 | 0.92 | 0.95 | 0.95 | 0.98 | 0.99 | 0.46 | 0.92 | 0.77 |
| SSG | 0.13 | 0.57 | 0.89 | 0.46 | 0.02 | 0.95 | 0.43 | 0.57 | 0.65 | 0.01 | 0.05 | 0.99 | 0.05 | 0.46 | 0.1 | 0.43 |
| TGT | 0.85 | 0.82 | 0.46 | 0.96 | 0.05 | 0.92 | 0.97 | 0.65 | 0.82 | 0.01 | 0.5 | 0.11 | 0.01 | 0.77 | 0.77 | 0.86 |
| TOU | 0.94 | 0.32 | 0.96 | 0.96 | 0.01 | 0.97 | 0.71 | 0.57 | 0.82 | 0.01 | 0 | 1 | 0.5 | 0.5 | 0.82 | 0.29 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TPS | 0.97 | 0.96 | 0.82 | 0.96 | 0.01 | 0.98 | 0.97 | 0.92 | 0.99 | 0.95 | 0.95 | 0.5 | 0 | 0.94 | 0.94 | 0.99 |
| VEH | 0.97 | 0.99 | 0.99 | 0.99 | 0.65 | 0.99 | 0.82 | 0.96 | 0.99 | 0.01 | 0.5 | 0.99 | 0.98 | 0.96 | 0.95 | 0.92 |
| WEW | 0.66 | 0.99 | 0.99 | 0.94 | 0.95 | 0.99 | 0.65 | 0.99 | 0.99 | 0.01 | 0.5 | 1 | 0 | 0.46 | 0.99 | 0.99 |
| WHT | 0.97 | 0.94 | 0.99 | 0.99 | 0.86 | 0.99 | 0.65 | 0.86 | 0.86 | 0.01 | 1 | 0.95 | 0.82 | 0.98 | 0.99 | 0.77 |
| WIS | 0.5 | 0.46 | 0.46 | 0.82 | 0.05 | 0.5 | 0.65 | 0.77 | 0.07 | 0.01 | 0 | 0.95 | 0.5 | 0.46 | 0.32 | 0.1 |

## 7.7 Appendix G. Summary of fuzzy-set membership scores (sets and union of sets)

**Table 7.10 Summary of fuzzy-set membership scores (sets and union of sets)**

| | Solution paths | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Case** | **I1** | **I2** | **I3** | **I4** | **I2+i4** | **A1** | **A2** | **A3** | **A2+A3** | **E1** | **E2** |
| AWW | 0.65 | 0.65 | 0.71 | 0.65 | 0.65 | 0.71 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 |
| ACO | 0.32 | 0.32 | 0.57 | 0.32 | 0.32 | 0.57 | 0.32 | 0.32 | 0.32 | 0.57 | 0.57 |
| BTR | 0.65 | 0.65 | 0.71 | 0.65 | 0.65 | 0.82 | 0.65 | 0.65 | 0.65 | 0.71 | 0.82 |
| BGF | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| BCY | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| BST | 0.82 | 0.39 | 0.43 | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 | 0.57 |
| BVG | 0.32 | 0.32 | 0.32 | 0.39 | 0.39 | 0.32 | 0.32 | 0.39 | 0.39 | 0.39 | 0.32 |
| CLI | 0.97 | 0.95 | 0.95 | 0.95 | 0.95 | 0.97 | 0.86 | 0.86 | 0.86 | 0.86 | 0.86 |
| CLE | 0.77 | 0.77 | 0.89 | 0.77 | 0.77 | 0.89 | 0.77 | 0.77 | 0.77 | 0.89 | 0.89 |
| CHU | 0.92 | 0.43 | 0.43 | 0.43 | 0.43 | 0.98 | 0.77 | 0.77 | 0.77 | 0.43 | 0.77 |
| CUL | 0.35 | 0.35 | 0.57 | 0.35 | 0.35 | 0.46 | 0.35 | 0.35 | 0.35 | 0.46 | 0.57 |
| DLI | 0.32 | 0.32 | 0.32 | 0.57 | 0.57 | 0.32 | 0.32 | 0.57 | 0.57 | 0.57 | 0.32 |
| DFL | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.96 | 0.96 | 0.89 | 0.89 |
| EPU | 0.86 | 0.86 | 0.89 | 0.86 | 0.86 | 0.89 | 0.86 | 0.86 | 0.86 | 0.89 | 0.89 |
| ECV | 0.32 | 0.65 | 0.32 | 0.32 | 0.65 | 0.32 | 0.89 | 0.32 | 0.89 | 0.65 | 0.32 |
| ECW | 0.32 | 0.32 | 0.57 | 0.32 | 0.32 | 0.57 | 0.32 | 0.32 | 0.32 | 0.82 | 0.57 |
| ECZ | 0.32 | 0.46 | 0.32 | 0.32 | 0.46 | 0.32 | 0.46 | 0.32 | 0.46 | 0.77 | 0.32 |
| GSU | 0.71 | 0.39 | 0.39 | 0.39 | 0.39 | 0.57 | 0.57 | 0.57 | 0.57 | 0.39 | 0.71 |
| GTR | 0.99 | 0.82 | 0.82 | 0.82 | 0.82 | 0.99 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 |
| HAR | 0.71 | 0.5 | 0.5 | 0.5 | 0.5 | 0.71 | 0.71 | 0.71 | 0.71 | 0.5 | 0.71 |
| HFR | 0.96 | 0.71 | 0.71 | 0.71 | 0.71 | 0.96 | 0.96 | 0.96 | 0.96 | 0.71 | 0.96 |
| IPA | 0.77 | 0.77 | 0.82 | 0.77 | 0.77 | 0.82 | 0.77 | 0.77 | 0.77 | 0.86 | 0.82 |
| IWB | 0.57 | 0.57 | 0.57 | 0.65 | 0.65 | 0.57 | 0.57 | 0.65 | 0.65 | 0.71 | 0.57 |
| KOR | 0.65 | 0.65 | 0.94 | 0.65 | 0.65 | 0.94 | 0.65 | 0.65 | 0.65 | 0.95 | 0.94 |
| MCP | 0.77 | 0.5 | 0.5 | 0.5 | 0.5 | 0.95 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 |
| MST | 0.26 | 0.21 | 0.26 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.26 |
| MOG | 0.26 | 0.32 | 0.26 | 0.26 | 0.32 | 0.26 | 0.32 | 0.26 | 0.32 | 0.43 | 0.26 |
| ODS | 0.57 | 0.32 | 0.57 | 0.32 | 0.32 | 0.32 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| PEM | 0.71 | 0.96 | 0.71 | 0.71 | 0.96 | 0.71 | 0.96 | 0.71 | 0.96 | 0.96 | 0.71 |
| PRE | 0.35 | 0.35 | 0.71 | 0.35 | 0.35 | 0.71 | 0.35 | 0.35 | 0.35 | 0.46 | 0.46 |
| PRI | 0.65 | 0.57 | 0.65 | 0.57 | 0.57 | 0.57 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| PWO | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| PLY | 0.57 | 0.57 | 0.57 | 0.65 | 0.65 | 0.57 | 0.57 | 0.71 | 0.71 | 0.65 | 0.57 |
| RMA | 0.65 | 0.5 | 0.5 | 0.5 | 0.5 | 0.71 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| RNA | 0.94 | 0.5 | 0.5 | 0.5 | 0.5 | 0.96 | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 |
| STW | 0.65 | 0.65 | 0.71 | 0.65 | 0.65 | 0.71 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 |
| STR | 0.71 | 0.65 | 0.65 | 0.65 | 0.65 | 0.71 | 0.71 | 0.92 | 0.92 | 0.65 | 0.71 |
| SSG | 0.57 | 0.43 | 0.43 | 0.43 | 0.43 | 0.46 | 0.46 | 0.46 | 0.46 | 0.43 | 0.57 |
| TGT | 0.46 | 0.65 | 0.46 | 0.46 | 0.65 | 0.46 | 0.65 | 0.46 | 0.65 | 0.82 | 0.46 |
| TOU | 0.32 | 0.32 | 0.32 | 0.57 | 0.57 | 0.32 | 0.32 | 0.57 | 0.57 | 0.71 | 0.32 |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| TPS | 0.82 | 0.92 | 0.82 | 0.82 | 0.92 | 0.82 | 0.92 | 0.82 | 0.92 | 0.96 | 0.82 |
| VEH | 0.96 | 0.82 | 0.82 | 0.82 | 0.82 | 0.99 | 0.96 | 0.96 | 0.96 | 0.82 | 0.99 |
| WEW | 0.99 | 0.65 | 0.65 | 0.65 | 0.65 | 0.94 | 0.94 | 0.94 | 0.94 | 0.65 | 0.99 |
| WHT | 0.86 | 0.65 | 0.65 | 0.65 | 0.65 | 0.94 | 0.86 | 0.86 | 0.86 | 0.65 | 0.86 |
| WIS | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 |

## Appendix H. Cases and empirically dominant configurations

**Table 7.11 Cases sorted by fuzzy set membership scores – relevant solutions paths for SVI**

| Case | I1 | SVI | Case | I3 | SVI | Case | I2+I4 | SVI |
|---|---|---|---|---|---|---|---|---|
| GTR | 0.99 | 0.26 | CLI | 0.95 | 0.9 | PEM | 0.96 | 0.97 |
| WEW | 0.99 | 0.46 | KOR | 0.94 | 0.55 | CLI | 0.95 | 0.9 |
| CLI | 0.97 | 0.9 | CLE | 0.89 | 0.21 | TPS | 0.92 | 0.94 |
| HFR | 0.96 | 0.95 | DFL | 0.89 | 0.98 | DFL | 0.89 | 0.98 |
| VEH | 0.96 | 0.96 | EPU | 0.89 | 0.98 | PWO | 0.89 | 0.98 |
| RNA | 0.94 | 0.88 | PWO | 0.89 | 0.98 | EPU | 0.86 | 0.98 |
| CHU | 0.92 | 0.88 | GTR | 0.82 | 0.26 | GTR | 0.82 | 0.26 |
| DFL | 0.89 | 0.98 | IPA | 0.82 | 0.86 | VEH | 0.82 | 0.96 |
| PWO | 0.89 | 0.98 | TPS | 0.82 | 0.94 | CLE | 0.77 | 0.21 |
| EPU | 0.86 | 0.98 | VEH | 0.82 | 0.96 | IPA | 0.77 | 0.86 |
| WHT | 0.86 | 0.98 | AWW | 0.71 | 0.95 | HFR | 0.71 | 0.95 |
| BST | 0.82 | 0.69 | BTR | 0.71 | 0.98 | AWW | 0.65 | 0.95 |
| TPS | 0.82 | 0.94 | HFR | 0.71 | 0.95 | BTR | 0.65 | 0.98 |
| CLE | 0.77 | 0.21 | PEM | 0.71 | 0.97 | ECV | 0.65 | 0.98 |
| IPA | 0.77 | 0.86 | PRE | 0.71 | 0.43 | IWB | 0.65 | 0.98 |
| MCP | 0.77 | 0.83 | STW | 0.71 | 0.86 | KOR | 0.65 | 0.55 |
| GSU | 0.71 | 0.43 | PRI | 0.65 | 0.5 | PLY | 0.65 | 0.55 |
| HAR | 0.71 | 0.32 | STR | 0.65 | 0.46 | STW | 0.65 | 0.86 |
| PEM | 0.71 | 0.97 | WEW | 0.65 | 0.46 | STR | 0.65 | 0.46 |
| STR | 0.71 | 0.46 | WHT | 0.65 | 0.98 | TGT | 0.65 | 0.77 |
| AWW | 0.65 | 0.95 | ACO | 0.57 | 0.46 | WEW | 0.65 | 0.46 |
| BTR | 0.65 | 0.98 | CUL | 0.57 | 0.95 | WHT | 0.65 | 0.98 |
| KOR | 0.65 | 0.55 | ECW | 0.57 | 0.95 | DLI | 0.57 | 0.95 |
| PRI | 0.65 | 0.5 | IWB | 0.57 | 0.98 | PRI | 0.57 | 0.5 |
| RMA | 0.65 | 0.94 | ODS | 0.57 | 0.18 | TOU | 0.57 | 0.5 |
| STW | 0.65 | 0.86 | PLY | 0.57 | 0.55 | BGF | 0.5 | 0.46 |
| IWB | 0.57 | 0.98 | BGF | 0.5 | 0.46 | HAR | 0.5 | 0.32 |
| ODS | 0.57 | 0.18 | HAR | 0.5 | 0.32 | MCP | 0.5 | 0.83 |
| PLY | 0.57 | 0.55 | MCP | 0.5 | 0.83 | RMA | 0.5 | 0.94 |
| SSG | 0.57 | 0.46 | RMA | 0.5 | 0.94 | RNA | 0.5 | 0.88 |
| BGF | 0.5 | 0.46 | RNA | 0.5 | 0.88 | ECZ | 0.46 | 0.55 |
| TGT | 0.46 | 0.77 | TGT | 0.46 | 0.77 | WIS | 0.46 | 0.46 |
| WIS | 0.46 | 0.46 | WIS | 0.46 | 0.46 | CHU | 0.43 | 0.88 |
| CUL | 0.35 | 0.95 | BST | 0.43 | 0.69 | SSG | 0.43 | 0.46 |
| PRE | 0.35 | 0.43 | CHU | 0.43 | 0.88 | BST | 0.39 | 0.69 |
| ACO | 0.32 | 0.46 | SSG | 0.43 | 0.46 | BVG | 0.39 | 0.97 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BVG | 0.32 | 0.97 | GSU | 0.39 | 0.43 | GSU | 0.39 | 0.43 |
| DLI | 0.32 | 0.95 | BVG | 0.32 | 0.97 | CUL | 0.35 | 0.95 |
| ECV | 0.32 | 0.98 | DLI | 0.32 | 0.95 | PRE | 0.35 | 0.43 |
| ECW | 0.32 | 0.95 | ECV | 0.32 | 0.98 | ACO | 0.32 | 0.46 |
| ECZ | 0.32 | 0.55 | ECZ | 0.32 | 0.55 | ECW | 0.32 | 0.95 |
| TOU | 0.32 | 0.5 | TOU | 0.32 | 0.5 | MOG | 0.32 | 0.93 |
| MST | 0.26 | 0.65 | MST | 0.26 | 0.65 | ODS | 0.32 | 0.18 |
| MOG | 0.26 | 0.93 | MOG | 0.26 | 0.93 | MST | 0.21 | 0.65 |
| BCY | 0.03 | 0.35 | BCY | 0.03 | 0.35 | BCY | 0.03 | 0.35 |

**Table 7.12 Cases sorted by fuzzy set membership scores - relevant solution paths for SAC**

| Case | A1 | SAC | Case | A2+A3 | SAC |
|---|---|---|---|---|---|
| GTR | 0.99 | 0.35 | DFL | 0.96 | 0.98 |
| VEH | 0.99 | 0.95 | HFR | 0.96 | 0.99 |
| CHU | 0.98 | 0.82 | PEM | 0.96 | 0.99 |
| CLI | 0.97 | 0.82 | VEH | 0.96 | 0.95 |
| HFR | 0.96 | 0.99 | WEW | 0.94 | 0.99 |
| RNA | 0.96 | 0.99 | STR | 0.92 | 0.92 |
| MCP | 0.95 | 0.77 | TPS | 0.92 | 0.94 |
| KOR | 0.94 | 0.99 | ECV | 0.89 | 0.92 |
| WEW | 0.94 | 0.99 | PWO | 0.89 | 0.99 |
| WHT | 0.94 | 0.99 | CLI | 0.86 | 0.82 |
| CLE | 0.89 | 0.89 | EPU | 0.86 | 0.82 |
| DFL | 0.89 | 0.98 | WHT | 0.86 | 0.99 |
| EPU | 0.89 | 0.82 | CLE | 0.77 | 0.89 |
| PWO | 0.89 | 0.99 | CHU | 0.77 | 0.82 |
| BTR | 0.82 | 0.96 | GTR | 0.77 | 0.35 |
| IPA | 0.82 | 0.96 | IPA | 0.77 | 0.96 |
| TPS | 0.82 | 0.94 | HAR | 0.71 | 0.92 |
| AWW | 0.71 | 0.46 | PLY | 0.71 | 0.35 |
| HAR | 0.71 | 0.92 | BTR | 0.65 | 0.96 |
| PEM | 0.71 | 0.99 | IWB | 0.65 | 0.65 |
| PRE | 0.71 | 0.65 | KOR | 0.65 | 0.99 |
| RMA | 0.71 | 0.99 | TGT | 0.65 | 0.77 |
| STW | 0.71 | 0.46 | DLI | 0.57 | 0.71 |
| STR | 0.71 | 0.92 | GSU | 0.57 | 0.23 |
| ACO | 0.57 | 0.86 | TOU | 0.57 | 0.82 |
| ECW | 0.57 | 0.89 | BGF | 0.5 | 0.77 |
| GSU | 0.57 | 0.23 | AWW | 0.46 | 0.46 |

| | | | | | |
|---|---|---|---|---|---|
| IWB | 0.57 | 0.65 | ECZ | 0.46 | 0.82 |
| PRI | 0.57 | 0.99 | MCP | 0.46 | 0.77 |
| PLY | 0.57 | 0.35 | SSG | 0.46 | 0.1 |
| BGF | 0.5 | 0.77 | BST | 0.39 | 0.94 |
| CUL | 0.46 | 0.46 | BVG | 0.39 | 0.94 |
| SSG | 0.46 | 0.1 | RNA | 0.39 | 0.99 |
| TGT | 0.46 | 0.77 | CUL | 0.35 | 0.46 |
| WIS | 0.46 | 0.32 | PRE | 0.35 | 0.65 |
| BST | 0.39 | 0.94 | ACO | 0.32 | 0.86 |
| BVG | 0.32 | 0.94 | ECW | 0.32 | 0.89 |
| DLI | 0.32 | 0.71 | MOG | 0.32 | 0.32 |
| ECV | 0.32 | 0.92 | STW | 0.32 | 0.46 |
| ECZ | 0.32 | 0.82 | MST | 0.21 | 0.82 |
| ODS | 0.32 | 0.5 | ODS | 0.14 | 0.5 |
| TOU | 0.32 | 0.82 | RMA | 0.1 | 0.99 |
| MOG | 0.26 | 0.32 | WIS | 0.07 | 0.32 |
| MST | 0.21 | 0.82 | BCY | 0.03 | 0.39 |
| BCY | 0.03 | 0.39 | PRI | 0.03 | 0.99 |

**Table 7.13 Cases sorted by fuzzy set membership scores - relevant solutions paths for SER**

| Case | E1 | SER | Case | E2 | SER |
|---|---|---|---|---|---|
| PEM | 0.96 | 0.97 | VEH | 0.99 | 0.92 |
| TPS | 0.96 | 0.99 | WEW | 0.99 | 0.99 |
| KOR | 0.95 | 0.94 | HFR | 0.96 | 0.82 |
| CLE | 0.89 | 0.97 | KOR | 0.94 | 0.94 |
| DFL | 0.89 | 0.82 | CLE | 0.89 | 0.97 |
| EPU | 0.89 | 0.16 | DFL | 0.89 | 0.82 |
| PWO | 0.89 | 0.92 | EPU | 0.89 | 0.16 |
| CLI | 0.86 | 0.94 | PWO | 0.89 | 0.92 |
| IPA | 0.86 | 0.77 | CLI | 0.86 | 0.94 |
| ECW | 0.82 | 0.82 | WHT | 0.86 | 0.77 |
| TGT | 0.82 | 0.86 | BTR | 0.82 | 0.57 |
| VEH | 0.82 | 0.92 | IPA | 0.82 | 0.77 |
| ECZ | 0.77 | 0.86 | TPS | 0.82 | 0.99 |
| GTR | 0.77 | 0.86 | CHU | 0.77 | 0.35 |
| BTR | 0.71 | 0.57 | GTR | 0.77 | 0.86 |
| HFR | 0.71 | 0.82 | GSU | 0.71 | 0.46 |
| IWB | 0.71 | 0.43 | HAR | 0.71 | 0.1 |
| TOU | 0.71 | 0.29 | PEM | 0.71 | 0.97 |

| | | | | | |
|---|---|---|---|---|---|
| ECV | 0.65 | 0.35 | STR | 0.71 | 0.77 |
| PLY | 0.65 | 0.57 | ACO | 0.57 | 0.46 |
| STR | 0.65 | 0.77 | BST | 0.57 | 0.57 |
| WEW | 0.65 | 0.99 | CUL | 0.57 | 0.65 |
| WHT | 0.65 | 0.77 | ECW | 0.57 | 0.82 |
| ACO | 0.57 | 0.46 | IWB | 0.57 | 0.43 |
| DLI | 0.57 | 0.94 | PLY | 0.57 | 0.57 |
| BGF | 0.5 | 0.97 | SSG | 0.57 | 0.43 |
| HAR | 0.5 | 0.1 | BGF | 0.5 | 0.97 |
| AWW | 0.46 | 0.29 | AWW | 0.46 | 0.29 |
| CUL | 0.46 | 0.65 | MCP | 0.46 | 0.23 |
| MCP | 0.46 | 0.23 | PRE | 0.46 | 0.46 |
| PRE | 0.46 | 0.46 | TGT | 0.46 | 0.86 |
| CHU | 0.43 | 0.35 | RNA | 0.39 | 0.96 |
| MOG | 0.43 | 0.46 | BVG | 0.32 | 0.57 |
| SSG | 0.43 | 0.43 | DLI | 0.32 | 0.94 |
| BST | 0.39 | 0.57 | ECV | 0.32 | 0.35 |
| BVG | 0.39 | 0.57 | ECZ | 0.32 | 0.86 |
| GSU | 0.39 | 0.46 | STW | 0.32 | 0.14 |
| RNA | 0.39 | 0.96 | TOU | 0.32 | 0.29 |
| STW | 0.32 | 0.14 | MST | 0.26 | 0.03 |
| MST | 0.21 | 0.03 | MOG | 0.26 | 0.46 |
| ODS | 0.14 | 0.94 | ODS | 0.14 | 0.94 |
| RMA | 0.1 | 0.96 | RMA | 0.1 | 0.96 |
| WIS | 0.07 | 0.1 | WIS | 0.07 | 0.1 |
| BCY | 0.03 | 0.06 | BCY | 0.03 | 0.06 |
| PRI | 0.03 | 0.04 | PRI | 0.03 | 0.04 |