SUSTAINABLE AGRICULTURE IN RURAL BURUNDI: EXPLORING THE ROLE OF FARMER GROUPS' ENTREPRENEURIAL ACTIVITIES BÉLYSE MUPFASONI

SUSTAINABLE AGRICULTURE IN RURAL BURUNDI: EXPLORING THE ROLE OF FARMER GROUPS' ENTREPRENEURIAL ACTIVITIES

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Propositions

1. Training Burundian farmers in sustainable entrepreneurship stimulates the implementation of adequate crop and land management practices.
   (this thesis)

2. Farmers' prior knowledge is a crucial factor in recognizing opportunities that sustain the farming system.
   (this thesis)

3. Anthropogenic global warming cannot comprehensively explain climate change.

4. Interbasin water transfers are not a good alternative for solving water scarcity.

5. Tackling cultural beliefs and norms that stimulate favoritism towards males, is the only way to tackle gender inequalities.

6. Investing in nutrition for children in Africa is even more important than investing in their education.

Propositions belonging to the thesis, entitled:

Sustainable agriculture in rural Burundi: Exploring the role of farmer groups' entrepreneurial activities

Bélyse Mupfasoni
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Sustainable agriculture in rural Burundi: Exploring the role of farmer groups' entrepreneurial activities

Bélyse Mupfasoni

Thesis

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Dedicated to my husband Willy Nkurunziza
and our daughters Ketsia, Keren, Noella & Narielle

1. General introduction

1.1 Introduction: Setting the Scene

This thesis contributes to debates on sustainable rural development by exploring how farmer groups' entrepreneurial activities could contribute to more sustainable agriculture in rural Burundi. The research was conducted within the framework of the project "Fanning the spark" implemented in Burundi from 2014 to 2016. In this project, two approaches were used to motivate farmers through trainings to transform their small-scale subsistence farm households into more productive and sustainable farms.

The first approach is the Integrated Farm Planning (PIP) approach (from French 'Plan Intégré du Paysan'). In the PIP approach, farmers were empowered and encouraged to think on their current farm situation, to visualize the family's dream for the future (3 to 5 years) and plan the development of concrete actions made by the entire family. The PIP approach focuses on aspects such as sustainable agriculture (SA), integrated management of the farm, resilience of the household, collaboration among farmers, market orientation, and going to scale (up-scaling) in order to achieve impact on food security and sustainable local development (Kessler and van Reemst, 2018). Changing farmers' mind-sets by motivating them to transform their reality by collective action is at the core of the PIP approach. As such, the PIP approach builds a foundation for sustainable change, facilitating that farmers can become sustainable entrepreneurs.

The second approach concerns developing Integrated Groups Plans (PIC - from French "Plan Intégré Collectif"). In the PIC approach, farmers that created PIPs at their households were encouraged to join other PIP farmers in order to benefit from collaboration and develop a sustainable commercial idea together, that can help them later to implement the planed PIPs for their households. These farmer groups received a series of trainings for developing PICs based on the groups entrepreneurial ideas. The training focused on training farmer groups in sustainable entrepreneurship (SE), meaning that each farmer group had to elaborate a PIC or an integrated group plan that differs from a conventional group business plan in the sense that it includes integrated activities considering the "3Ps of the sustainability", hence concepts of social (people), environmental (planet), and economic (profit) sustainability related to the group business activity.

Recent studies have revealed that going back to green or organic production is relatively more profitable economically and environmentally friendly to conventional methods (Rigby and Cáceres, 2001; Delbridge et al., 2013). This has led to the rise of a sustainable agriculture movement (especially in the USA and European Union) as a result of the adverse impacts of cultivating practices on agricultural lands depleting non-renewable resources and posing a threat to the ecosystem and livelihood (Buttel, 1992; Rigby and Cáceres, 2001; Tilman et al.,

2002). Sustainable farming systems centre on the need to manage agricultural lands with innovations and practices that favour the ecosystem and future 'land re-use'.

Local and global problems and challenges facing the agricultural sector of Africa today, including Burundi, are highly complex in nature. It has been demonstrated that these problems and challenges cannot be addressed and solved in isolation and with the single dimensional mind-sets and tools of the past (Nguyen and Bosch, 2013). Therefore, agricultural sustainability requires approaches, interventions and capacity building of farmers that work on the land. This thesis explores how farmer groups entrepreneurial activities can contribute to more sustainable agriculture in Burundi.

This first chapter provides a general introduction and background to the thesis. It elaborates on the problem tackled by this research, highlighting the main conceptual issues that set that stage for the thesis. These inform empirical chapters, which are embedded in specific scientific debates. Subsequently, the general research objective and research questions are presented, followed by the organisation of the thesis, the methodological design and the thesis outline.

1.2 Towards sustainable agriculture in Burundi

In Burundi rural livelihoods are closely tied to agriculture as a source of food and income earnings (WFP, 2004). Agriculture encompasses 90% of the workforce through small-scale, subsistence-oriented family farming units, and contributes 95% to the national food supply. The leading agricultural products can be classified into cash crops (coffee, tea, cotton), food crops (manioc, beans, bananas, sweet potatoes, maize, sorghum) and horticultural produces (MINAGRIE, 2008). An estimated 85% of the food crop production of the total cultivated surface together with livestock keeping represents the main source of food and income for most households (D'Haese et al., 2010). The country exports mainly coffee and tea. Coffee is the main source of foreign exchange income and represents 80% of Burundi export (Nkuruniza and Ngaruko, 2002; Baghdadli et al., 2008). Burundian agriculture faces many challenges, given that the production system remains traditional with the use of family labour and few external inputs. Agricultural production systems have evolved in response to the high population density and associated acute scarcity of agricultural land. In the past, adequate rainfall patterns and good soils made Burundi self-sufficient in food production (Bergen, 1986). Nowadays, agricultural production is limited by the unavailability of high potential land and the progressive depletion of soil fertility in rural areas (Cochet, 2004).

In response to the challenges mentioned above, a facilitation process that motivates smallholder farmers to go beyond subsistence farming is necessary (MINAGRIE, 2011). Sustainable agriculture in Burundi is necessary as a huge number of small-scale subsistence farms continue to face low productivity levels, mainly due to continued soil degradation, low efficiency of their production systems, the absence of affordable inputs and markets, and low economic returns of innovations at farm level (Kessler and van Reemst, 2018). However, sustainable agriculture cannot just be achieved through governmental interventions or new technologies adoption, but requires also a series of trainings to change farmers' attitude towards alternative forms of farming activities (Papadopoulos et al. 2015).

1.3 Sustainable entrepreneurship and farming

In order to achieve more sustainable agriculture for their households, collaborating on the inter-household level, with the aim of identifying and pursuing new sustainable business opportunities that consider the 3Ps of sustainability, is essential for Burundian farmers. Collective actions are often at the heart of entrepreneurial activities in rural areas, where farmers lack the means and legitimacy to start individually and prefer to join others to work collectively because it may leverage their own resources and provide access to new resources, including physical (e.g. land), human and social capital (Tiessen, 1997). In Burundi group entrepreneurship is particularly attractive among farmers who are not able to start an entrepreneurial business on their own. For that, social networks play a key role in the initial steps of (sustainable) entrepreneurial opportunity recognition. Kahan (2012) claims that some smallholder farmers are more secure if they work together with others in a group.

However, identification and exploitation of "sustainable" business opportunities is not easy for farmers in the developing world in general and in Burundi in particular. Hence, farmers need to be empowered in sustainable entrepreneurship in order to think and work on business opportunities that sustain the natural and/or communal environment, as well as to provide development gains for others (Patzeld & Shepherd, 2011). Training in sustainable entrepreneurship is important because sustainable entrepreneurship is widely acknowledged as an answer to current environmental challenges (Dean and McMullen, 2007; Cohen and Winn, 2007; York and Venkataraman, 2010) and related social challenges (Zahra et al., 2009; Greco and De Jong, 2017).

1.4 The problem and research questions

The negative environmental effects of conventional agriculture and the inability of most African farmers to afford the necessary capital investments have raised questions as to which farming practices can support sustainable productivity increases in the region (Binswanger and Mc Calla, 2010; Adenle et al 2012). There is widespread agreement that smallholders need to are crucial to the continual reinforcement of African agriculture and the achievement of food security (Gowing and Palmer, 2007; Alarcón and Bodouroglou, 2011). However, the challenge of increasing agricultural production for food security nowadays is far more complex than in the past and will require strengthened systems of innovation with the flexibility to respond to the specific needs of farmers in a variety of ecological and socio-economic contexts (Lipton, 2010), without expanding the agricultural frontier and with sustainable use of natural resources. Achieving these objectives simultaneously will require a great transformation in agriculture and land management.

In Burundi, despite efforts being made in improving agriculture and land management practices that have a potential to improve soil fertility and increase productivity, agriculture has not evolved and continues to use unreliable and ineffective techniques (Oxfam, 2011). Burundi has a preponderantly agricultural population of more than 90 per cent of the Burundian total population that practice subsistence farming on fragmented farms (with an average size of less than 0.5 hectares), often on soils that are highly eroded, scarce and not very fertile (MINAGRIE, 2011). The rapidly growing population, which doubles in size every 30 years, faces the problem of land that is becoming less available and increasingly unproductive due to a generalized overexploitation and abandonment of fallow periods, which are the traditional ways of maintaining soil fertility. Farmers have little or no capital to invest in improving land quality (IFAD, 2012). In an effort to tackle the Burundian agriculture problems, several support programs for sustainable agriculture have been implemented in Burundi but there is still a need for enhancing Burundi's capacity to incorporate new approaches in managing and improving agriculture. The second objective of the report on the prioritization of sustainable development goals in Burundi for 2016-2030 is to eliminate hunger, ensure food security, improve nutrition and promote sustainable agriculture. The challenge for Burundi by 2030 is to double agricultural production and the incomes of small producers, especially women, including ensuring equal access to land. The first pillar of the Burundi's national development plan 2018-2027 is on modernization of agriculture through regionalizing crops, promoting integrated family farming, mechanizing agriculture, preserving agricultural land, transforming agricultural production, etc. According to MINAGRIE (2011), the vision which the government equipped itself for the agricultural sector is stated as follows: "The fundamental role of Burundi agriculture is to ensure food security in terms of quantity and quality for all Burundi people. To accomplish this, it must

be transformed from subsistence agriculture to family-operated commercial agriculture, providing a decent income for households, and respectful of the environment and sound management of resources" (MINAGRIE, 2011, page 5). It is hence important for Burundian farmers to invest in sustainable agriculture, because it will resolve not only the problem of poverty but also serious environmental problems (MINAGRIE, 2011).

As it is not easy for Burundian farmers who lack sometimes the necessary means at household level to go beyond subsistence agriculture and start an entrepreneurial activity individually, farmers' networks and collaboration through groups are essential (Kessler and van Reemst, 2018). Kassie & Zikhali (2009) state that networks could serve as a vehicle of development, implementation and adaptation of sustainable land management practices. But only forming groups of farmers is not sufficient to identify, develop and exploit sustainable entrepreneurial opportunities that considers the 3Ps of sustainability. Hence, farmers groups need to be supported and empowered in sustainable entrepreneurship (SE) by means of training, that teaches them how to develop sustainable business plans that take into account economic, environmental and social aspects related to each farmer group's entrepreneurial activity. Imaita (2013) stated that training for farmers is a process of imparting specific practical skills to farmers that let them better perform their farm production activities and become more competent and proficient in doing their farm work.

Following from the above, the general objective of this research project is to explore how developing entrepreneurial activities by farmer groups can contribute to more sustainable agriculture in Burundi.

For answering to the general objective, the research poses the following specific research questions (RQs):

1. What is the role of specific internal states in farmers group formation and how do these internal states further affect the identification of collective sustainable business opportunities?

2. What is the relation between prior knowledge, motivation and early stage outcomes in the early phase of sustainable agricultural entrepreneurship in Burundi?

3. To what extent do sustainable entrepreneurship trainings influence knowledge (learning) and practice (behaviour) of farmer groups?

4. To what extent does group training in sustainable entrepreneurship influence the three key components of sustainable agriculture at the level of rural households in Burundi?

1.5 Organisation of the thesis

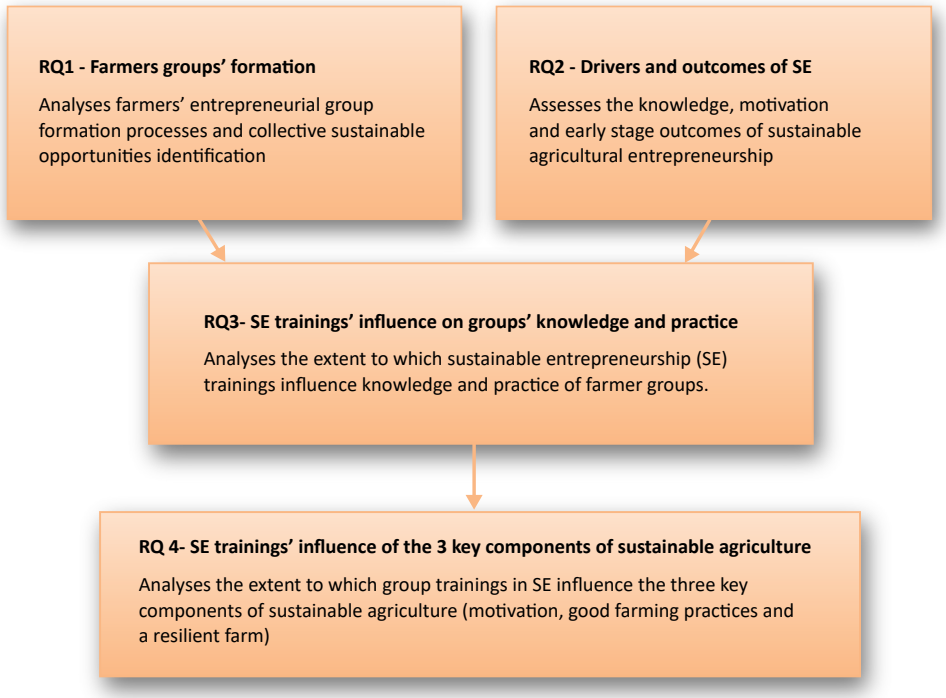

Figure 1.1 *Overview of the thesis*

The above thesis overview shows how the research questions are related:

RQ1 analyses the role of specific farmers' internal states (farmers' sustainable values and motivation related to agriculture, namely motivation to farm, land health and farm resilience) that underlie group formation and joint business idea identification of farmer groups in the context of Burundi;

RQ2 analyses the early and initial steps of working in groups. As the entrepreneurial activity starts normally with the recognition of business opportunities in the environment, this RQ2 assesses if farmer groups' prior knowledge in sustainability and their motivation in joining the group are related to the quality of the sustainable group business plan (that takes into account the 3Ps of sustainability);

RQ3 analyses the extent to which group training in sustainable entrepreneurship influences the knowledge (learning) and practices (behaviour) of the farmers' groups;

RQ4 analyses the extent to which group trainings in SE influence the three key components of sustainable agriculture at the level of rural households in Burundi.

Hence, RQs 1&2 are oriented mostly on the early phase of sustainable opportunities identification by farmers' groups. RQs 3&4 are more related to sustainable opportunities exploitation i.e. working on the planned sustainable entrepreneurial opportunities.

1.6 Methodological design

1.6.1 Description of the study area

This research was carried out in the republic of Burundi, a landlocked country in the great lakes region of central-eastern Africa. With a size of 27,834 km², the country counts 18 provinces spread over 11 agro-ecological zones that differ in soil, relief, climate, flora and fauna (Bidou et al., 1991). This research was conducted in four different communes (two collines/commune): Bukirasazi and Makebuko in Gitega Province, and Giteranyi and Butihinda in Muyinga Province. Gitega is located in the central part of the country, whereas Muyinga is located in the north-east close to Rwanda and Tanzania (Figure 1.2).

Figure 1.2 *Map of Burundi indicating the location of the study area*

1.6.2 Methods

The research was conducted within the framework of the Dutch project "Fanning the Spark" which was locally known as the SCAD project (from Solidarité Communautaire pour l'Auto Développement). This project trained farmers in the PIP approach and PIP creation, and this research worked with 103 PIP farmers in Gitega Province (10 groups) and in Muyinga Province (10 groups). Among these 20 groups, ten farmer groups had received SE training, and ten were not-trained groups. All groups were formed on the initiative of the group members themselves, taking into account aspects like proximity, having the same vision, and already existing friendships and trust among the members.

The ten trained groups were selected from 63 initially interested groups in developing a PIC, based on two aspects: 1) if they were ready to start with the joint business ideas, 2) whether their joint business ideas was concrete. The ten not-trained groups for this study were selected from the 53 remaining groups by looking to the groups that are most comparable to the 10 trained groups.

The overall research design of this study is a mixed method approach (qualitative & quantitative). Primary data were collected using a combination of household surveys, structured interviews and focus group discussions (FGD). For RQ1, data were collected using a questionnaire in which basic characteristics and specific indicators of internal states of the farmer groups were assessed, and this was completed by the FGDs.

For RQ2, a semi-structured interview approach focusing on prior knowledge and motivation of each group member individually was used and completed by the FGDs. For RQ3, quantitative data were collected on ten farmer groups which had received training in PIC development, as well as on ten not-trained groups. FGDs were used to further analyse findings of quantitative data. For RQ4, the study was conducted on the 103 individual farmers belonging to the 20 groups. We used FGDs with the groups of farmers and interviews with farmers individually to further analyse the quantitative data.

Secondary data were obtained from published and unpublished books, articles, research papers and government documents. Data were analysed using content analysis and basic statistics, with t-tests and ANOVA to test significance levels.

1.7 Thesis outline

The thesis consists of this introduction chapter and the following five chapters. Chapter 2 contributes to the understanding the factors that influence entrepreneurial-group formation and joint business idea identification of farmer groups in a Burundian smallholder farming context. The drivers and outcomes of sustainable agriculture entrepreneurship in Burundi are assessed and further analysed in Chapter 3. Chapter 4 and 5 respectively analyse the influence of SE trainings on knowledge and practice of farmers groups and subsequently on the three key components of sustainable agriculture at the level of rural households in Burundi. The final chapter 5 (the synthesis) discusses the major findings of the thesis, and outlines the main conclusions drawn from the findings. It also draws out the policy and extension implications, science and society contributions and discusses issues for future research.

2. Exploring entrepreneurial-group formation by smallholder Burundian farmers

This study analyses the role of specific internal states (i.e. the set of sustainable values and motivations) that underlie group formation and joint business idea identification of farmer groups in the context of Burundi. Quantitative and qualitative data were combined in this study. Quantitative data were analysed using basic statistics. Qualitative data was collected in focus group discussions with farmer groups. Findings revealed that groups are not just formed on the basis of homophily (same level of internal states) but also on 'compensation' and 'committed leadership'. Moreover, prior sustainable behaviour of members influences sustainability of new group business ideas and the nature (e.g. focus on farming) of that business idea. The results of the study suggest the need to encourage strategies to promote sustainability and better natural resource management by working first on empowering and motivating the human resource base. Once empowered and recognizing the value of the land, farmers will be motivated to make investments in resilient farming, and then opportunities and collective initiatives for sustainable entrepreneurial activities will emerge naturally.

Based on

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2.1 Introduction

Burundi is characterized by subsistence farming (with 95 percent of the population depending on agriculture), fragmentation of farms (with an average size of less than 0.2 hectares; (FAO, 2015)), and highly eroded soils that are becoming increasingly unproductive due to intensive farming. Hence, sustainable land management (SLM) is crucial, i.e. the adoption of a land use system that, through appropriate management practices, enables land users to maximize the economic and social benefits from the land while maintaining or enhancing the ecological support functions of the land resources (Babalola and Olayemi, 2013). Several support programs for SLM have been implemented in Burundi over the past decade, but there is an urgent need for more action, as land is degrading at a very fast pace, and climate change increasingly impacts food security. Moreover, reality is that farmers have little or no capital to actually invest in fertilisers (Ndedi and Nisabwe, 2017) for improving land quality. Fortunato (2014) argues that more rural communities are turning to developing entrepreneurship as a local economic development strategy that can provide high-impact at low cost and, thus, kick-start SLM. This was the starting-point of the Integrated Farm Planning (PIP) approach in Burundi (from French "Plan Intégré du Paysan"), which aims to stimulate subsistence farmers to develop into sustainable entrepreneurs through a significant focus on mind-set of farmers and collaboration and peer-learning as a vehicle to do so. Developing sustainable entrepreneurship competencies in groups, in particular vision building (e.g. foresighted thinking competence), learning and planning (e.g. strategic action competence) were crucial in this approach (Ploum et al., 2018c). This strategy was operationalized in tailor-made trainings in which farm households created a long-term vision with their family members based on a drawing of their future farm, in which they made a joint action plan to become intrinsically motivated and skilled to invest in SLM practices. Central in this training approach was collaborative learning because – despite the popular legend of the heroic lone entrepreneur – the creation and management of new ventures is often a shared effort (Kamm et al., 1990; West, 2007). To take collaboration to the next level, farmer households already involved in the PIP approach were invited to identify new business opportunities together with other farmers and lay these down in so-called Integrated Groups Plans (or "Plan Intégré Collectif" in French – PIC). Thus, the PICs focused on the inter-farm level whereby PIP farmers were stimulated to pool (human) resources and start collaborating on the inter-household level, resulting in the formation of entrepreneurial groups with the aim of identifying and pursuing new sustainable business opportunities together. The specific role of farmers mind-sets in the group formation process as well as how this affects the collective identification of sustainable opportunities is at the heart of this study.

A focus on farmers' mind-set in the group formation and opportunity identification process as initial steps in the entrepreneurial process is also theoretically a deliberate choice. From

the team formation literature, the role of, what they refer to as "internal states," is well described (Ruef et al., 2003). In general, entrepreneurs pick their team members based on similarities in terms of internal states. The relevance and influence of such internal states on entrepreneurial decision making is further highlighted in the literature on imprinting. Formative and foundational experiences of entrepreneurs leave a long lasting impact on future decision making of entrepreneurs and their ventures (Mathias et al., 2015). Moreover, they may do so in different ways, for instance through influencing which opportunities entrepreneurs select, how they evaluate them, what priorities entrepreneurs make for the future of their ventures or even may guide them away from pursuing new ventures (Mathias et al., 2015). Also literature on sustainable entrepreneurship highlights the important role of such internal states, referring to values and motivations, like pro-environmental behavior values, altruism toward others and moral competencies that shape the opportunity identification process (Patzelt and Shepherd, 2011; Ploum et al., 2018a; West, 2007). Building further on this latter work, we broadly defined internal states in this study as "the set of values and motivational aspects" that relate to sustainable entrepreneurship decision making and action.

The majority of the work on the relation between internal states and entrepreneurial decision making focusses on the individual, not on the influence of these "sources of imprinting" on the team level decision making. In addition, the studies on entrepreneurial teams are mostly from western, innovation driven economy contexts; literature on entrepreneurial team (formation) from emerging or developing economy contexts is relatively scarce. This is surprising as collective actions are often at the heart of entrepreneurial activity in rural areas where farmers lack the means and legitimacy to start individually and prefer to join others to work collectively because it may leverage their own resources and provide access to new resources, including physical (e.g. land), human and social capital (Tiessen, 1997).

The overarching research question guiding this study is :

> What is the role of specific internal states in farmers group formation and how do these internal states further affect the identification of collective sustainable business opportunities?

Our theoretical contribution is twofold. First, despite its relevance for performance and potential long-term imprinting effects, the role that internal states have in group formation processes still remains under researched, especially in emerging/developing economy contexts (Ruef et al., 2003). Second, we also investigated the influence of group members internal states on the first decision in the entrepreneurial process, namely, the development of a joint business idea: the (farming) activity the group is going to pursue as a collective.

This will shed more light on whether differences in group members internal states in fact influence one of the earliest decision making moments in the entrepreneurial process: the identification of new venture opportunities. Also practically, better insight into this research issue is necessary since group entrepreneurship is particularly attractive for those farmers who are not able to start an entrepreneurial business on their own. Often these are the poorest farmers in the community or the farmers with the weakest links to the economy. Such smallholder farmers are more secure if they work together with others in a group (Kahan, 2012) and they deserve evidence-based guidance and support from entrepreneurship educators and rural extension workers.

2.2 Theoretical framework

2.2.1 Entrepreneurship as decision-making activity: the entrepreneurial process

In daily language, entrepreneurship and entrepreneurs are often referred to as either having a position in society (i.e. an owner/manager) or a role or function that they play in a certain context (i.e. showing entrepreneurial behavior). Despite the abundance of definitions regarding entrepreneurship in scholarly literature, there is a clear trend to recognize that the core and most distinctive element of entrepreneurship is the identification, evaluation and pursuit of business opportunities, or, to be more accurate, of entrepreneurial opportunities (Shane and Venkataraman, 2000). As such it introduces the notion of entrepreneurship as a process, where depending on the underlying theoretical assumptions of the opportunity concept, opportunities are considered as waiting to be discovered or "constructed" more or less actively by the individual recognizer (Barreto, 2012).

Acknowledging both opportunity perspectives, the conceptual work by Vogel (2017) is helpful here for framing the emergence of new ventures from the very first insights until their exploitation. Together, the opportunity process consists of idea generation, incubation and exploitation (Vogel, 2017). The first phase, idea generation, emphasizes three different paths and triggers of venture idea generation; as a result of either a recognized customer segment or customer need "market pull" or more accidental discovery; or a resource that is to be commercialized "resource push" or more intentional idea generation, individuals may start their entrepreneurial efforts by seeking to use the resources they have at hand for productive purposes; people may also engage in new firm creation simply because of their desire to be an entrepreneur, without yet knowing specifically what they are going to do "desire to start" or more as legacy. Which paths and triggers lead to the best venture

ideas and help designing improved pathways to venture idea generation? Likewise, the incubation, second phase emphasizes the emergence of the "venture concept" (i.e. a rudimentary business model in which the idea is connected to the opportunity), which can serve as an important unit of analysis in entrepreneurship research allowing for tracking the further evolution of the new raw idea to exploitation and beyond. What are key pivoting activities that evolve from an initial idea through to the incubation process, what additional information is necessary and is it really desirable and feasible to launch it as a venture? Finally, when the opportunity and its corresponding business model are fully developed the moment of experimenting (i.e. getting out there) starts. It is this phase that Vogel (2017) refers to in his model as the "exploitation" phase, the final phase in his process model. This exploitation phase is described in literature as building efficient, full scale operations for products or services created by, or derived from, a business opportunity (Choi et al., 2008).

2.2.2 Mechanisms of group formation

The model of Vogel also emphasizes that the opportunity production process is not a purely individual activity, it highlights the importance of sense making, discussing ideas with others regarding the attractiveness and feasibility of the opportunity (Felin and Zenger, 2009; Wood and McKinley, 2010). The emergence of a new venture idea and concept and its potential further exploitation will always involve decisions on who will participate and what they might contribute. New ventures are rarely the product of one entrepreneur working in isolation, most new ventures are the product of a team of entrepreneurs (Jin et al., 2017; Kamm et al., 1990). Entrepreneurs themselves as well as investors – often anecdotal – stress the importance of having a good founding team, a team which is comfortable with uncertainty, chaos and change (Blank and Dorf, 2012). Klotz et al. (2014, p. 3) defined a new venture team as a "group of individuals that is chiefly responsible for the strategic decision making and ongoing operations of a new venture." More specifically, a team can be defined "as group of individuals who attempt to work together to achieve a set of imperfectly overlapping and negotiated superordinate organizational goals, potentially for different reasons and often in spite of conflicts emerging from their backgrounds, personalities, and individual motives" (Schjoedt et al., 2013, p. 4).

But on what basis do early-stage entrepreneurs choose other, potentially relevant team members? According to sociologists, there are five distinct mechanisms that can influence team membership: homophily and functionality considerations, status, network and ecological constraints (i.e. proximity). Homophily considerations mean that group formation is mainly based on shared characteristics of members, included ascribed ones (e.g. gender, ethnicity) as well as deeper lying values and motivations, so-called internal states. Functionality considerations are based on the idea that group members are looking

for complementarity in terms of backgrounds to be able to be successful (e.g. the inventor entrepreneur needs to be complemented with a marketer). Status means that group formation is based on cultural biases regarding status (e.g. men over women, or ethnic majorities over minorities). Network constraints mean that during the process of group formation the choice of members (based on shared identities, functional considerations or status expectations) is inevitably constrained by strong (e.g. family members) and weak (e.g. friends) network ties. Ecological constraints refer to the importance of geographic proximity in group formation.

In theory, all mechanisms (and combinations) could play a role in the group formation process, however, research suggests that in reality entrepreneurial team formation is driven by similarities in terms of shared internal states, rather than differences for instance terms of functional complementarity (Ruef et al., 2003).

2.2.3 The (co-)founder values and motivations in relation to new venture formation

Taking into consideration the relevance of shared characteristics in the entrepreneurial team formation process, the question arises which internal states are valuable in which circumstances? Or to put it differently, what are motives and goals of nascent entrepreneurs, meaning why and for what purpose do they start creating their business? The answer is that it probably depends on the different meanings that founders associate with the creation of their new firm. The social identity literature on entrepreneurship is helpful here. First, social identity theory supports the idea that founders have different meanings that they associate with the creation of a new firm, meanings that reach well beyond the classical view that founders are driven primarily by the prospects of personalmonetary gain (e.g. Schumpeter, 1942). Second, as individuals strive for behaviors and actions that are consistent with their identity, the social identity approach helps to explain why founders choose to pursue particular behaviors and actions in new firm creation, thereby providing novel insights into stark differences among different firms' creation processes and outcomes (Fauchart and Gruber, 2011).

Empirically, three main types of founders have been identified according to their respective "social identity" (Fauchart and Gruber, 2011; Sieger et al., 2016): Darwinians, Communitarians and Missionaries. Darwinians are generally motivated by self-interest, want to be evaluated in terms of being a competent professional, and see competitors as the primary frame of reference. Their firms thus resemble a classic profit-maximizing and performance-oriented business. Communitarians create a business out of mutual concern for the interests of known others, they want to be true to similar others, and see a specific

group as frame of reference. An example is an entrepreneur whose business develops new skiing technology to enhance the skiing experience of fellow ski drivers. Missionaries, in turn, want the business to advance a cause for unknown others, they want to contribute to make the world a better place, and see society-at-large as frame of reference. In addition, "hybrid" identities may exist, meaning that founders exhibit two or more identities at the same time.

2.2.4 Farmers' internal states and sustainable entrepreneurship

Sustainable entrepreneurship is different than "normal" entrepreneurship because of the value oriented character of the decisions made which entails making a trade-off between economic, social and environmental values without, a priori, choosing one over another – even if this entails tensions and conflicts (Ploum et al., 2018b). As such internal states, like values, are of utter importance in crucial decisions in the sustainable entrepreneurial journey, including initial steps like team formation and idea formation. But what do they imply in the context of subsistence farming in a country like Burundi? These sustainable values and motivations should be seen in the light of the broader discussion on sustainable agriculture. In many countries, intensive crop production has depleted agriculture's natural resource base, jeopardizing future productivity. In order to meet projected demand over the next 40 years, African farmers must double food production, a challenge made even more daunting by the combined effects of climate change and growing competition for land, water and energy. The challenges to farmers and agriculturalists are the abilities to develop and implement new technologies that will allow them to maintain and increase yields of agriculture products while increasing ecological efficiencies. It reflects our concern with the long-term viability of agriculture (Ikerd, 2001). Many scholars argue (e.g. Gibbon, 2012; Ikerd, 2001) that sustainable agriculture can be defined in many ways, but ultimately it seeks to sustain farmers, resources and communities by promoting farming practices and methods that are profitable, environmentally sound and good for communities. Sustainable agriculture rewards the true values of producers, draws lessons from organic farming, and is based on the ecological perspective that natural resources should not be placed at risk by agricultural activities which are not environmentally friendly (Neher, 1992). Nonetheless, sustainable farming is more management intensive, as it takes more people on the land to maintain the natural fertility and health of the land, and thereby, to reduce reliance on pesticides and fertilizers. Collective coordinated (group) activities as well as valuing sustainability are therefore very important to advance toward more sustainable agriculture.

Next to sustainable farming, the term resilient farming has been coined in the sustainability debate. Resilient farming aims at managing the farm in an integrated way and by farmers (good stewards) who are able to cope with shocks (e.g. due to changing climate conditions

and/or prices). The term resilience has become central in both academic discourse and policy agendas in a broad range of fields, including agriculture and rural development (Lin, 2011; Conger and Conger, 2002; Lamine, 2015; Wilson, 2010; Ashkenazy et al., 2018). Holling (1973) has emphasized that the ability to manage or cope with change is important at different levels of the system. Walker et al. (2004, p. 2) defined resilience as "the capacity of a system to absorb disturbance and reorganise [itself] while undergoing change so as to still retain essentially the same function, structure, identity and feedbacks." Furthermore, and contributing to resilience, farmers will need a diverse portfolio of crop varieties that are suited to a range of agro-ecosystems and farming practices, and resilient to climate change (Gibbon, 2012). Undertaking resilient farming generally requires more effort from the farmer (investments in labor), the pooling of resources, and an internal state that values diversity and nature.

In sum, the development toward sustainable agriculture and resilient farming emphasizes, from the perspective of the farmer, strong motivation and commitment as the road is paved with uncertainty, ambiguity, tensions and potential conflicts. Socio-psychological models have been relatively successful in demonstrating and explaining farmers' attitudes and behavior regarding nature conservation in agricultural landscapes, and in stipulating the relationship between motivation for and implementation of conservation practices on farms (Willock et al., 1999; Zubair and Garforth, 2006; Duesberg et al., 2014; Home et al., 2014). In addition, sustainable agriculture implies involvement in new – often collective and entrepreneurial – actions to make the farm and household more resilient, which also requires motivation and commitment. Hence, sustainable agriculture cannot just be achieved through state interventions, legislation or new technologies, but requires responsible actions of the farmers involved.

2.3 Methods

2.3.1 Description of the study area

This study was performed within the framework of activities of Fanning the Spark, a Dutch project in Burundi. Data were collected in four villages of the provinces Gitega (Bukirasazi and Makebuko) and Muyinga (Butihinda and Giteranyi) between November 2016 and December 2016.

2.3.2 Participants

Five farmer groups in the Gitega province and another five in Muyinga province participated in the study. These ten groups were selected from 63 groups initially interested in making a so-called PIC: an integrated collective (business) plan at the group level, based on readiness to start working as group and clear joint ideas in the group. In total, 24 members from 5 groups in Gitega (GIT) and 32 from 5 groups in Muyinga (MUY) participated in the study. The smallest group had three members, the largest ten. All 56 farmers in the two provinces have been involved since 2014 in the creation and implementation of PIPs (the integrated farm plan), following the different steps of the PIP approach. In the first step, even before drawing and creating a PIP, the focus in this approach was on awareness raising concerning current problems and possible solutions, both in the village and within each household. In the next step, each family created a PIP together with all household members, based on each other's needs and aspirations. Once having a PIP, implementation started, with each family doing this at its own pace and according to its capabilities. The project Fanning the Spark supported this with trainings on sustainable crop and land management (LM) practices for the first generation PIP farmers, who, in their turn – trained the second generation PIP farmers and transferred their knowledge to them. As a follow-up for farmers already involved in the PIP approach, PIP farmers were encouraged and stimulated to start collaborating in PIC groups, with the aim of developing new entrepreneurial activities together. The PIP farmers were completely free to form these PIC groups, allowing for naturally occurring groups, providing thus an excellent context to observe to basic formation mechanisms such as homophily.

2.3.3 Data collection and analysis

To collect in-depth information on basic characteristics, internal states, group formation processes and initial steps toward a collective business idea, data were collected a few days after the groups were formed, using a mix of qualitative and quantitative data collection methods. Quantitative data were collected through a questionnaire in which basic characteristics and specific indicators of internal states of the PIC group members were captured. Basic characteristics of each group (gender, mean age, PIP generation, education, prior experience with the joint business idea) were collected on individual level first. For determining the group level on the gender component, we calculated the percentage of female and male members inside each PIC group; mean age index, we averaged the number of each group member's age; PIP generation component, we calculated the percentage of first and second generation farmers in each PIC group; Education, we calculated the percentage of the three education categories (none, primary and secondary) for each PIC group; and prior experience with the joint business idea refers to the members in the

group who have a prior experience with the business idea.

For internal states , we focused specifically on farmers' commitment and motivation to farm. As tangible outcomes of these internal states prior investment behaviors of farmers were taken. Research suggests that sustainable entrepreneurship requires action competence (Ploum et al., 2018a, b), and, that farmers' decisions to care of the environmental is influenced by their prior behavior in investing in healthy soil, drawing on natural sources of plant nutrition and the use of mineral fertilisers wisely (Gibbon, 2012). For farmers' commitment and motivation, five questions were formulated, related to use and implementation of PIP activities (i.e. commitment to sustainable entrepreneurship approaches), and the reasons for being a farmer (i.e. motivation to farm). Example items for "commitment to sustainable entrepreneurship approaches" were: "What is the quality of your integrated farm plan?", "How do you think your farm looks like in about 3–5 years"? Examples of items for "motivation to farm" were: "I farm mainly because I have no other choice" and "I farm to keep my land in a good condition (it is my obligation, stewardship)." To get scores at group level, we first searched five components scores by averaging the individual scores of farmers in each group, second, we summed the five components scores.

Prior investment in land health was measured based on the changes in number of natural resource management (NRM) and LM practices over the past three years; the investments made by farmers in these practices (converted from Burundian Francs (BIF) to Euros); and the investments in fertilizers (converted from Burundian Francs (BIF) to Euros). Prior investment in farm resilience was measured by means of changes in crop and livestock diversity over the past three years, as well as investments by the farmer in crops, livestock, stables and household improvements (converted from Burundian Francs (BIF) to Euros).

Qualitative data were collected through focus group discussions (FGDs) in order to further analyze the findings from the individual survey and to get richer data on the group level. Focal questions in FGDs concerned the process of group formation, as well as the choice of the joint business idea. Data from FGDs were analyzed first by organizing data from the discussions by categorizing them regarding the questions asked. The next step was to sort out group discussions and link them to quantitative data.

2.3.4 Sample characteristics

To start with the "end," Table 2.1 shows the joint business ideas which the ten sampled groups identified and started to work on after groups were formed. The table shows that both in Gitega and Muyinga the groups business ideas are diverse, with some similar cases.

For example, GIT 1 and 3 have agricultural related business activities, with GIT 3 selling agro-pastoral inputs and GIT 1 growing three types of crops and commercializing them. Muyinga, however, has some groups in agro-transformation (MUY2), and others in sustainable farming (MUY4) or livestock (MUY 5).

Table 2.1 *Groups joint business ideas and short description*

Group	Joint business idea	Short description
GIT 1	Grow and commercialise maize, peas and beans	Members interested in selling a part of their maize, peas and beans harvest in the market around during lean period
GIT 2	Grow and transform banana in local drinks	Members growing bananas but are facing competition in the area
GIT 3	Establish a selling point for agro-pastoral inputs	A group that want to reduce the long distance in getting agro-pastoral inputs by establishing a selling point near their neighbours in the community
GIT 4	Open a food shop of basic needs	A group composed by only women interested in selling basic needs in the area to facilitate their neighbours
GIT 5	Open a restaurant	Members who have a restaurant project driven by selling lunches to workers in the area
MUY 1	Bakery	Group interested in bakery with multiple type of breads as a marketing strategy
MUY 2	Make oil from avocados	Members introducing a novel agribusiness technique in the area
MUY 3	Modern Beekeeping	A group with some members experienced in bee-keeping and others learning from them
MUY 4	Sustainable farming / selling of tomatoes, cabbage, maize	A group composed by only men who are interested in sustainable farming
MUY 5	Weaving and breeding of chickens	Ten women who share the weaving passion and want also to do livestock

In terms of basic (demographic) characteristics, Table 2.2 shows considerable diversity within groups. Women represent 62.5 percent of all members. Three groups are homogeneous in terms of gender (all men or all women), the other 7 are heterogeneous. The mean age is 37 years with the oldest group being GIT 1 (48) and MUY 5 (27) the youngest group. Among the

56 farmers considered in this study, both first generation (16 percent) and second generation PIP farmers (84 percent) were present, with most groups being heterogeneous in terms of experience (seven out of ten). In three groups there is no specific experience related to the joint business idea, in the other seven some group members have prior experience related to the joint business idea. With regard to education, there is less diversity, both between and within groups: the majority have primary level of education (75 percent); with MUY 4 having the highest percentage of educated people (67 percent with secondary level of education).

Table 2.2 *Basic characteristics of the 10 groups*

Group ID	**#**	**Gender**		**Mean age**	**Experience-PIP generation**		**Prior experience with joint business idea**	**Education level**		
		% male	% female		% 1st gen.	% 2nd gen.		% None	% Primary	% Secondary
Total	**56**	**37.5**	**62.5**	**37**	**16**	**84**		**11**	**75**	**14**
GIT 1	5	20	80	48	40	60	Known by two members in the group (2/5)	0	80	20
GIT 2	5	60	40	33	0	100	New as a business for the group (0/5)	0	100	0
GIT 3	5	0	100	42.6	40	60	New for the group (0/5)	0	80	20
GIT 4	4	25	75	36.5	50	50	One member experienced (1/4)	0	80	20
GIT 5	5	40	60	47.6	0	100	New for the group (0/5)	40	60	0
MUY 1	4	50	50	32.8	25	75	One member experienced (1/4)	0	75	25
MUY 2	5	60	40	40.6	0	100	Known by two members in the group (2/5)	0	80	20
MUY 3	10	60	40	35	10	90	Two members in the group experienced (2/10)	30	70	0
MUY 4	3	100	0	37.3	33	67	Known by all members in the group (3/3)	33	0	67
MUY 5	10	0	100	27.9	0	100	Weaving known by 3 members and breeding of chicken by 4 members (3/10 – 4/10)	0	90	10

2.4. Results

2.4.1 Group formation and internal states

Motivation and commitment

Table 2.3 shows that composite motivation and commitment scores do not differ a lot between all ten groups, with the lowest (minima) overall sum in motivation for farming being 10.6 and the highest (maxima) 13.4. GIT 3 has the lowest mean score. The lowest overall mean in commitment is a score of 16 (GIT 2 and 5) and the highest is 18 (GIT 3 and MUY 4).

Table 2.3 *Groups sum in commitment and motivation just after the group formation process*

Group	**Commitment to sustainable entrepreneurial approches[a]**						**Motivation to farm[b]**					
	Stor.	Qual.	Freq.	Impl.	Vis.	**Av.**	Job	Alt.	BIF	Stew.	Resp.	**Av.**
GIT 1	3.4	2.8	4.2	2.6	4.2	**17.2**	2.8	2.6	2.2	2.6	1.4	**11.6**
GIT 2	2.4	3.0	4.2	2.8	3.6	**16.0**	2.4	1.8	2.8	2.8	1.4	**11.2**
GIT 3	3.6	3.4	4.2	2.6	4.2	**18.0**	2.4	2.0	2.4	2.6	1.2	**10.6**
GIT 4	2.8	2.8	4.3	3.0	4.0	**16.8**	2.5	2.3	3.0	3.0	1.5	**12.3**
GIT 5	2.6	3.0	3.8	2.4	4.2	**16.0**	2.6	2.0	2.6	2.8	1.8	**11.8**
MUY 1	2.8	3.3	4.3	3.0	4.0	**17.3**	2.8	2.5	3.0	3.0	2.0	**13.3**
MUY 2	3.2	3.2	4.4	2.8	4.2	**17.8**	3.0	2.6	3.0	2.6	2.2	**13.4**
MUY 3	2.9	3.4	4.5	2.6	3.8	**17.2**	2.9	2.3	2.7	2.9	1.8	**12.6**
MUY 4	3.7	3.3	4.3	2.3	4.3	**18.0**	3.0	2.0	3.0	3.0	2.3	**13.3**
MUY 5	3.0	3.2	3.8	2.6	3.7	**16.3**	2.5	2.1	2.8	2.7	1.2	**11.3**

*Av: Average

Notes: **a** Composite score based on five questions which were formulated, related to use and implementation of PIP activities. To get the five components scores, individual scores of farmers in each group were averaged. The group score is again the sum of the five components scores; **b** composite score based on five questions which were formulated, related to the reasons for being a farmer (see the Appendix). To get the five components scores, the individual scores of farmers in each group were averaged. The group score is again the sum of the five components scores (see explanation next page)

Explanation of Table 2.3

Commitment	Measurement Scale
Q1* Stor: Where is the PIP stored?	1= visible on the wall, 2 = at hand 3= stored, 4= not in the house
Q2 * Qual: What was the quality of the PIP?	1=nice, good quality, 2= okay reasonable quality, 3= dirty or damaged, 4= not nice
Q3 * Freq.: How often does the family consult or look at the PIP?	1=several time/week, 2= once/week, 3= once/month 4=less than once/month, 5= never
Q4 * Impl. : .= Does the family have an action plan to implement activities PIP?	1= yes the original plan, 2= yes an update plan, 3=no
Q5 *Vis.: Farm vision, How do you think your farm looks like in about 3-5 years?	1= full of changes/ideas ; 2=many changes/ideas , 3= some changes/ideas , 4= small changes/ideas, 5 = no changes/ideas
Motivation to farm	
Q1*job: I farm because I like the job	1=No, 2= Maybe, 3= Yes
Q2 *Alt: I farm mainly because I have no other choice	1= Yes, 2 = Maybe , 3= No
Q3 *BIF: I farm because it provides income for the household	1=No, 2= Maybe, 3= Yes
Q4: *Stew. : I farm to keep my land in a good condition (it is my obligation, stewardship)	1=No, 2= Maybe, 3= Yes
Q5* Resp. = I farm because this land is mine, I feel responsible (I inherited the land)	1=No, 2= Maybe, 3= Yes

However, internal state patterns do differ within groups. When discussing the role of internal states in the FGD in relation to the group formation process, they seem to be important for the group formation process, but in different ways. On the one hand, being on the same level of internal states seems to be an important selection criteria for certain groups, as explained by members of MUY 4 in FGD: “When we saw that we share many ambitions and that we are all motivated and have the same eager to care of land and farming using improved techniques, we decided to form this group.” Muyinga groups are the top 3 (MUY 1, 2, 4) in motivation for farming and this can be explained by the fact that they are composed by a homogeneous group of dynamic and enthusiastic farmers who are willing to try novel techniques like a water-pump to irrigate their crops (MUY 4) or transforming avocados into oil (MUY 2). For instance MUY 2, which scored high on motivation, is composed of open minded and dynamic persons, in this case also in adjacent fields, as one MUY 2 group member is an agricultural technician who is known for introducing improved agricultural techniques in the community.

However, on the other hand, not all groups show this homogeneity in internal states. Group internal states are also seen in the light of having a role model or a motivated leader in the group. As one member reported: "We wanted farmer 'X' to be one of us in this group to learn from her." GIT 3 is an interesting case from this perspective, as they score high in commitment, but altogether relatively low on their motivation to farm. In the FGDs, it appeared that this group has a diverse composition of farmers as two (out of the five) members are so-called PIs (Paysan Innovateur/Innovative farmer) who lead the group and are highly committed, much more compared to others. Their roles in the community are mainly to transfer their skills and knowledge to the next generation of farmers by means of farmer to farmer trainings. They act as a kind of role model to other group members and help to raise their intrinsic motivation. PIs are dynamic and trusted farmers by the local community, they have a long-term vision and are willing and able to experiment on their farm (they have the skills and some financial incentives compared to other farmers in the community), and do show some innovative activities. PIs are often explicitly selected in these groups. As was explained in one of the focus groups: "I was discussing with my neighbor PI regularly about my PIP implementation when he was visiting me which kept me updated and committed; I wanted him to be part of our PIC group." The importance of a PI in a group for internal states can also be seen in GIT 2, 5 and MUY 5. All three groups are composed 100 percent by second generation farmers (no PI) (see Table 2.2) and have the lowest score in commitment (around 16).

Prior investment in land health and resilient farming

Table 2.4 shows the averages per group from the individual investments in land health. From those averages, one can see that members of the ten groups adopted at least one new NRM technique on an average between 1 and 3 new practices introduced by group members in each group prior to the group formation. As members of MUY 4 stated during the FGD: "we came together as a group because we knew each other's willingness and capability to invest in techniques to improve land quality." Interestingly, the Muyinga groups' members adopted more NRM techniques compared to the Gitega ones. MUY 2, 3, 4 and 5 members adopted at around three new NRM techniques like compost pits, vegetation borders and contour lines. The lowest mean investment is €37 in MUY1: MUY 1 is composed by one PI experienced in farming techniques and leading the group. MUY4 has the highest: €203. MUY 4 group members also invested a lot more money in crops compared to other groups (€224) (see Table 2.5), due to the fact that the group is cultivating already on a big shared piece of land. As such it is not a surprise that MUY 4 has developed a "farming" focused business idea (see Table 2.1).

Table 2.4 *Farmers' prior investments in land health (averages per group)*

PIC_ group ID	(mean) NRM Change	(mean) NRM_ invest_ EUR	(mean) invest organic_ fertilizer_ EUR	(mean) invest chemical_ fertilizer_ EUR
GIT 1	2.4	42.5	144.4	92.2
GIT 2	2.8	46.3	97.7	90.4
GIT 3	1.8	38.7	124.4	91.9
GIT 4	3.5	56.1	147.2	99.3
GIT 5	2.4	48.3	228.8	203.7
MUY 1	1.5	37.1	83.3	73.5
MUY 2	3.8	66.3	95.5	82.2
MUY 3	4.1	98.1	80	75.3
MUY 4	3.7	203.5	100	82.5
MUY 5	3.8	189.1	112.2	93.2

Table 2.5 *Farmers' prior investment in resilient farming (average per group)*

PIC_ group _ID	(mean) crop diversity change	(mean) all crops Invest_ EUR	(mean) livestock _number _change	(mean) live-stock_ Invest _EUR	Invest _stables_ livestock_EUR	Total _hh _ Invest _EUR
GIT 1	2.2	119.0	10	611.6	50.7	395.9
GIT 2	1.8	73.8	4.8	225.2	55.2	233.1
GIT 3	1.8	60.7	10	366.7	33.7	419.0
GIT 4	2.3	160.6	6.5	188.9	21.7	278.8
GIT 5	1.4	102.0	7.8	152.0	22.4	323.9
MUY 1	2.3	83.8	4	80.3	12.2	169.2
MUY 2	2.0	99.4	8.4	371.7	90.4	415.7
MUY 3	1.4	50.3	10	161.9	34.9	177.5
MUY 4	2.0	224.9	3.7	591.9	67.6	701.7
MUY 5	1.3	53.1	7.1	295.4	54.8	759.2

2.4.2 Groups composition, formation and the collective entrepreneurial opportunities

When comparing tables 2.1, 2.3, 2.4 and 2.5, the interrelationship between the group characteristics, internal states and the type of business opportunities they pursued becomes

clear. Groups identified different business opportunities and in most groups at least some of the group members have prior experience in the chosen topic (all MUY groups and GIT 1 & 4).

In addition it seems that especially prior investment behavior of group members has a profound influence on the nature of the new, joint business activity. As already mentioned above it is not a surprise that MUY 4 has developed a "farming" focused business idea (see Table 2.1) as it invested a lot more money in crops compared to other groups (see Table 2.5). The strong relationship between prior investment behavior and the new group business idea is also visible in other groups. The groups which are planning to undertake a business related to land and primary production (see Table 2.1) also have a history of investing in farm resilience and in land health compared to others. See for instance group GIT 1. Group members of GIT 1 bought pigs to increase manure for more production and have planned a joint business of growing tree crops and commercialize them (Table 2.1). Groups that have members that have invested more in land health and farm resilience (crop diversity and livestock) have also developed joint businesses that are more related to agriculture.

Only in the three groups, the joint business idea was totally new (GIT 2, 3 and 5). For GIT 2 and 5, their respective projects of growing and transform banana in local drinks and opening a restaurant were driven by the available market in their communities. For GIT 3, the idea of establishing a selling point for agro-pastoral input products was driven by a perceived need in the community.

2.5. Discussion

By studying factors that influence entrepreneurial-group formation in a Burundian smallholder farming context, our main interest was on the role of internal states (i.e. motivations/values) during the group formation process, as these are extremely important early success indicators for sustainable entrepreneurship (Ploum et al., 2018a, b). Two research questions guided this study:

What is the role of specific internal states in farmers group formation and how do these internal states further affect the identification of collective sustainable business opportunities?

Concerning the first part of the research question, being on the same level of internal states seems to be important selection criteria for certain groups (I am motivated thus

I join the other motivated). This was particularly evident in those groups composed by who are willing to try novel techniques, as in one of the Muyinga cases where they purchased a water-pump to irrigate their crops. This phenomenon is widely reported in entrepreneurship team formation literature from western literature. For instance, Miller McPherson et al. (2001) and Ruef et al. (2003) stated that the entrepreneurial group formation process was predominantly based on homophily considerations, i.e. on shared characteristics.

However, interestingly, these entrepreneurial groups in Burundi are not just formed on homophily. This point is first reflected in the considerable diversity in groups when looking at basic (demographic) characteristics. Only three groups were homogeneous in terms of gender, while most groups were also heterogeneous in terms of experience (seven out of ten). Heterogeneity in terms of gender, generation, experience and education may be beneficial for the opportunity identification process, as it helps these farmers to escape their own "knowledge corridors" (Gruber et al., 2013). Second, the simplicity of the homophily argument is also visible in the fact that in many groups (seven out of ten) internal state patterns differ within a group. Such groups were formed on "compensation" and "committed leadership" principles, where one or two PIs as leaders/role models help to motivate and inspire the others.

These PIs have undergone a longer capacity building trajectory than the other farmers and were also chosen as PIs because of their intrinsic motivation and innovative capacities. The fact that they have followed these intensive group trainings, and have had the opportunity to discuss with other – similarly motivated – farmers, has boosted their motivation to foster sustainability in their community. Such more experienced and motivated innovative farmers have an altruistic motivation that arises when individuals experience empathy and sympathy for others (Gruber et al., 2013; Batson et al., 1991; Davis et al., 1994). Thus contrary to the findings of Ruef et al. (2003) showing that team composition is predominantly driven by similarity/homophily, our study found that also "functionality considerations" – based on the idea that group members are looking for complementarity in terms of backgrounds to be able to be successful – played a role in the group formation process.

Coming back to the second part of the research question, the cases emphasize the influence of internal states and prior, domain related experience on the identification of collective sustainable business opportunities. As such our work supports the work of Mathias et al. (2015) on the group level, who showed that "sources of imprinting" (like prior experiences) guide entrepreneurs' perceptions and have a lasting impact on entrepreneurs and their ventures.

High prior sustainable investment behavior of group members translates into more sustainable joint business ideas: business ideas in which groups respond to common problems in the community/village and converting those into business activities that can sustain also the natural environment next to making profit. More specifically, farmers who already invested more in land health (showing commitment to resilient farming) chose to continue with a farming-related, sustainable entrepreneurial activity on the group level.

However, not all groups follow this pattern, suggesting that prior experience and prior investment should not be seen as single indicators for collective sustainable, entrepreneurial practices. For instance the case of transforming bananas in local drinks suggests that some groups focus directly on available market opportunities in the community. Thus our study supports Vogel (2017) who argued that there are different paths and triggers behind business ideas generation, also on the group level. The cases of farmers who already invested more in land health and who chose to continue with a sustainable farming-related entrepreneurial activity on the group level show the scenario of "resource push": intentional and a more inside-outside idea generation. The cases of groups that opted for a joint business idea that was totally new for them seem to be more driven by emerging market opportunities, opting for the route identified by Vogel (2017) as "market pull": accidental discovery and more outside-inside idea generation.

2.6 Conclusions

This study analyzed the mechanisms that underlie group formation and joint business idea identification in the context of the PIP/PIC approach in Burundi.

We were mostly interested in the role of so-called internal states of farmers group composition (motivation, commitment, land health and resilience). Findings revealed that entrepreneurial groups are not just formed on the basis of homophily (same level of internal states) but also on "compensation" and "committed leadership." Moreover, prior sustainable behavior of members influences sustainability of new group business ideas and the nature (e.g. focus on farming) of that business idea. Farmers who already invested more in land health chose to continue with a farming-related sustainable entrepreneurial group activity. These are often the more intensively trained PIP farmers, who during these trainings became intrinsically motivated to invest in their farm and household. Hence, instead of identifying an opportunity to leave agriculture, such farmers have become aware that their farm is their main resource base, and that investing in resilient farming is worth the effort.

Our findings underline that internal states are at the base of sustainable development of rural areas. Emergence and enactment of sustainable business practices should not be seen as single isolated insights ("aha moments"), but rather as products of a continued process of shaping, evaluation and refinement of those involved. Therefore, in Burundi and in other developing countries in similar conditions, policies that focus on sustainable rural development, should first work on empowering and motivating the human resource base. Starting to promote entrepreneurship, for instance stimulating farmers to step in promising value chains, without recognizing prior investments, capacity and motivation of farmers to build a sustainable future, makes no sense. As our results suggest, groups can play an important role in this process. Once empowered and recognizing the value of the land, farmers will be motivated to make investments in resilient farming, and then opportunities and collective initiatives for sustainable entrepreneurial activities will emerge naturally. It is this insight that we now better understand as a result of the findings in this chapter.

However, as this study was done at an early stage of the entrepreneurial process and with a small number of groups in only two provinces of Burundi, further monitoring to examine if the observed motivation persists and actually results in sustainable groups and positive effects on resilient farming is required. In addition, as our groups were very diverse in terms of gender and other basic characteristics it will be interesting to see whether this indeed will enable them, and under which circumstances, to leverage this diversity, or that it will hinder them as heterogeneity in the entrepreneurial team is not necessarily always a good thing (Ensley et al., 1998). Such long-term effects and insights will help to draw more in-depth conclusions on the influence of entrepreneurial-groups, formation processes and the long-term influence of internal states on sustainable rural development in emerging economies.

3. Sustainable agricultural entrepreneurship in Burundi: drivers and outcomes

This study assessed knowledge, motivation and early stage outcomes of sustainable agricultural entrepreneurship in the context of farmer groups in Burundi. Quantitative and qualitative data were combined in a multiple-source case study. Data were analysed using content analysis and basic statistics. Results revealed that farmer groups' prior knowledge on environmental sustainability is better developed than their social and economic sustainability. This is reflected in the environmental sustainability part of the business plans, which is generally better than the economic and social sustainability parts. Moreover, the top groups on prior knowledge identified opportunities directly related to their prior knowledge. Pro-activeness of the group was a more determining factor than risk-taking and innovativeness. Furthermore, there seemed to be a positive interplay between the groups' prior knowledge, entrepreneurial orientation and knowledge motivation and the quality of the sustainable business plan. In particular, knowledge motivation seemed to be important, but other variables also explained the quality of the business plan, such as level of education. As the results highlight the complexity as well as the importance of the early-stages of the entrepreneurial process, this study suggests that in Burundi (in which community-based entrepreneurship is common) ample attention must be given to group members' backgrounds. This means that differences in prior knowledge, motivation and other more generic characteristics of group members (e.g. level of education, experience) should be addressed in an early stage.

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3.1 Introduction

With an economy dependent on agriculture, Burundi is a small, landlocked country where 90 percent of the population lives on less than US$ 2 per day. Burundi's economy is dominated by subsistence agriculture (FAO, 2015), with the main staple crops being banana, cassava, sweet potato and beans. Coffee is the main export crop, followed by tea, cotton and sugar. As in many developing countries, the agricultural sector is evolving in Burundi, driven largely by the vision of the government that agriculture has a fundamental role in ensuring food security in terms of quantity and quality for all Burundi people. To accomplish this, "agriculture must be transformed from subsistence to family-operated commercial agriculture, providing a decent income for households, and respectful of the environment and sound management of resources" (MINAGRIE, 2011).

Alsos *et al.* (2011) state that entrepreneurship in the farming sector is seen as a means to transform the sector as well as to bring new economic *development* to rural areas. Agricultural entrepreneurship has received much attention in the last decade, in developed and developing economies. Recent studies show that agricultural entrepreneurship is not only wishful thinking or a new hype: it has a profound impact on business growth and survival (Lans *et al*., 2011; Verhees *et al.*, 2011). Although entrepreneurship has been embraced by rural communities as a local economic development strategy that can provide high-impact at low cost (e.g. Dabson (2007)), one could question the sustainability of entrepreneurial practices. According to the traditional schools of thought in entrepreneurship theory, based on the work of Schumpeter (1934), Knight (1921) and Israel (1973), the pursuit of financial profit is the central driver of entrepreneurial activity; entrepreneurs can be seen as money-driven, growth and production-orientated individuals who pursue purely economic goals (Lans *et al*., 2014). McElwee *et al.* (2011) also recognize that some agricultural entrepreneurs initially pursued entrepreneurship with the aim of fulfilling their own self-interest. With the increasing attention worldwide to prominent challenges of our time, including preserving ecosystems, counteracting climate change, reducing environmental degradation and so on, there is also a small but emerging literature on *sustainable* entrepreneurship (Patzelt and Shepherd, 2011; Cohen and Winn, 2007; Dean and McMullen, 2007; Hockerts and Wüstenhagen, 2010; Pacheco *et al.*, 2010; Belz and Binder, 2017). Sustainable entrepreneurship can be defined as the recognition, development and exploitation of opportunities by individuals to bring into existence future goods and services with economic as well as social and ecological gains (Belz and Binder, 2017). The recognition, development and exploitation of opportunities describe the generic process and activities of entrepreneurship (Shane and Venkataraman, 2001). The entrepreneurial process always starts with the identification of a potential business idea that could be explored and further developed into a new product, service or process (Shane and Venkataraman, 2000). The sustainable part in this equation

is that sustainable development entrepreneurs are motivated by more than just personal economic gains ("me"). Individual (ethical) values and motives related to "others" (either socially or environmentally oriented) are therefore considered as essential for sustainable entrepreneurship and could even be seen as distinctive for sustainable entrepreneurs (Patzelt and Shepherd, 2011).

One of the most widely used models on opportunity recognition for sustainable development is the conceptual model of Patzelt and Shepherd (2011). From that model, sustainable development opportunities are recognized based on the individual's prior knowledge and motivation. Differences in prior knowledge and motivation may explain variance in entrepreneurs' direction of attention towards aspects of the natural and communal environment, and thus their recognition of sustainable development opportunities. Individuals may particularly recognise opportunities related to their own prior knowledge for a given aspect of their environment (Patzelt and Shepherd, 2011). Furthermore, studies on entrepreneurial motivation in agriculture have shown that an important driver for entrepreneurial success in agriculture is entrepreneurial orientation (Grande *et al.,* 2011; Verhees *et al.,* 2011). Entrepreneurial orientation - seen in this study as motivational driver - can be defined as a farmer's 'willingness to innovate, to rejuvenate market offerings, take risks to try out new and uncertain products, services and markets, and be more proactive than competitors towards new marketplace opportunities' (Wiklund and Shepherd, 2005).

However, it has been questioned whether high levels of entrepreneurial orientation also increase the likelihood that farmers will focus on business opportunities that consider sustainability aspects (Verhees *et al.*, 2011).

Despite considerable interest in studying the factors that foster sustainable opportunity recognition (Baron and Ensley, 2006; Corbett, 2007; Grégoire ***et al.***, 2010 ; Shane, 2000) empirical studies are rather scarce as most research is still conceptual in nature (Davidsson, 2015; Dimov, 2007). As a result, there is a growing gap between theorizing about sustainable opportunity recognition and studying the phenomenon with concrete research practices.

This chapter aims to contribute to the emerging literature on sustainable entrepreneurship by studying drivers and early stage outcomes of sustainable agricultural entrepreneurship in the context of farmer groups in Burundi. The theoretical contribution of this paper is twofold. Firstly, most research in agricultural entrepreneurship investigates the entrepreneurial process after opportunities have been discovered; there are only few studies in agricultural entrepreneurship that focus on the phase of opportunity recognition. Even fewer studies exist that focus on the context of emerging economies, such as Burundi, where agriculture consists mainly of small subsistence family farms and where entrepreneurship is much

more a group and community-based phenomenon (MINAGRIE, 2011). Secondly, although research on sustainable entrepreneurship is very topical, most work so far has been done on the conceptual level, empirical work is scarce.

This study was carried out within the project "Fanning the spark" in Burundi, in which Wageningen University and Research (WUR) was one of the partners. In this project, organized farmer groups were empowered to develop "Integrated group plans", or in French "Plans Integrés Collectifs" (PICs). Essentially a PIC is a sustainable business plan in which groups consider and work on the "3Ps" or the "triple bottom line" of sustainability, being "People (social), Planet (environmental) and Profit (economic)".

The objective of the research was to study in-depth the drivers and exemplary outcomes of groups in the early phase of the sustainable entrepreneurship process. More specifically, our overarching research question was: what is the relation between prior knowledge, motivation and early stage outcomes (i.e. the sustainable business plans, the PICs) in the early phase of sustainable agricultural entrepreneurship in Burundi?

3.2 Literature review

3.2.1 Sustainable entrepreneurship in the context of agriculture

Sustainable entrepreneurship can be defined as the recognition, development and exploitation of opportunities by individuals to bring into existence future goods and services with economic, social and ecological gains (Belz and Binder, 2017). Similarly, Patzelt and Shepherd (2011, p 632) define sustainable entrepreneurship as: "the discovery, creation, and exploitation of opportunities to create future goods and services that sustain the natural and/or communal environment and provide development gains for entrepreneurs and others". Sustainable entrepreneurship thus signifies that next to financial aspects, also social and environmental issues should be taken into consideration when creating, delivering and capturing value.

Financial, social and environmental can be seen as the parts of a complex interplay of the 3P's. From a "Planet" perspective, agriculture is based on plant growth and on how different conditions such as soil fertility, climate and pests affect it. The focus is on how various management practices and environmental conditions affect yield and how these conditions can be improved. Sustainable agriculture then focuses on maintaining or improving current levels of biophysical productivity. From a "Profit" perspective, agriculture is an enterprise

at the farm level and an important economic sector at the international, regional, national and local community levels. The focus on massive production was the main driver of the so-called green revolution, also known as the industrialized or conventional model of agriculture. The downside of conventional agriculture is that massive application of modern agricultural techniques has resulted in numerous ecological disadvantages, such as mis-management of resources leading to land degradation, impoverishment of the rural masses and the fact that farmers increasingly depend on a few agricultural multinationals. From a "People" perspective, agriculture is viewed as a producer with focus on its ability to satisfy requirements for food and fibre. Here, sustainable agriculture is associated with the prospects of meeting national and global food needs, quality and security of food supply, labour conditions, learning, well-being of people and human development in a general sense. Human development comprises the process of enlarging people's choices at three essential capabilities: to lead a long and healthy life, to be knowledgeable and to have a decent standard of living (McKinney and Schoch, 2003; Szirmai, 2005).

3.2.2 Drivers of sustainable entrepreneurship in agriculture

Simultaneously creating, delivering and capturing economic, environmental and social forms of value is not easy. Sustainable entrepreneurs engage in complex and difficult decision making processes and systemic thinking (Loorbach 2010). These additional elements require individuals to have a strong internal motivation (Kuckertz & Wagner 2010), to have specific knowledge of the environment (Patzelt and Shepherd, 2011) and to have incentives that go beyond the appropriation of tangible outcomes for themselves (Hallberg 2017). Reality is, however, that entrepreneurs are often ignorant of their environmental impact, have limited resources to tackle environmental issues, and are unwilling to take action due to time- and resource constraints (Pimenova and Van Der Vorst, 2004; Revell *et al*.,2010). Patzelt and Shepherd (2011) explicitly conceptualize how entrepreneurs identify sustainable opportunities, emphasizing in particular knowledge-related and motivational drivers such as entrepreneurial knowledge, environmental knowledge and altruistic motivations. These drivers are discussed in more detail below.

Knowledge-related drivers

Prior knowledge is a central element in studies on drivers of the early phases in (sustainable) entrepreneurship. Entrepreneurs identify opportunities related to the information they possess (Shane, 2000). Prior knowledge refers to an individual's knowledge about a particular matter and helps him/her to identify opportunities (Shepherd and DeTienne, 2005). Westhead et al. (2009) argue that entrepreneurs with previous business ownership identify a larger number of business opportunities than novice entrepreneurs. Cooper and Park (2008) found that knowledge and an entrepreneur's work experience play a central role

in the recognition and exploitation of innovative new product technologies. Prior knowledge on sustainable entrepreneurship conceptualizes how entrepreneurs identify sustainable opportunities, using social, environmental and economic knowledge. Patzelt and Shepherd (2011) suggest that entrepreneurs are more likely to identify sustainable opportunities if they have knowledge of the natural factors (earth, biodiversity, ecosystems, etc.) and social factors (e.g. culture, health and life expectancy). For example Rodgers (2010) - in his study of three UK-based SMEs - found that some entrepreneurs started sustainable enterprises after increasing their knowledge through "green" education.

Motivational drivers

More general studies from agricultural entrepreneurship have shown the importance of entrepreneurial orientation as a motivational driver (Grande et al., 2011; Verhees *et al.*, 2011). Entrepreneurial orientation from this research tradition is seen as a combination of three elements: innovativeness, risk taking, and pro-activeness (Covin and Slevin, 1989; Miller, 1983; Swierczek and Ha, 2003; Wiklund and Shepherd, 2005; Zahra and Covin, 1993).

Innovativeness is the willingness 'to engage in and support new ideas, novelties, experimentation, and creative processes'; 'it is a 'basic willingness to depart from existing technologies or practices' (Verhees *et al.,* 2011; Verhees *et al.,* 2012). In the early works of Schumpeter, innovation was seen as a breakthrough or radical change characterized by marketing and technological discontinuity and primarily produced by large firms and concentrated markets. However, innovation is rarely a dramatic breakthrough, but rather concerns small improvements in a new process or product— incremental innovation (Szirmai *et al.,* 2011). According to Gebreeyesus (2011) micro and small enterprises in developing countries lack expectations. They produce largely for the low income group and employ lower levels of techniques. Many microenterprises are the self-employed type with a low graduation rate into higher size categories and their innovative activities are limited (Kiggundu, 2002). An innovation in a small enterprise in the developing countries context is largely an adoption of a product, process, or method that has already been adopted elsewhere but new to the firm and not necessarily new to the world, region, country, or industry (Szirmai *et al.,* 2011).

Risk taking is the willingness to commit resources to plans with a reasonable chance of costly failures (Verhees *et al.,* 2012). Farmers differ in the degree to which they accept risk. Some farmers are willing to accept more risk than others. Attitudes to risk are often related to the financial ability of the farmer to accept a small gain or loss. According to De Brauw and Eozenou (2014), risk preferences among farmers in developing countries are important constraints that keep farmers from reaching their productive potential. Smallholders in developing countries face risk at several points in the production process. Dercon and

Christiaensen (2011) explicitly show that Ethiopian farmers are constrained in technology adoption by risk. Dadzie and Acquah (2012) argue that most agricultural decisions are taken in the environment of risk and uncertainty. Farmers will have to make decisions now, which will affect their production later. But farmers are often not sure of changes in a range of factors including weather, government policies, and technology, which makes it difficult for them to predict the future with certainty. Risk and uncertainty impact households' production and consumption decisions.

Pro-activeness is defined as the willingness to act in anticipation of future problems, customer needs, or changes in the market environment (Verhees *et al.,* 2012). Pro-activeness is an opportunity seeking, forward looking perspective characterized by the introduction of new products or services ahead of the competition and acting in anticipation of future demand (Miller, 1983). Kessler (2006) found that farmers who are driven to make progress are more willing to experiment and make investments. These progressive farmers can later transfer their knowledge to other farmers and become leaders of new activities in a village.

Innovativeness, risk taking, and pro-activeness, in small firms like farms, are characteristics of the owner-manager, but, similar to large firms, together these dimensions of entrepreneurial orientation allow farms to renew their organization and drive markets by offering an alternative and potentially superior customer value proposition (Verhees *et al.,* 2011).

As already stated, sustainable development entrepreneurs are motivated by more than just personal economic gain (Patzelt and Shepherd, 2011), with altruism often being mentioned as important. Altruism is an individual's motivation to enhance the welfare of other people without conscious regard of one's self-interest (Patzelt and Shepherd, 2011; Simpson and Willer, 2008). Altruistic individuals are generally more generous, helping, and kind than others. Altruistic motivation arises when individuals experience empathy and sympathy for others (Batson *et al.,* 1991; Davis, 1994). Consistent with Patzelt and Shepherd (2011), social entrepreneurship literature emphasizes altruistic motives and the desire to help others as drivers of opportunity recognition (Hockerts, 2005; Mair and Noboa, 2003; Doherty *et al.,* 2006). Shaw and Carter (2007) argued that social entrepreneurs maximize networks and utilize them to build local credibility and reputation, rather than finance matters . Understanding what constitutes cultures and groups (the communal environment) may also contribute to recognizing opportunities that create social gain. For instance, entrepreneurial action may create greater social gain when it considers the cultural values and social groups of the communities it targets for sustainable development. For environmental gain, Patzelt and Shepherd (2011) state that if individuals are more aware of their own (and society's) inability to sustain the natural and communal environment, their sensitivity to opportunities for sustainable development will be enhanced.

For example, destruction of the natural environment by pollution threatens the lives of many people, and individuals living in highly polluted areas are vitally interested in opportunities to reduce pollution (Patzelt and Shepherd, 2011).

3.3 Materials and methods

3.3.1 Description of the study area

A multiple-source case study approach was employed within the framework of activities of the Fanning the Spark project in Burundi. Data were collected in four villages of the provinces Gitega (Bukirasazi & Makebuko) and Muyinga (Butihinda & Giteranyi). Gitega is found in the central part of Burundi and Muyinga in the Northern part of Burundi. The province of Muyinga is located along the border with Tanzania and therefore presents relatively good business opportunities due to cross-border trade. The province of Gitega is located in the heart of Burundi, but also Gitega is being the second biggest town of Burundi at a two-hour drive from the capital Bujumbura and with considerable trade opportunities.

3.3.2 Participants

The study was conducted on 10 farmer groups in the Gitega (5 groups) and Muyinga (5 groups) provinces. The 10 groups were selected from among 63 groups initially interested in making a so-called PIC: a sustainable business plan at the group level. PIC groups were formed on the initiative of the group members themselves, taking into account aspects like proximity, having the same vision, and already existing friendships and trust among the members. The final selection of the 10 groups was based on additional aspects like group dynamism and readiness to start working as a group. Twenty four (24) members from five groups in Gitega (GIT) and thirty two (32) from five groups in Muyinga (MUY) participated in the study. Each group had a minimum of three members and a maximum of ten. The main characteristics of the 10 groups are given in Table 3.1.

Table 3.1 shows that groups differ in terms of the activities that they want to undertake as businesses, and beyond that their experience in the respective businesses. This is supported by a short group description, that highlights one or more key aspects of each group. Next to the **basic characteristics** of each group (*gender, education* and *mean age*) the **farming** category in table 1 shows the *"farming experience share"*, which is the share of group members with farming experience: 1 means that all group members have experience in farming (e.g. MUY 4) and 0.80 means that 80% of the members have farm work experience (GIT1).

Table 3.1 *Group characteristics*

					Basic characteristics			Farming	
Group	**# of members**	**Activity of the group**	**Experience in the group' project**	**Group short description**	**Gender (femal share)**	**Education (secondary school share)**	**Mean age**	**Farming experience share**	**Years' experience in farming**
GIT 1	5	Grow and commercialize maize, peas and beans	Known by two members in the group	Solid group, ready to learn the commerce from the peers. Commitment in saving money for the group project and high level of trust	0.80	0. 20	48.0	0.80	32
GIT 2	5	Grow and transform banana in local drinks	New as a business for the group	Members growing bananas but want to do the business in the area of a lot of competition	0.40	0	33.0	1	24
GIT 3	5	Establish a selling point for agro-pastoral inputs	New for the group	Creative group, targeted a needed business in the area but new for the group	1	0.20	42.5	0.80	12
GIT 4	4	Open a food shop of basic needs	One member experienced	Solid group of women committed and acting in many development associations of credits and saving	0.75	0.20	36.5	1	24
GIT 5	5	Open a restaurant	New for the group	Unexperienced team in the project idea and also little entrepreneurially oriented	0.60	0	47.5	1	35
MUY 1	4	Bakery	One member experienced	One member who lead the group and experienced in business management, others are like followers	0.50	0.25	32.7	0.75	16
MUY 2	5	Make oil from avocados	Known by two members in the group	Open minded and dynamic persons who want to introduce a novel technique.	0.40	0.20	40.5	0.80	16

					Basic characteristics			Farming	
Group	**# of members**	**Activity of the group**	**Experience in the group' project**	**Group short description**	**Gender (femal share)**	**Education (secondary school share)**	**Mean age**	**Farming experience share**	**Years' experience in farming**
MUY 4	3	Sustainable farming/ selling of tomatoes, cabbage, maize	Known by all members in the group	Team of hard working and dynamic men. Experienced in land preparation and care.	0	0.66	37.3	1	21
MUY 5	10	Weaving and breeding of chickens	Weaving Known by 3 members and breeding of chicken known by 4 members	Enthusiasts and young women with many ideas. They started with two projects	1	0.10	27.8	1	14

Also in this category is the *"years' experience in farming"* index, which is the average number of years that the members in a group have worked as farmers; GIT 3 with on average 12 years of farming experience and GIT 4 with 24 years.

3.3.3 Data collection and analysis

Firstly, data were collected using a semi-structured interview approach focusing on prior knowledge and motivation of each group member individually. Prior knowledge was operationalised by knowledge about social, environmental and economic sustainability. Respondents were asked (i) five questions to capture their social sustainability, (ii) nine questions to capture environmental sustainability, and (iii) six questions for economic sustainability. This amounts to twenty questions for the whole prior knowledge index. For each question the response scale was from 1 (no Prior Knowledge) to 5 (Considerable Prior Knowledge).

To get the prior knowledge index at group level, we first averaged the responses to the twenty questions per individual. This is the prior knowledge (PK) index at individual level. Next, for members of the same group, we averaged their individual PK indices to get the mean of "prior knowledge" per group.

Motivation included entrepreneurial orientation plus other types of motivations (income- and knowledge motivation, see table II for a summary of the used constructs) of each group member. For entrepreneurial orientation, three underlying dimensions were used i.e. innovativeness, risk taking, and pro-activeness. Respondents were asked (i) three questions

to capture their pro-activeness, (ii) one question to capture their risk- taking, and (iii) two questions to capture their innovativeness. This amounts to six questions for the whole entrepreneurial orientation index. For each question the response scale was from 1 (never done any entrepreneurial activity) to 4 (often done such activities). These dimensions were discussed with and assessed by the farmers using constructs validated by Verhees *et al.* (2011) in the context of agricultural entrepreneurship. We computed the entrepreneurial orientation (EO) index at group level in a similar way as for the PK group level index: we first averaged the responses per individual, and then averaged the individual EO indices of members of the same group to get the mean of "entrepreneurial orientation" per group.

Next to entrepreneurial orientation, other motivational factors of the farmers to join the group and create a sustainable business plan were discussed, with proxies for self-interest versus more altruistic types of motivations developed. Farmers were asked to what extent gaining more income (income motivation) or increasing knowledge (knowledge motivation) played a role as a motivating factor to join the PIC process.

For income motivation (IM), as an example, in the group GIT 1, 80% of its members were driven by income motivations. As some members were also having other motives like friendship or being able to sell products together, the sum of the two motives is not always 100%.

Table 3.2 *Drivers data analysis*

	Variables to be measured	**Scale for measuring each variable**
Prior knowledge on sustainability aspects (PK)	Social sustainability Environmental sustainability Economic sustainability	1. No knowledgeable 2. Little knowledge 3. Some knowledge 4. Reasonable knowledge 5. Considerable knowledge
Entrepreneurial orientation (EO)	Pro-activeness Innovativeness Risk taking	1. Never 2. Seldom 3. Sometimes 4. Often
Other types of motivation	Income motivation share (IM) Knowledge motivation share (KM)	Percentage of income and knowledge motivation share

Secondly, focus group discussions (FGDs) were used with the groups in order to further analyse the findings from individual interviews and to get richer data on the group level. Questions in FGDs concerned group formation, as well as how the group perceived its

groups scores on prior knowledge and motivations . Data from FGDs were analysed first by organising data from the discussions by categorising them regarding the questions asked. The next step was to sort out group quotes and link them to quantitative data. Finally, the sustainable business plan developed by each group was taken as an outcome in this paper. In this early stage, before acting on the planned projects by each group, the plans represent a concrete group output for sustainable entrepreneurship. For assessing the quality of each sustainable business plan, the "integration" concept was emphasised (Table III). This means that a plan (i.e. the PIC) includes truly integrated activities that together aim at making it more sustainable, considering the "3Ps" and including concepts of social (people), environmental (planet), and economic (profit) sustainability. In order to systematically evaluate the group plans, we used "rubrics" (Dawson, 2015) to assess different dimensions: concreteness of the PIC (the PIC is specific, not general and vague), comprehensibility (the PIC is easy to understand), flexibility (the PIC allows including changes at a later stage), sustainability (the PIC covers the 3 Ps of sustainability). Based on the dimensions, we used the levels of competence with the rating ranging from 0 (insufficient) to 5 (excellent) in each section of the plan (social, environmental and economic) and for the mean "business plan score per group". The levels were designed as follow:

0 = insufficient: Almost none of the required themes are elaborated in the section. The writing is disorganized and very difficult to understand.

1 = sufficient: The quality of the section is of acceptable average. Basic concepts related to the section are mentioned but not well developed. The PIC group demonstrates minimum understanding of the basic concepts.

2 = satisfactory: The section is developed satisfactorily. The PIC groups complies with the basic requirements of the section. The writing is acceptable. They demonstrate understanding of the basic concepts.

3 = good: The section is of high quality. The material is presented well. The PIC group demonstrates clear understanding of the section.

4 = very good: The section is extremely well developed. The PIC group demonstrates complete understanding of the material required to complete the tasks.

5 = excellent: The section comprises more than what is required and it is developed in a logical, organize and concise way.

Table 3.3. *Outcome data analysis*

	Variables to be measured	Scale for measuring each variable
Business plan (BP)	Social sustainability Environmental sustainability Economic sustainability	0. Insufficient 1. Sufficient 2. Satisfactory 3. Good 4. Very good 5. Excellent

3.4 Results

Results of this study are summarized in Tables 3.4, 3.5 and 3.6, which are explained in this section, with focus on the highest and lowest group scores on prior knowledge (PK), entrepreneurial orientation (EO), and on the quality of the business plans (BP).

Table 3.4. *Group scores on the prior knowledge, motivation and entrepreneurial outcomes*

GROUP	Mean PK score (Prior Knowledge)	Mean EO score (Entrepreneurial orientation)	Mean BP score (Business Plan)	Income motivation share (IM)	Knowledge motivation share (KM)
GIT 1	**2.45 #**	2.93	**3.66 ***	0.80	0.20
GIT 2	**2.16 #**	2.86	**2.66 #**	0.40	0.40
GIT 3	2.64	**2.70 #**	3.00	0.60	0.20
GIT 4	2.68	3.03	**3.66 ***	0.40	0.40
GIT 5	**2.37 #**	**2.79 #**	**2.66 #**	0.75	0.25
MUY 1	2.60	2.91	3.33	0.50	0.25
MUY 2	**3.12 ***	**3.13 ***	3.00	0.40	0.20
MUY 3	2.58	**2.76 #**	3.00	0.60	0.40
MUY 4	**3.05 ***	**3.05 ***	**4.00 ***	0.33	0.66
MUY 5	**2.77 ***	3.11 *	**2.66 #**	0.69	0.10

* top three in each category; # bottom three in each category

Table 3.5 *In depth analysis of entrepreneurial orientation (EO) and prior knowledge (PK)*

	EO			PK		
GROUP	**Pro-active-ness index_ group**	**Risk- taking Index_ group**	**Innovativeness index_ group**	**Social sustainabil-ity_ index_ group**	**Environmental_ sustainability_ index_ group**	**Economic sustainabil-ity index group**
GIT 1	3.2	2.6	2.7	2.2	2.7	2.3
GIT 2	3.2	2.4	2.6	2.2	2.6	1.5
GIT 3	3.1	2.2	2.4	2.5	3.1	2.1
GIT 4	3.2	2.6	3.0	2.5	3.1	2.2
GIT 5	3.2	2.3	2.5	2.1	2.6	2.3
MUY 1	3.1	2.5	2.9	2.2	3.3	1.9
MUY 2	3.4	2.8	2.9	2.9	3.7	2.4
MUY 3	2.9	2.3	2.8	2.2	3.2	1.9
MUY 4	3.3	2.7	2.8	2.8	3.7	2.3
MUY 5	3.4	2.5	3.0	2.6	3.0	2.5

Table 3.6 *In depth analysis of business plan (BP)*

	BP		
GROUP	**Evaluation score_ social sustainability**	**Evaluation score environmen-tal sustainability**	**Evaluation score_ economic sustainability**
GIT 1	4	4	3
GIT 2	2	3	3
GIT 3	3	3	3
GIT 4	3	4	4
GIT 5	2	3	3
MUY 1	3	4	3
MUY 2	3	3	3
MUY 3	2	4	3
MUY 4	4	4	4
MUY 5	2	3	3

Concerning prior knowledge, Table 3.4 shows that the highest group score on PK is 3.12, which is nearest to score 3 (some knowledge). The lowest score is 2.16 which is closest to score 2 (little knowledge). Looking more in-depth into the social, environmental and economic sustainability aspects that compose PK (see table 3.5), we find that both top and bottom groups have relatively little knowledge on social and economic sustainability aspects, with scores around 2 (little knowledge). This is understandable given that group members are all farmers with little experience of working in groups and on economic issues. As one of the group members of MUY 5 explained in the focus group discussion: "*this is our first experience to work as a group on a common business idea"*. For the top three groups, PK for environmental sustainability is relatively high (i.e. beyond 3; some knowledge) compared to the bottom three that have very little PK on environmental sustainability aspects. This higher score is seen in MUY 4 that is using improved farming techniques for land care in order to have better production, and MUY 5 which is using chicken manure for more productive lands.

A more detailed analysis shows that the top three groups in PK (MUY 2, 4 and 5) seem to recognise opportunities in an area where some or all group members already had prior knowledge. For instance, MUY 2 aims at the business opportunity of making oil from avocados. As farmers explained in the focus group discussions, this transformation practice is known by two of the five members of the group. Furthermore, MUY 4 wants to do business in selling tomatoes and cabbages fresh from the land, which is also related to the PK of two among the three group members, who have an average of 21 years of prior farming experience. MUY 5 is targeting the two parallel businesses of "weaving and breeding chickens". Among the ten members of MUY 5, three are already familiar with weaving and four with breeding chickens.

In the case of the bottom three groups, there is a weaker connection between PK and the business opportunity. Among the bottom three PK groups (GIT 2, 5 and 1), two want to work on "new opportunities for the group"; this is the case of GIT 5 and 2 that respectively want to open a restaurant and transform banana in local drinks. These ideas were driven by making money, because both groups are located in the same sub-village where trade is very active. As reported by one of the group members of GIT 5 *"Our sub-village is an area of many teachers, nurses, judges, etc. who live in the town of Gitega located 28 km away, so mid-day they have difficulties to find where to eat and where to refresh with some local drinks after work"*.

The groups reported also to have a desire of increasing income. For GIT 1, the opportunity of commercialising maize, peas and beans was not completely new for two members among the five, but estimating the market and the way to serve it were still very new for the group.

As one of the GIT 1 group members explained: *"We formed this group to increase knowledge in business of the main crops and serve the market better".*

Concerning motivational drivers, for entrepreneurial orientation (EO) the highest score is 3.13 which is quite high because in this category the scale ranges from 1 to 4. The lowest score is 2.7. The results show that the top three in EO rating are also the same MUYINGA groups as in PK rating (MUY 2, 5 and 4 respectively) and the bottom three are GIT 3, MUY 3 and GIT 5. For example, MUY 2 is targeting both the local and Tanzanian (export) market for avocado oil, and is already planning to buy a processing machine and other requirements from Tanzania. By analysing EO more in-depth (see table 3.5), namely pro-activeness, risk taking and innovativeness separately, we find that both top and bottom groups rarely take risks and have not been innovative before, because scores were around 2. For the top three groups, their pro-activeness scores seem to make the difference for scoring high on EO, i.e. being far beyond 3 meaning that these farmers have a vision of the farm and act proactively. For instance, MUY 4 bought a pump to irrigate their crops and as such increased and secured the production. One MUY 4 member said: *"It is better to spend money today and buy a pump and work on opportunities, our effort will be rewarded. It will be easy also and enjoyable for our group to do this business, that's why we are trying to be proactive instead of reactive to challenges".*

Interestingly, it was also MUY 4 which was the most motivated by the wish to increase knowledge (KM) rather than income (IM). As one of MUY 4 members clearly stated: *"We need to increase knowledge in farming, collaboration and learn from each other for better production for ourselves and our community"*. Contrarily to MUY 4, MUY 5 was the least motivated by increasing knowledge. Their focus was on intending to innovate their equipment for weaving and as such out-compete other weavers in the area. As one of the MUY 5 group members explained: *"Our group is planning to innovate in weaving using machines and put better sheets and tablecloths at an affordable price in the market"*.

Concerning the business plan (BP), Table 3.4 shows that the high score is 4 (very good) and the lowest is 2.6 which means a tendency to become good (i.e. between satisfactory and good). MUY 4, GIT 1 and GIT 4 have the highest scores. The bottom three groups are GIT 2, GIT 5 and MUY 5. The analysis of the three factors that compose the "integrated" BP, namely social, environmental and economic sustainability (see table 3.6), shows that the top three groups were having a high score in environmental sustainability (4 = very good) while for social and economic sustainability all groups scored more or less equal (between 3 and 4). For the bottom three, environmental and economic sustainability scores were equal with score 3 (good), but they scored low on social sustainability (2 = satisfactory).

3.5 Discussion

Coming to our overarching objective and research question stated in the introduction, the results show first of all that in this context prior knowledge and entrepreneurial orientation are not homogenous constructs: we see clearly differences among their components. Firstly, table V shows that for prior knowledge as a driver of sustainable agriculture entrepreneurship, farmer groups in general have relatively little prior knowledge on social aspects (like group cohesion, common group visions, mutual trust, etc.) and economic aspects (like knowing the market, the way to serve it, dealing with customers, etc.). However, the results also show that in the Burundian agriculture context, the environmental sustainability aspects like how plants grow, how to work the land, and how to control erosion are well-known by farmers; it is related to their day to day life. This seems to be further reflected in the early outcome: the "integrated" sustainable business plan (BP). Among the 10 groups, the top three in having a higher score on BP also have a higher score on the environmental sustainability part of the business plan. Overall, this shows that in a farming context, the environmental sustainability part is well understood, followed by the economic sustainability and lastly the social sustainability part.

Moreover, based on the interviews with the groups, differences in prior knowledge also seem to influence the initial paths of opportunity identification. Groups high in prior knowledge seem to construct the business ideas more from an "inside-out" mode (i.e. stemming from ideas or wishes from group members). Groups low in prior knowledge seem to source their business ideas mainly from what is available in their direct environment (i.e. reacting to circumstance in the environment). This is an interesting finding as it confirms that multi-paths are possible (Vogel, 2016), but also generated additional research questions, concerning which paths eventually will generate more success in this context.

Secondly, concerning entrepreneurial orientation (EO), farmer groups in general are rarely taking risks and are not perceiving themselves as innovative. The top three EO groups have particularly higher pro-activeness scores compared to the bottom three EO groups. This shows that farmers perceive themselves as more pro-active rather than risk-taking or innovative (see table V). Pro-activeness as an opportunity seeking behaviour, a forward looking perspective (Lumpkin and Dess 1996), is beneficial for firms in formal sectors in developing countries (Boso *et al.*, 2013) and micro-enterprises operating in emerging economies (Lindsay *et al.,* 2014). Concerning risk taking, De Brauw and Eozenou (2014) state that risk preferences among farmers in developing countries are important constraints that keep farmers from reaching their productive potential. Also in Burundi we see that farmers score very low on this factor, and that it is the lowest component of entrepreneurial orientation.

When analysing relations between the drivers – prior knowledge (PK) and motivations (EO, IM, KM) - and the outcomes (BP), from Table IV we find three different situations.

Firstly, one of the top three groups in both PK and EO and with a high share of knowledge motivation (KM), is also one of the top three groups in quality of BP (MUY 4). Furthermore, one of the bottom groups in PK and EO and with a low share of KM is also one of the bottom three groups in BP (GIT 5). This suggests that 1) having prior knowledge of a sustainable opportunity, 2) being entrepreneurial oriented and 3) being motivated to increase knowledge (i.e. showing aspects of altruists motivation), positively influences the quality of the business plan. This is supporting the earlier work of Patzelt and Shepherd (2011), who propose that more knowledge of the natural or communal environment and altruistic motives drive the recognition of opportunities for sustainable development. Entrepreneurial alertness, in its turn, is a necessary condition for the success of the opportunity identification triad: recognition, development and evaluation. This is again in line with Patzelt and Shepherd (2011) who argued that knowledge of markets will direct the attention of altruistically motivated individuals towards entrepreneurial activities that develop economic, environmental, and social gains.

Secondly, two other groups which score in the top three of PK and EO (MUY 2 and MUY 5) score low on the quality of their business plan (BP). This illustrates the importance of knowledge motivation in the interplay between drivers and outcome in our case, because both groups have one of the lowest scores for knowledge motivation (KM). Hence, this would suggest that if these groups would be driven less by the motivation to increase income (IM) and more by KM, that their business plan would have been better and include more sustainability aspects.

Finally, when looking at the BP scores, GIT 1 and GIT 4 are among the top three. However, these groups score low to regular on PK, EO and KM; hence, this contradicts the suggestion made above concerning the importance of these drivers. These results suggest that, next to these drivers, there are other factors that lead to developing high quality sustainable business plans, for instance the influence of individual team members and/or their complementarity for achieving a higher quality end-product. In our case, both groups (GIT 1 and GIT 4) have a teacher at a primary school as a team member, who helped the group in writing in a concise way, suggesting that individual team members' education also influences the quality of the BP. This further illustrated by GIT 2 and 5 which are in the bottom three of BP, and have members with rather low levels of education (some are even illiterates).

Education level of the individual members of a group thus seems to have an important influence: people with more education have greater abilities to overcome obstacles to

business start-up and continuity in terms of planning, securing initial capital requirements, legislative and licencing processes, logistics, marketing and ensuring quality of products (Cannon 1991; Dolinsky *et al.* 1993; Bosire 2001; Bosire and Etyang 2003). However, focusing on business plans only as early outcome of the sustainable entrepreneurship process is a limitation for the present paper. Therefore, research that investigates alternative outcomes (i.e. expert ranking of the quality of business ideas, see (Baggen et al. 2017) as well as investigating later stage outcomes is clearly needed.

3.6 Conclusion

This chapter studied drivers of sustainable agricultural entrepreneurship (knowledge and motivation related drivers) as well as early outcomes (quality of the sustainable business plan). In analysing the drivers separately, three major findings were revealed for this Burundian case. Firstly, farmers' prior knowledge on environmental sustainability is better developed than knowledge on social and economic sustainability aspects. This is reflected in the environmental sustainability part of the business plan, which is generally better than the economic and social sustainability part of the business plan. Secondly, the top groups in prior knowledge identify opportunities directly related to their prior knowledge and seem to follow a different opportunity identification path. Thirdly, concerning entrepreneurial orientation, pro-activeness of the group is more of a determinant than risk-taking or innovativeness. In fact, all farmer groups in this study had hardly ever undertaken a risky business before, nor started something innovative. It was their pro-activeness, triggered by the opportunity offered to start integrated group plans, that determined a higher score on entrepreneurial orientation.

Analysing relationships between drivers and outcome, there seems to be a positive interplay between the groups' prior knowledge, entrepreneurial orientation and knowledge motivation and the quality of the business plan. Particularly knowledge motivation, the drive to gain more knowledge (as a proxy of altruistic motives) rather than more income, is very important. However, there are also other variables in play that explain the quality of *sustainable* business plans in this early phase of entrepreneurial group work, such as level of education. This combination of having received better education and being driven to gain more knowledge, is of crucial importance for obtaining better quality business plans that consider sustainability aspects.

Group alignment, eliciting strengths and weaknesses and discussing them in the light of the groups' ambitions - seems to be important. Such discussions should include empowering

farmers to become more pro-active, activate their prior knowledge, seek for business opportunities, and raise awareness (and educate) about the importance of sustainability aspects related to smallholder businesses. This will also trigger farmers' intrinsic motivation to improve, learn and gain more knowledge, leading eventually to business plans that are more sustainable and better integrated into the farming system.

Findings from this study also demand further monitoring of the later stage outcomes of the recently started business plans in this study, in order to draw more in-depth conclusions on their contribution to sustainable development

4. Influence of sustainable entrepreneurship trainings on knowledge and practice of farmer groups in Burundi

This study analysed the extent to which sustainable entrepreneurship (SE) trainings influence learning (knowledge) and behaviour (practice) of farmer groups in the context of Burundi. A "then" and "post"-test design was used to collect quantitative data on both starting and current level of knowledge and practice from ten farmer groups which had received SE training and ten not-trained groups. In order to further analyse findings from the quantitative data, qualitative data was also collected. Both the trained and not-trained farmer groups perceived an increase in knowledge and practice in all the three sustainability aspects (economic, environmental and social) between 2016 and 2019, particularly concerning social aspects. However, the trained groups perceived a higher increase compared to the not-trained groups. This higher increase was mostly in the economic aspects of sustainability. Moreover, the findings show that this reported higher increase by the trained groups comprises more advanced levels of understanding and application of sustainability aspects than the not-trained groups. The study suggests that policies that focus on sustainable rural development, should work on empowering farmers through training and give them time and space to practice and share knowledge. Moreover, as in this study both groups (trained and not-trained) reported that group members learnt from each other via sharing knowledge and experience, informal learning among farmers should be encouraged. This means that the solution is not just more formal training, but also to stimulate other types of learning on the job.

Based on:

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4.1 Introduction

Knowledge and attitude gaps limit entrepreneurs in developing and emerging countries to set-up sustainable businesses, which, in turn, may have negative consequences for employment, productivity, and economic growth (McKenzie and Woodruff, 2013). Targeted education and training interventions can remove such competence gaps, and training in different kinds of management and entrepreneurial competencies have therefore become increasingly important in developing and emerging countries (Falola *et al*., 2014; Fafchamps *et al*., 2014; Giné and Mansuri, 2014; Elnaga and Imran, 2013; Kraiger, 2003). Landini and Brites (2018) showed that implementing training processes focused on experience sharing and reflection on practice seems advisable for rural extension agents. Togbé *et al*. (2015) found that training in good agricultural practice through participatory research experiments increase farmers' knowledge and practice of integrated pest management.

In this chapter we report on such an intervention: the development of Integrated Collective Plans in Burundi, or PIC (Plan Intégré Collectif in French). PIC development in Burundi is preceded by the creation of Integrated Farm Plans (PIP, from French 'Plan Intégré du Paysan'). The latter focuses on the household level with the aim to foster a significant change in mind-set through enhancing farmers' capability and motivation to care for their land. As a follow up to PIP creation at the household level, the development of PICs is focused on sustainable entrepreneurship at the group level: farmers who have a PIP are stimulated to start collaborating in the local community and develop and implement new sustainable business opportunities in groups. The end result of the PIC intervention is the development of "sustainable" business plans by the PIC groups, which differ from conventional group business plans in the sense that they include the 3Ps (people, planet and profit) of sustainability that together make the business plan more sustainable.

Designing these integrated, collective business plans by small farmer groups is not happening overnight, but rather evolves through a series of trainings. These training sessions for the PIC groups were executed from June 2016 to July 2016. Training farmers has been proven to have a variety of results, such as enhancement of farmers' skills in farming (Tripp *et al*. 2005). Although there are trainings that specifically focus on sustainable entrepreneurship (SE) in Western economies and higher education contexts (e.g. Climate-KIC), designing and evaluating such trainings in developing and emerging (D&E) contexts is hardly done (Mckenzie, 2010). Moreover, most studies that try to capture effects of training in D&E contexts 'isolate' the training effects in a pre- and post-test, without paying much attention to the learning activities that actually trigger development, as well as the broader context of development in which the training is embedded. Although such pre- and post-test studies

provide important evidence for research and policymakers about the potential effect of training interventions, they also have their limitations. A first challenge is the fact that it is difficult for participants to do a proper self-assessment of their current state of knowledge, skills or attitude at the start of such a training. As participants are often completely new to a topic, such a pre-test is problematic. A second challenge is the fact that learning is not exclusively taking place in the training and at the individual level. Much learning is taking place alongside working with others (Landini and Brites, 2018), by handling tasks in work itself, etc. (Eraut, 2004). Therefore, it remains difficult to attribute learning outcomes solely to a training intervention.

To contribute to the literature on the role and impact of business training in emerging and development countries, we are reporting on the influence of specific designed SE trainings on knowledge (learning) and practice (behaviour) of farmer groups in Burundi. To do so we studied 10 groups that followed this training, and matched these with 10 similar groups that did not, three years after the training was conducted. Our contribution is threefold. Firstly, the studied training did not focus on managerial or entrepreneurial 'skills-deficits' of individual farmers, but more holistically focussed on knowledge development, collaboration, community involvement and land stewardship. Secondly, as explained, instead of a pre- and post-test design, we used a "then" and "post"-test measures design (Howard and Dailey, 1979; Shaw *et al*., 1999). This means that we asked participants to reflect in a later stage, three years after the training, about their starting level and their current level, therefore capturing self-perceived increase, rather than absolute proficiency levels.

Thirdly, we recognized that learning cannot be claimed or isolated for the training only. Therefore, we looked at the influence of training on further learning and knowledge development in the groups. In order to do so, we probed for development of knowledge and practice in general in these three years, and not especially re-calling increase in the context of the training.

More specifically, the following research question guided this study:

To what extent do sustainable entrepreneurship trainings influence knowledge (learning) and practice (behaviour) of farmer groups?

4.2 Theoretical framework

4.2.1 Business and entrepreneurship training in developing & emerging countries

Business training programs are a popular policy option to try to improve the performance of enterprises (including farms) around the world, but until more recently there has been very little rigorous evidence on the specific impacts of business and entrepreneurship training programs in D&E countries (McKenzie and Woodruff, 2013).

The last years have seen a rapid increase in attention to the idea that "managerial capital" or poor management is a constraint to production in developing countries (Bruhn *et al*., 2010; Bloom and Van Reenen, 2010; McKenzie and Woodruff, 2013). There is relatively modest impact measured of training on the survival of existing firms, but stronger evidence that training programs help prospective owners launch new businesses more quickly (McKenzie and Woodruff, 2013). Most studies find that trainees implement some of the practices taught in the training, but the magnitude of these improvements in concrete practices are often relatively modest (McKenzie and Woodruff, 2013). Murshed-E-Jahan and Pemsl (2011) in their study concluded that building the capacity of farmers through training is more valuable than the provision of financial support when it comes to enhancing production and income. In general, Vesala and Pyysiäinen (2008) indicate that most farmers agree that entrepreneurial skills are important and can be learned.

A further justification that policymakers sometimes make in subsidizing training is that business growth may have broader benefits for others in the community through increasing employment opportunities. The most direct employment impacts are likely to be for the owner him or herself – through increasing their chances of employment by starting a new business and through reducing the chance of business failure. When it comes to programs working with microenterprises, Karlan and Zinman (2011) found that business training resulted in 2 to 3 percentage point increase in the likelihood of loan perfect repayment (although this is only marginally significant). Ashby *et al.* (2009) found that a combination of training that goes beyond business skills training is needed for farmer groups in order to perform their small agri-businesses.

4.2.2 Trend towards education/training for sustainable entrepreneurship outcomes

The traditional schools of thought, based on the work of Schumpeter (1934), Knight (1921) and Kirzner (1973), emphasize the financial-economic functions of entrepreneurial

activity. However, entrepreneurship for sustainable development is more than an economic phenomenon (Ploum et al., 2018). The emerging stream of academic literature on sustainable entrepreneurship adds a new dimension to the promise of entrepreneurship being an attractive way of generating competitive advantage and resulting in economic gain, by emphasizing *additional goals* of promoting sustainable environmental and social improvement (Schaltegger and Wagner, 2011).

Sustainable entrepreneurs try to manage the "triple bottom line" (Patzelt and Shepherd, 2011); in other words, they balance economic health, social equity, and environmental resilience through their entrepreneurial behaviour. In this respect, sustainable entrepreneurship is seen as a way of generating competitive advantage by recognizing new business opportunities resulting in new products, new methods of production, new markets or new ways of organizing business processes more sustainably (Patzelt and Shepherd, 2011). Thus, the recognition of new opportunities can be seen as an important element of (sustainable) entrepreneurship (Shane and Venkataraman, 2000). Therefore, sustainability is not only something to act on, comply with, or engage in, but a major source for change and opportunities (Dean and McMullen, 2007). As such, knowledge, skills and attitudes to manage sustainable development have not only become key competencies for managers, workers or students but also for those involved in starting new businesses (Ploum et al., 2018).

Today, in the rural area where the farmers are key players in contributing to sustainable development, only craftsmanship will no longer be enough to proactively pick-up new opportunities which integrate responsibilities for People (employment, health, education, human rights), Profit (economic and financial continuity) and Planet (clean environment and preservation of resource stocks). In addition to sound craftsmanship, farmers need to develop sustainable managerial and entrepreneurial skills (Lans *et al*., 2014; Phelan and Sharpley, 2012; Vesala and Vesala, 2010). Farmers thus need to learn and further professionalize in the field of sustainable entrepreneurship. Ashby *et al*. (2009) tackle the question in which features of farmer group training we need to invest to prepare poor farmers to engage successfully with markets. Their findings suggest that part of the answer to this question lies in the innate drive observed in successful farmer groups to develop a capability to coordinate actions in a variety of domains by proposing a conjunction of five skills and competencies. These domains include: basic group management skills, basic financial skills, basic market skills, basic experimentation and innovation skills and basic sustainable production and natural resource management skills. Those skills are needed by poor farmers to organize collectively for successful engagement in "sustainable entrepreneurship".

4.2.3 Training impact evaluation

Measuring the impact of training has a long tradition from the pioneering work of Kirkpatrick (1959), who developed a pragmatic model for helping practitioners thinking about learning and training programmes. He did so by using four levels of training evaluation: (1) Reaction: how well learners appreciated the learning process; (2) Learning: what they learned, i.e. the extent to which the learners gain knowledge and skills; (3) Behaviour change: changes in job performance resulting from the learning process, i.e. capability to perform the newly learned skills while on the job; and (4) Organisational performance: the tangible results of the learning process in terms of reduced cost, improved quality, increased production, efficiency, etc.

At levels 2, 3, and 4 of Kirkpatrick's evaluation framework, the aims of training evaluation include assessing whether a change in learning, behaviour or results has occurred; whether the change can be attributed to the training rather than to other causes; and whether the magnitude of the change is worth the effort and expenditure of providing the training (Shaw *et al*., 1999). In order to determine whether a change has occurred normally requires both a pre-test and a post-test measures. This change occurrence further needs to be analysed in order to see if the desirable outcomes are reached. This is what Golembiewski and colleagues (1976) refer to as alpha and beta changes of an intervention. *Alpha change* is the true change in some variables, measured before and after an intervention, on a scale that has constant meaning across administrations. The difference between pre- and post-measures assesses alpha change, assuming no beta change has occurred. *Beta change* occurs when the meaning of the measurement scale's anchor points change over time (sometimes called response-shift). This can make pre-post comparisons invalid because the scale used may have different meanings at the two administrations.

Note that beta change is actually a desirable outcome in many training settings, as individuals are expected to both increase their knowledge and skills (awareness of the limits of their knowledge), as well as their practices of what is possible through the learning process as a result of the training. One way of dealing with beta change is to give respondents a chance to rate pre-course competency retrospectively at the end of training (called a then-measure). When beta change (response shift) has occurred, a pre- to post comparison of ratings would be almost meaningless. A comparison of then-measures to post measures provides a picture of true change (Howard and Dailey, 1979).

4.3. Materials and methods

4.3.1 Description of the study set-up

This study was performed within the framework of activities of the project Fanning the Spark[1]. Data were collected in four villages of the provinces Gitega (Bukirasazi and Makebuko) and Muyinga (Butihinda and Giteranyi) between April and May 2019. Data collection focused on ten farmer groups which had received SE training in PIC development (i.e. the integrated collective (business) plan at the group level), and ten not-trained groups. All groups were formed on the initiative of the group members themselves, taking into account aspects like proximity, having the same vision, and already existing friendships and trust among the members (see Mupfasoni et al., 2019). The ten trained groups were selected from 63 initially interested groups in developing a PIC, based on two aspects: 1) if they were ready to start with the joint business ideas, 2) whether their joint business ideas was concrete. The ten not-trained groups for this study were selected from the 53 remaining groups.

Table 4.1 shows the characteristics of the trained and not-trained groups. In almost all aspects the variables indicate that the two type of groups are comparable. For example, for the group size, 51 trained farmers in the 10 groups were compared to 52 not-trained ones in the other 10 groups. Concerning age the trained groups are on average 37.83 years old and the not-trained 39.47; hence also quite similar. About gender both trained and not-trained groups are mixed with 60.22% of women and 39.78% of men for the trained groups whereas the not-trained groups are composed by slightly more men (51.51) than women (48.49). Finally, trained and not-trained groups are on average quite comparable in terms of PIP experience within the groups, i.e. in composition and distribution of first generation PIP farmers (the most innovative farmers, trained by the project), and subsequent PIP generations (second and third) that started later with PIP creation on their farm.

The training sessions, executed from June 2016 to July 2016, focused on how to create a PIC, which differs from conventional or traditional group business plans because of including integrated aspects that together aim at making the PICs more sustainable. In the SE training, concepts of social (people), environmental (planet), and economic (profit) sustainability are used as a basis for the creation of the PICs. Two first training modules were on social sustainability, the third and fourth modules on environmental sustainability and the fifth module on economic sustainability. Given that truly learning about these sustainability aspects and adopting them within the PICs takes time, the whole training process took

1 Fanning the spark is a Dutch project implemented in Burundi from 2013 to 2017, in which Wageningen University and Research was one of the partners. In this project, farmers were empowered to develop an integrated farm plan (PIP) for their household, and to form organized farmer groups with an Integrated group plan (PIC).

Table 4.1. *Characteristics of the trained and not-trained groups*

Group category	Group ID	#	Gender		Mean age	Experience-PIP generation		
			% male	% female		% 1st gen.	% 2nd gen.	% 3rd gen.
Trained Groups	**Total**	**51**	**39.78**	**60.22**	**37.83**	**20.23**	**79.77**	**0**
	GIT 1	5	20	80	48	40	60	0
	GIT 2	5	60	40	33	0	100	0
	GIT 3	5	0	100	42.6	40	60	0
	GIT 4	4	25	75	36.5	50	50	0
	GIT 5	5	40	60	47.6	0	100	0
	MUY 1	4	50	50	32.8	25	75	0
	MUY 2	5	60	40	40.6	0	100	0
	MUY 3	7	42.8	57.2	31.1	10	90	0
	MUY 4	3	100	0	37.3	33	67	0
	MUY 5	8	0	100	28.8	0	100	0
Not-trained Groups	**Total**	**52**	**51.51**	**48.49**	**39.47**	**31.1**	**52.34**	**16.56**
	GIT 6	5	40	60	53	60	40	0
	GIT 7	4	100	0	33	50	50	0
	GIT 8	5	20	80	44	60	40	0
	GIT 9	5	20	80	41.6	20	40	40
	GIT 10	5	100	0	34.8	40	60	0
	MUY 6	7	14.3	85.7	31.1	14.3	14.3	71.4
	MUY 7	4	75	25	35	25	50	25
	MUY 8	8	62.5	37.5	40	25	62.5	12.5
	MUY 9	6	50	50	34.6	16.7	66.6	16.7
	MUY 10	3	33.3	66.7	47.6	0	100	0

about 5 full days in total, and one to two final day(s) to finalize the PIC in each group.

More in detail: in module 1 *"Group building and empowerment",* the training focused on group building activities that aim at having the same mentality and motivation to carry out the PIC, based on collaboration within the group, trust between the members, and intrinsic motivation. In module 2 *"Achieving our objective together*, aspects developed in the training were: participatory analysis of the group, drawing the dream PIC, SWOT analysis of the PIC group, what is needed within the group to achieve the dream PIC, commitment of all members, and agreements. Module one and two were taught on Day one. On day two, the module 3 *"The importance of integrated activities"* was taught on awareness raising activities that aim at having a common vision on integrated activities and how these strengthen environmental sustainability of the PIC, the household and the village. Problems in the village and integrated solutions (opportunities to improve)

were discussed also, as well as social and economic activities which can contribute to sustainable development in the village.

On day three, in the module 4 *"Caring for our environment",* the training was on discussing and defining activities for environmental sustainability of the PIC, collective activities directly strengthening the PIC, as well as individual activities that enrich and strengthen the PIP of each of the members (e.g. small kitchen gardens, erosion control, reforestation, water harvesting, health elements, better housing, etc.). Days four and five were reserved for Module 5 *"Managing a small business with a business plan",* and aspects developed in it were: activities needed for economic sustainability of the small business, how to run a small business, managing the micro-credits, own contributions, assigning a treasurer, when able to be independent of credit, planning, tracking inputs/outputs, setting internal rules (obligations and sanctions), organising meeting schedule, scanning the market, making a business plan as part of the PIC and drawing of the final business plan.

4.3.2 Data collection and analysis

To measure development of sustainable entrepreneurship, the competence model of Ashby *et al*. (2009) was used with its 27 indicators. From these 27 indicators, we selected 14 indicators that best measure both knowledge and practice representing the three major sustainability aspects (economic, social and environmental) related to our context and trainings.

Table 4.2 *An overview of the selected indicators for this study*

Economic	Social	Environment
1. Managing group funds transparently	6. Having a shared vision	11. Identifying and understanding the interdependencies among farms and the wider landscape
2. Saving regularly and managing savings so these are protected	7. Capability of resolving internal conflicts	12. Designing and implementing effective conservation, rehabilitation or sustainable production plans
3. Collectively marketing members' products	8. Democratic leadership and management, with enforcement of compliance with internal rules	13. Negotiating with other stakeholders about the use of natural resources
4. good records	9. Sustaining and sharing learning internally	14. Having collective rules to efficiently and fairly manage their natural resources with respect to erosion and soil fertility loss, use and protection of water sources, and protection of agro-biodiversity (flora and fauna).
5. Building market relationships and scope for negotiation with buyers and suppliers	10. Building active relationships/ trust	

These indicators were further operationalised using Kirkpatrick's (1959) five levels of (training) evaluation. For the present paper we collected only data on the two more advanced levels of training evaluation, namely learning and behaviour changes. The reaction level was not explicitly captured as we did not want to put too much emphasis on the training itself (see theoretical framework), as this may more easily lead to social desirable results. Moreover, business performance was not captured as there was no 'business' when the training started and ended in 2016. All groups started from scratch.

In order to assess changes in knowledge (learning) and practice (behaviour), the fourteen indicators were operationalized in 14 short questions. All questions were asked for the current situation (April 2019), and for the start of the project, early 2016, which was used as the anchor point in the past.

For each question the response scale was from 1 (not at all) to 5 (very high extent). All questions were answered on the group level with the group members together in each group. Participants were encouraged to talk to each other and rate themselves on each question. The minima score for both knowledge and practice that a group could therefore reach was 14 and the maxima 70.

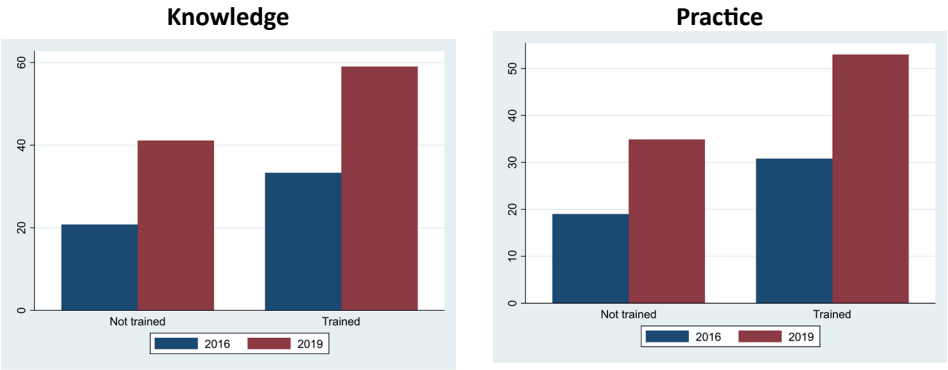
Quantitative data were analysed using STATA. T-tests were calculated and graphs were generated in order to see the scores on knowledge and practice levels of the training evaluation in the three sustainability aspects for the trained and not-trained groups between the two periods of the study.

Qualitative data were collected through focus group discussions (FGDs) in order to further analyse the findings from the quantitative data and to get richer data on the group level. Focal questions in FGDs focused on "what contributed to the changes in knowledge and practice for both trained and not-trained groups" and "what the groups do differently now as compared to three years ago". Data from FGDs were analysed first by organizing data from the discussions by categorizing them regarding the questions asked. The next step was to sort out group discussions and link them to quantitative data.

4.4. Results

Graphs 4.1 and Table 4.3 below show respectively the means in self-reported scores in knowledge and practice gains in all the three sustainability aspects (social, economic and environmental) for the trained and not-trained groups between 2016 and 2019, and

differences between these scores.



Graph 4.1 *Means of self-reported scores in Knowledge and Practice gains for three sustainability aspects taken together between 2016 and 2019 for the trained and not-trained groups*

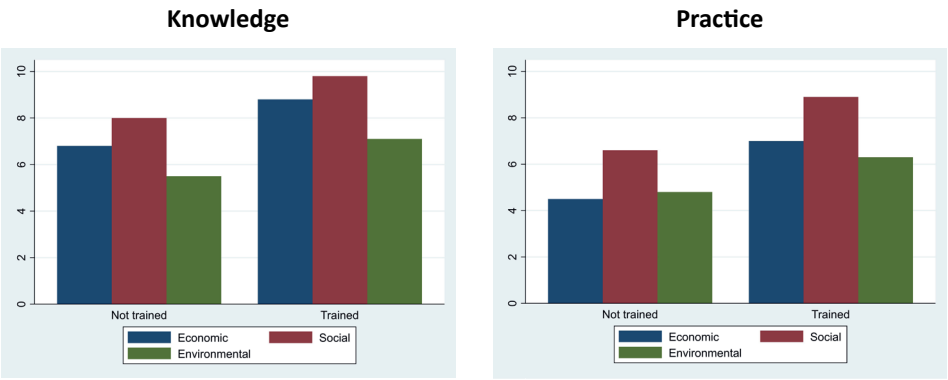
Table 4.3 *Differences in self-reported mean scores in knowledge and practice gains in the three sustainability aspects between 2016 and 2019 for trained and not-trained groups*

	Difference for Not-trained groups between 2016 and 2019	**Difference for trained groups between 2016 and 2019**	**Difference trained vs not-trained**	**P_Value of T stat.**
Knowledge (overall)	20.3	25.7	5.4	0.027*
Economic knowledge	6.8	8.8	2	0.022*
Social knowledge	8	9.8	1.8	0.091
Environmental knowledge	5.5	7.1	1.6	0.118
Practice (overall)	15.9	22.2	6.3	0.003**
Economic practices	4.5	7	2.5	0.002**
Social practices	6.6	8.9	2.3	0.019*
Environmental practices	4.8	6.3	1.5	0.078

*p<0.1 **p<0.05; ***p<0.01

Results reveal that all groups (trained and not-trained) self-report an increase in their knowledge in all the three sustainability aspects (Knowledge overall) between 2016 and 2019 with the mean difference of 20.3 for the not-trained groups compared to the mean difference of 25.7 for the trained groups. This 5.4 difference is statistically significant at 10%. By analysing the difference in self-reported practice in all the three sustainability aspects (Practice overall) between 2016 and 2019, the mean differences are 22.2 and 15.9 respectively, and the difference is statistically significant at 5%. This means that all groups

perceived an increase in their knowledge and practice in all the three sustainability aspects (economic, environmental and social) between 2016 and 2019, but the trained groups perceived a significantly higher increase of knowledge and practice compared to the not-trained groups.



Graph 4.2 *Differences in self-reported mean scores in knowledge and practice gains in the three sustainability aspects between 2016 and 2019 for trained and not-trained groups*

Table 4.3 and Graph 4.2 furthermore shows the self-reported mean scores and differences in knowledge and practice gains for the three sustainability aspects between the trained and not-trained groups more in detail. The mean perceived increase in knowledge and behaviour/practice for the trained and not-trained groups is higher for social aspects. Mean increase in knowledge in social aspects is **8** for the not-trained groups and **9.8** for the trained, while increase in practice of social aspects is **6.6** for the not-trained groups and **8.9** for the trained groups. This is followed by economic and environmental aspects, with an exception of the mean difference in practice for environmental (**4.8**) aspects lightly higher than economic ones (**4.5**) for not-trained groups.

Looking at the differences between trained vs not-trained, Table 4.3 shows that the overall difference in knowledge is 5.4 which is statistically significant at 10% and the overall difference in practice is 6.3 which is statistically different at 5%, with the economic aspect that highly contributes to the difference in both knowledge and practice and being significant respectively at 10% and 5 %, followed by the social and finally the environmental dimensions.

Focus group discussions (FGD)

How farmers learn about the sustainability aspects was further discussed in the FGDs with the question “what contributed to the increase in knowledge and practice” within the not-trained groups? Different explanations were given, including experiential learning, peer

learning and learning from experienced others. For instance, concerning the not-trained groups, members of group MUY 6 reported that *"we learned some new knowledge in keeping records and saving regularly from our experienced friend in the group, who was in a village saving association before".* For group GIT 7 members the increase in knowledge and practice was due to *"peer learning via the informal training given by some innovative farmers (PI) in the trained groups via farmer-to-farmer training sessions "* For group GIT 10 members, the increase in practice was due to *"learning from their trials and errors in management of funds, in keepings sales reports"* i.e. experiential learning .

Not surprisingly, the trained group members mentioned explicitly the training they received in 2016. However, they also mentioned other factors like for group GIT 3 members *"the increase in knowledge was due to many other learning activities, also including peer-learning, learning from others and just learning on the job".* For MUY 8 group members *"the increase in knowledge and change in practice is attributed to the former belonging in other associations of its members, assistance received from agriculturalists assistants, sharing knowledge and experience between members and many years of farming experience."*

Table 4.4 *What the trained and not-trained groups reported doing differently in the three sustainability aspects as reported in the FGDs*

Trained groups	**Not-trained groups**
Economic • We improved the recording system; before we were trying but now with training we do it better • We understand the market and negotiate favourable price, sometimes we wait for a more favourable time to sell • We have established rules about saving and engaging money efficiently by planning and prioritization in spending • We are doing a weekly control of the entries and expenses and a plan for next steps/weeks • We have opened an account in microfinance for saving our money • We introduced a good habit of giving contributions regularly based on clear calendar • We are now selling as a group after scanning the market in the community	**Economic** • We initiated a record system recently helped by one experienced member • We have just started to collect some information on the market especially on the competitors' prices and we use this information to negotiate fair prices • We have initiated guiding rules about planning the use of money • We have started an occasional control for our business • We now plan to open an account for saving • We set rules in order to have the contributions of all members • We have just started selling as a group some of our products

Trained groups	Not-trained groups
Social • We are using now clear internal rules, signed by all members to guide us • We set clear tasks and roles for all members and meet regularly now to share ideas for better understanding the project • We set rules to follow in case of conflict inside the group • We initiated a program of sharing experience among us and approaching other farmers on regular basis in our village on planned session	**Social** • We set recently some group rules • We just started putting together our effort towards setting members tasks and roles and; initiated meeting sessions in trying to understand well our common and shared project • We are initiating rules guiding us in case of conflicts inside the group • We have planned to share our knowledge to others during village weekly works
Environmental • We use now improved farming techniques like improved compost pit, crop rotation, improved seeds • We are protecting the natural resource as learned • We are considering now other stakeholders around our project and try to respect them while working on our project	**Environmental** • We are initiating meeting sessions with agricultural assistants to teach us preparing well land to avoid erosion and practicing good farming by using improved seeds and putting enough and improved compost pit • We are planning meetings in order to exchange ideas among us on the natural resource protection • We are initiating considering other stakeholders directly and indirectly affected by what we in order to care of our environment

In terms of 'what' the groups have learned, table 4.4 shows examples of what the trained and not-trained groups reported doing differently in knowledge and practice in the 3 sustainability aspects. The examples show that the trained groups reported growth towards **more advanced levels of understanding** and application in the three sustainability aspects than the not-trained ones. The trained groups reported "a clear calendar of actions, engaging money efficiently, improved recording system" just to mention a few, whereas similar points are still at basis or middle level of understanding and action for the not-trained groups.

4.5. Discussion

In this section we further discuss our research question *"To what extent do sustainable entrepreneurship trainings influence knowledge (learning) and practice (behaviour) of farmer groups?*, and the role and impact of SE training in emerging and development countries.

It was **first** observed that all trained and not-trained groups increased their knowledge and practice in all three sustainability aspects between 2016 and 2019, but that the trained groups perceived a higher increase than the not-trained groups. Next to the trainings in the trained groups, sources for both groups were peer learning and learning on the job. The FGDs furthermore suggest that the increase for trained groups is mostly in terms of accomplishing more advanced levels of understanding and application of knowledge and practice in the three sustainability aspects. The explanation could be that during the trainings group members had time to reflect and try-out what they learnt when they were together with other group members. The group trainings may have provided a more complete learning cycle, including reflection (see e.g. Kolb, 2014 or Landini and Brites, 2018) as well as initiating higher quality group learning processes (e.g. storage and retrieval, boundary crossing, goal alignment, etc. ; Decuyper *et al*., 2010)).

Second, all groups increased more knowledge and practice in the social sustainability aspects than in the economic and environmental ones. This may be explained by the fact that all groups (trained and not-trained) are composed by PIP farmers who already developed sufficient knowledge in environmental aspects during individual PIP training at farm level, and, who already had a certain level of practicing the environmental part related to their business ideas. The social and economic aspects related to the group business were new for the farmer groups and needed their attention and concentration in learning and practice, hence the increase in the two aspects. However, especially the social aspect may have gotten most attention of the groups because even if farmers are quite used to work together in other domains (e.g. in saving and loan associations of peer help in the community) , working as a group of farmers on the business idea was the true new element in this set-up: their business ideas were difficult or hard to realise at individual level. Both trained and not-trained farmer groups took the new collective adventure very seriously. Group entrepreneurship is particularly attractive among farmers who are not able to start an entrepreneurial business on their own, as farmers feel more secure if they work together with others in a group (Kahan, 2013). So in order to reach the same vision in the group, building trust and a certain level of leadership with common internal rules, groups members may have used all possible ways of developing the social sustainability part of their collective business ideas.

Third looking at the differences in perceived increase in knowledge and practice between the trained and not-trained groups, the trained groups self-reported a higher increase than the not-trained ones, mostly in knowledge and practice in economic sustainability aspects, followed by social and environmental ones. This is understandable as the SE training for farmers is adding value especially on economic aspects for e.g. how to run a small business, managing of funds, assigning a treasurer, keeping record, scanning the market, or making a business plan. In addition, the higher increase of knowledge in economic aspects for the trained groups over the not-trained may also be due to the fact that this type of knowledge is mostly cognitive, more declarative knowledge (e.g. how to do record keeping, management of group funds, etc.), which is typically developed in targeted, instruction-based learning environments like trainings. This was also mentioned during the FGDs by the members of the trained groups.

Concerning the result of more increase in practice, this is less easy to directly explain as the result of the training as typically change of practices are also the result of ongoing peer learning and learning on the job. For instance Innovation Platforms have shown to be valuable contexts for informal learning of farmers and powerful tool for promoting agricultural development (Sanyang et al.,2016). However, the increase of knowledge via the training can act as a catalyst for developing new or additional practices that may not come natural in informal learning settings. Whether the trained groups have been more involved informal learning (e.g. participating more or more actively in new learning configurations) than the non-trained groups is an interesting question that would require additional studies as informal learning is often implicit, unintentional, and, hence, difficult to capture in the type of studies we conducted (Eraut, 2004).

4.6. Conclusions and implications

This paper analyzed the extent to which sustainable entrepreneurship trainings influence learning and development of knowledge and practices of farmer groups in the context of Burundi. Our results show a nuanced picture of the role of training in developing sustainable entrepreneurship competencies.

Firstly, our results show a (self-observed) increase in knowledge and practice for all the three sustainability aspects (economic, environmental and social) between 2016 and 2019 both trained and, comparable, not-trained groups. However, the trained groups reported a higher increase than the not-trained groups. Moreover, trained groups showed more advanced levels of understanding and application of the three sustainability aspects compared to the not-trained.

So, although non-trained groups also develop themselves as sustainable entrepreneurs through a variety of (informal) learning activities, the results suggest the added value of targeted interventions for developing collective sustainable entrepreneurship competencies. Targeted interventions like group training can assist the more natural informal, experiential learning so characteristic for the entrepreneurial process (e.g. Corbett, 2005) by completing the learning cycle. Therefore, in Burundi and in other developing countries in similar conditions, policies that focus on sustainable rural development, should not only work on empowering farmers by training them, but also giving them time and space to practice and share knowledge during the training and after. As this study showed: both groups (trained and not-trained) reported that group members learnt from each other via sharing knowledge and experience, it is relevant to encourage informal learning among farmers . To put it simple: the solution is not just more training, but also to stimulate other types of learning on the job.

Secondly, both trained and not-trained groups particularly increased knowledge and practice in social sustainability aspects. For this Burundian case with groups of farmers who had already acquired environmental knowledge and practiced the knowledge at their household level, the increase in knowledge and practice in social aspects is understandable because it is related to the new collective business idea of the group and the fact of forming the entrepreneurial groups in order to realize what was difficult or impossible individually. Social aspects of SE are important for sustainability, but because of an historical focus of sustainability on environmental problems, they may have not given always the attention needed (Rogers et al. 2013). This study confirms that social aspects deserve attention especially for the farmers groups that are not used to working as groups in the early phases of the group entrepreneurial journey.

Finally, the trained groups self-reported a higher increase over the not-trained ones in knowledge and practice in economic sustainability aspects. This suggests that the added value of this particular training mostly is in the economic domain.

However, as this study was done with a small number of 20 groups in only two provinces of Burundi, further monitoring is needed to examine if the observed role of training in getting more deeper knowledge persists and actually results in better knowledge and practice of sustainability aspects. In addition, the added value of the SE training on developing economic knowledge and practice among farmers is interesting to further analyze, and could reveal whether this indeed will enable them to be successful in the newly collective business idea. Lastly it would be useful to see the influence of SE training on individual level, especially concerning what and how the group members apply the acquired knowledge and practice on their own farms for more sustainable agriculture.

5. Entrepreneurial group trainings and sustainable agriculture: experiences from Burundi

This study analysed the extent to which group trainings in sustainable entrepreneurship (SE) influence key components of sustainable agriculture by rural households in Burundi. Quantitative data using a questionnaire were collected from 103 farmers from 20 entrepreneurial farmer groups, of which 10 had received training in SE for the development of a collective integrated business plan, and 10 other groups had not received any training. To gain more in-depth insight into the group dynamics, qualitative data at group level were collected through Focus Group Discussions. Results revealed that farmers belonging to trained groups in SE are more motivated to farm, invest more in practices to restore the health of their land and are more advanced towards establishing a resilient farming system. Moreover, qualitative findings revealed that beyond SE training, group members benefited also from peer learning and the support from more experienced farmers in their groups, which led to the replication and putting in practice of some sustainable agriculture practices. The study suggests that training Burundian farmers about including SE activities in their farming system should be supported by national rural development policies and actors, given that it could change farmers' subsistence attitude towards a vision of integrating environmental, social and economic profits on the farm.

5.1 Introduction

Sustainable entrepreneurship (SE) in agriculture is closely related to what farmers, or groups of farmers do with their land. In order to become a sustainable entrepreneur, it is crucial to practice sustainable agriculture (SA), which involves the management of agricultural resources to satisfy human needs while conserving the environmental quality of natural resources for the future (Singh *et al*., 2011). SA furthermore means that the farmer understands the importance of the soil for crop production (De Wolf *et al.*, 2004), applying a land use system that enables him to maximize the economic and social benefits from the land, while maintaining or enhancing the ecological support functions of the land resources (Babalola & Olayemi, 2013). There are three key components of SA that are particularly important (Kessler and van Reemst, 2018). First of all, farmers' *motivation for farming* is essential. Motivation to invest in and be a good steward of the farm, the land, and its natural resources, is essential for SA (Kessler a nd van Reemst, 2018). Socio-psychological models have been relatively successful in demonstrating and explaining farmers' attitudes and behavior regarding nature conservation in agricultural landscapes, and in stipulating the relationship between motivation for and implementation of conservation practices on farms (Willock *et al.*, 1999; Zubair and Garforth, 2006; Duesberg *et al.*, 2014; Home *et al.*, 2014). Secondly, improvement in agricultural sustainability requires the optimal use and management of soil fertility and its physical and chemical properties, as well as stimulating soil biological processes and biodiversity on the land and in the soil. This implies implementing good management practices that foster *land health* by avoiding degradation and stimulating restoration of the land (Singh *et al.*, 2011). Thirdly, SA also involves establishing a *resilient farming* system that aims at managing the farm in an integrated way and by farmers (good stewards) who are able to cope with shocks (e.g. due to changing climate conditions and/or prices) (Kessler and van Reemst, 2018). Resilience in this sense is the ability of a farming household to absorb the perturbations from climatic changes in order to maintain or return to the desired state of livelihood (Mutabazi *et al*., 2015).

Although several support programs for SA have been implemented in Burundi, there is still an urgency to properly manage ecosystem services and to develop a comprehensive response to food insecurity in the country. Investing in SA in Burundi is essential because it will resolve not only the problem of poverty but also tackle serious environmental problems, particularly land degradation. For such investments to happen though, smallholder farmers require to be supported. However, sustainable agriculture cannot just be achieved through state interventions, legislation or new technologies, but requires also a series of trainings to change farmers' attitude towards alternative forms of farming activities (Papadopoulos *et al*. 2015) and build their capacity for successful agricultural development (Kahan, 2013). Training farmers is often seen as a process of imparting specific practical skills that

make them more competent and proficient in doing their farm work (Imaita, 2013), while stimulating them to adopt improved practices in crop and livestock production (Halakatti *et al.*, 2007). However, training is more than that, and according to FAO (2011) farmers' training also aims at replacing old attitudes by new ones, exchanging opinions and experiences, and reducing the amount of perceived complexity in a technology thereby creating a desired change. Duveskog *et al.* (2011) in rural Kenya and Luther *et al*. (2018) in Indonesia, showed that participation in farmer field school trainings improved knowledge of participants, and enabled them to practice more effective agricultural practices on their fields. Training in sustainable entrepreneurship for farmers is important because sustainable entrepreneurship is widely acknowledged as an answer to current environmental challenges (Dean and McMullen, 2007; Cohen and Winn, 2007; York and Venkataraman, 2010) and related social challenges (Zahra *et al.*, 2009; Greco and De Jong, 2017).

The "Plan Intégré du Paysan (PIP)" approach as currently applied in Burundi - the integrated farm planning approach – gives a central role to training, and has been used in Burundi since 2014 to motivate farmers to invest in SA and transform them into sustainable entrepreneurs (Kessler and van Reemst, 2018). In this approach, the PIP (the integrated farm plan made by a farmer family) is considered as the basis for planning at the farm level, and visualizes both the current farm situation and the dreamed future situation. Motivation (to farm), land health and farm resilience are the three key components in the PIP approach that foster SA. As explained in Mupfasoni *et al*. (2020), PIP creation at the household level is followed by the development of integrated group plans at group level (in French Plan Intégré Collectif - PIC). After following SE trainings, these PIC groups develop "sustainable" businesses plans, which differ from conventional group business plans in the sense that they include integrated activities that together make the business plan more sustainable. Although there is increasing interest for research on sustainable entrepreneurship, most work so far has been done in developed world contexts, with only few empirical studies that focus on emerging economies such as Burundi. This paper therefore aims to contribute to the emerging literature on sustainable entrepreneurship by studying the extent to which group training in SE influences households' farming activities, particularly the three key components of SA.

The research question guiding this study was: To what extent does group training in sustainable entrepreneurship influence the three key components of sustainable agriculture at the level of rural households in Burundi?

5.2 Methodology

5.2.1 Study areas

This study was performed within the framework of activities of the project Fanning the Spark, a project in Burundi in which individual farmers create Integrated Farm Plans (the PIPs) by visualizing both the current farm situation and the dreamed future situation (Kessler and van Reemst, 2018). As a follow-up to creating PIPs at the household level, farmers were encouraged to form organized groups and to develop PICs or integrated group plans. Data were collected between April and May 2019 in four villages of the project, in the provinces Gitega (Bukirasazi and Makebuko) and Muyinga (Butihinda and Giteranyi).

5.2.2 Information on Participants and the training

The study was conducted on 103 farmers from 20 PIC groups, of which 10 had received training in sustainable entrepreneurship for the development of a sustainable business plan, and 10 other groups had not received any training. The below table shows the basics characteristics of the trained and not-trained groups (gender, age and education), where the average age is similar (38 for the trained and 39 for the not-trained), while trained groups have slightly more women than men compared to the not-trained groups. Besides the generic farmer characteristics, Table 5.1 gives information on the PIP-generations present in the groups, illustrating “experience with PIP”. The first generation PIP farmers are those farmers trained directly by the project, called innovative farmers (or PIs). These are farmers who usually have more advanced experience in farming in their community. The subsequent other generations (second and third generations PIP farmers) are trained by the PIs by means of farmer-to-farmer training and thus started later with PIP creation on their farm. For both trained and not-trained categories considered in this study, the second generation PIP farmers represent a high percentage of farmers compared to the other generations.

5.2.3 Data collection and analysis

Quantitative data were collected for trained and not-trained farmers on the 3 key components of SA: motivation to farm, land health and farm resilience. Each component was subdivided in 5 sub-components, as shown in Table 5.2, each with specific indicators, which were measured during the survey by means of specific questions.

Table 5.1 *Characteristics of the trained and not-trained groups*

Group category	Group ID	#	Gender		Mean age	Experience-PIP generation			Education
			% male	% female		% 1st gen.	% 2nd gen.	% 3rd gen.	% Secondary school share
Trained Groups	**Total**	**51**	**39.78**	**60.22**	**37.83**	**20.23**	**79.77**	**0**	
	GIT 1	5	20	80	48	40	60	0	20
	GIT 2	5	60	40	33	0	100	0	0
	GIT 3	5	0	100	42.6	40	60	0	20
	GIT 4	4	25	75	36.5	50	50	0	20
	GIT 5	5	40	60	47.6	0	100	0	0
	MUY 1	4	50	50	32.8	25	75	0	10
	MUY 2	5	60	40	40.6	0	100	0	20
	MUY 3	7	42.8	57.2	31.1	10	90	0	0
	MUY 4	3	100	0	37.3	33	67	0	66
	MUY 5	8	0	100	28.8	0	100	0	10
Not-trained Groups	**Total**	**52**	**51.51**	**48.49**	**39.47**	**31.1**	**52.34**	**16.56**	Information not collected
	GIT 6	5	40	60	53	60	40	0	
	GIT 7	4	100	0	33	50	50	0	
	GIT 8	5	20	80	44	60	40	0	
	GIT 9	5	20	80	41.6	20	40	40	
	GIT 10	5	100	0	34.8	40	60	0	
	MUY 6	7	14.3	85.7	31.1	14.3	14.3	71.4	
	MUY 7	4	75	25	35	25	50	25	
	MUY 8	8	62.5	37.5	40	25	62.5	12.5	
	MUY 9	6	50	50	34.6	16.7	66.6	16.7	
	MUY 10	3	33.3	66.7	47.6	0	100	0	

Table 5.2 *Overview of the 3 key components of SA and their sub-components*

Key components of SA	Sub-components	Indicators
Motivation to farm	**Future vision of the farm**	Visualized vision of the farm in 5-10 years Objectives for the farm as expressed by the farmer Concrete action plan for the farm (short-term)
	Intrinsic motivation	Motivation for farming, enjoying farming or not Willingness to invest in the farm Drive to learn (from others) and do better
	Collaboration	Collaboration in the household for decision-making on farm and household expenditures Collaboration with others in the community Collaboration inside groups and his/her active participation
	Capabilities	Self-reliance of the farmer for problem solving on the farm and within the household Available means to work on the farm and improve Knowledge of what is necessary for the farm
	Conducive environment	Living environment in the household and on the farm Collaboration in the village and participation in collective works Trust, mutual respect and no major conflicts in the village
Land health	**Status of the land**	Trend of soil productivity in past 5-10 years Occurrence of soil erosion on the farm Loss of farmland in the past 3 years and risk of future land loss
	Avoiding soil loss	The physical practices employed to prevent soil loss Appropriateness of tillage practices Use of soil cover practices
	Soil fertility practices	Appropriateness of use of organic and chemical fertilizer Integrated soil fertility management practices
	Crop management	Crop rotations and plans for the different plots Intercropping system applied on the farm and different plots Practices to prevent and control weed and pest infestations
	Natural resources	Pressure on the land or use of fallow period Water availability on the land and in the soil The importance of the trees on the farm

Farm resilience	**Income sources**	Diversity of income from different farmers' activities Availability of sales opportunities Access to financial services
	Crop diversity	Adequacy and diversity in annual and perennial crops Cash crops grown for the market
	State of Livestock	Diversity in livestock type Livestock health Feed availability
	Living conditions	Food security and nutrition status as expressed by the farmer Accessibility and quality of education and training Assets availability for better farm management
	Coping mechanism	Impact of household shocks and disturbance over the past years Ability to cope and mitigate impact Trust in external organizations by the farmer

In most cases the points given for each question range on a 5-point Likert scale (10, 7.5, 5, 2.5 and 0); unless the question demands a ''yes'' or ''no'' answer. The average score for all questions under a certain indicator gives the "indicator score". Next we calculated the sub-component mean scores and finally the key components' mean scores for trained and not-trained groups.

A one-way ANOVA was run to test the effect of training on the development of the 3 key components of SA. As the PIP generations (i.e. "experience with PIP") differed among the groups, we judged it important to take into account and run a two-way ANOVA in addition to the one-way ANOVA. Hence, we examined the effect of both training and PIP generation on the 3 key components of SA at household level.

Moreover qualitative data were collected through focus group discussions (FGDs) by discussing with farmers belonging to the trained groups about how the SE training influenced the development and implementation of their individual PIPs, and hence progress towards sustainable agriculture.

5.3 Results

5.3.1 Scores on the 3 key components and sub-components

The mean scores on the 3 key components of SA and their sub-components by the trained and not-trained farmers is given in Table 5.3, showing that these are higher without exception for trained groups.

Table 5.3 *Mean scores on the 3 key components of SA and sub-components for trained and not-trained farmers*

	Trained					Not-trained				
Key components and sub-components	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Motivation to farm	51	**7.92**	0.84	6.68	10.29	52	**7.48**	0.76	5.75	8.98
Future vision of the farm	51	**8.11**	1.39	4.58	10.00	52	**7.55**	1.49	4.58	10.00
Intrinsic motivation	51	**7.81**	0.97	5.56	9.16	52	**7.39**	1.02	5.00	9.16
Collaboration	51	**8.09**	1.49	4.17	10.00	52	**7.75**	1.40	4.16	10.00
Capabilities	51	**7.06**	1.58	4.59	9.79	52	**6.58**	1.28	4.16	9.37
Conducive environment	51	**8.52**	1.81	6.25	18.75	52	**8.17**	1.01	5.83	10.00
Land health	51	**6.89**	1.03	4.86	8.99	52	**6.45**	1.12	3.95	8.65
Status of the land	51	**7.06**	2.18	2.92	10.00	52	**6.39**	2.39	2.08	10.00
Avoidance of soil loss	51	**7.70**	0.95	5.00	9.79	52	**7.46**	1.01	4.58	9.30
Soil fertility practices	51	**7.22**	1.42	4.58	10.00	52	**6.82**	1.46	2.22	9.44
Crop management	51	**6.18**	1.23	3.11	8.91	52	**5.71**	1.63	1.72	9.55
Natural resource	51	**6.27**	1.96	1.87	10.00	52	**5.84**	1.87	2.08	10.00
Farm resilience	51	**5.88**	1.15	4.30	8.41	52	**5.49**	0.89	3.90	7.36
Income source	51	**5.66**	1.81	2.50	8.95	52	**5.30**	1.73	2.70	9.16
Crop diversity	51	**4.84**	1.22	2.91	7.50	52	**4.63**	1.09	2.08	7.08
State of livestock	51	**5.78**	1.11	2.91	7.91	52	**5.50**	1.15	2.91	7.50
Living conditions	51	**6.69**	1.58	4.02	10.00	52	**6.17**	1.34	2.36	8.33
Coping mechanism	51	**6.45**	1.84	3.33	9.16	52	**5.85**	1.88	0.833	10.00

5.3.2 Effect of the training and PIP experience on the 3 key components of SA and sub-components

In addition to mean score results on the 3 key components and sub-components for the trained and not- trained farmers presented in the above section, the analysis of variance (ANOVA) was done in order to examine the effect of training on the 3 key components. More in detail we analyzed whether the 3 key components and their sub-components differ based on the training and PIP experience.

Table 5.4 shows the results of both the one-way and two-way ANOVA. Concerning the one-way ANOVA, the below findings show that all 3 key components of SA are significantly different for trained and not-trained farmers, respectively at 1% for *motivation to farm* (**p=0.0075**); 5% for *land health* (**p=0.0406**) and 10% for *farm resilience* (**p=0.0539**). Concerning the sub-components, statistically significant differences were mainly found in the sub-components of *motivation to farm*, namely the three sub-components "future vision of the farm" (**p=0.0516**), "intrinsic motivation" (**p=0.0334**), and "capabilities" (**p=0.0909**). Next to that, a statistically significant difference was also observed in the sub-component "living condition" (**p=0.0735**).

In the two-way ANOVA, where we tested for both "training" and "PIP experience" together, findings show that the key components *motivation to farm* (**p=0.0071**) and *land health* (**p=0.0094**) are statistically significant at 1%, while *farm resilience* shows a significance of **p=0.0103**. Compared to the one-way ANOVA, the same sub-components show significant differences between both groups of farmers, as well as three additional ones, namely two sub-components of *land health* ("status of the land" and "crop management practices" respectively at **p=0.0446** and **p=0.0624**) as well as "coping mechanisms" (**p=0.0518**).

Table 5.4 *ANOVA test on the key components of SA and sub-components for "training" and "PIP experience"*

	One-way ANOVA (testing for "training" only)		**Two-way ANOVA (testing for "training" and "PIP experience")**	
Key components / Sub-components	F	Significance	F	Significance
Motivation to farm	7.44	**0.0075**	7.56	**0.0071**
Future vision of the farm	3.88	**0.0516**	5.66	**0.0193**
Intrinsic motivation	4.65	**0.0334**	4.34	**0.0398**
Collaboration	1.42	0.2363	0.90	0.3445
Capabilities	2.91	**0.0909**	3.07	**0.0828**
Conducive environment	1.52	0.2203	1.22	0.2719

	One-way ANOVA (testing for "training" only)		Two-way ANOVA (testing for "training" and "PIP experience")	
Key components / Sub-components	F	Significance	F	Significance
Land health	4.46	**0.0406**	6.82	**0.0094**
Status of the land	2.42	0.1446	3.81	**0.0446**
Avoidance soil loss	1.55	0.2165	2.49	0.1181
Soil fertility management practices	2.00	0.1602	2.42	0.1227
Crop management practices	2.74	0.1011	3.55	**0.0624**
Natural resource management	1.29	0.2582	2.49	0.1180
Farm resilience	3.78	**0.0539**	6.68	**0.0103**
Income sources	1.05	0.3101	2.27	0.1320
Crop diversity	0.87	0.3524	2.28	0.1345
State of livestock	1.64	0.2038	2.38	0.1259
Living conditions	3.27	**0.0735**	5.33	**0.0230**
Coping mechanisms	2.64	0.1070	3.87	**0.0518**

5.4 Discussion

The research question in this chapter referred to the influence of group trainings in sustainable entrepreneurship on the three key components of sustainable agriculture (SA). The results in table 5.3 show that farmers belonging to trained groups in SE are more motivated to farm, invest more in practices to restore the health of their land and are more advanced towards establishing a resilient farming system. When discussing with farmers belonging to trained groups about how the SE training influenced their way of farming related to the 3 key components of SA, they gave the following testimonies:

Related to **motivation to farm**, farmer C in group 4 in Muyinga province said: *"I was farming just as an obligation in the past, but the SE training made me see that I can benefit from my land by adopting some good practices. I tried the good practices and now I feel completely in love with what I am doing in my farm and I am investing more in my farm now."* Farmer D in group 1 in Gitega province *said: "It was hard for me to be organised by setting rules and principles of my day to day activity in my household, but after learning in the SE trainings and with the help of my friends PIs who belong to the first generation, I now know the importance of organisation and guiding rules in my activities, I am more motivated, inspired and organised on my farm".*

Related to **land health** farmer X in Gitega province said : *"The SE training helped me to build a good relationship with other farmers in my group and farmer Y was always reminding me what he wrote in his book about training and he helped me also to select matching crops for the planned intercropping and to know the fair quantity of chemical fertiliser".* Farmer A in Muyinga province reported: *"I implemented the planned kitchen garden from what I learnt on caring of the environment during the SE training and from the experience we got in our group project on growing vegetables."* Farmer M in Gitega province mentioned that: *"In our group project we planned to make an improved compost pit for having enough manure for growing maize, beans and peas; this inspired me to make the improved compost pit at home as planned in my PIP."*

Related to **farm resilience**, farmer M in Gitega province said: *"I am enjoying the benefit of selling as a group, using negotiation technics learnt in the group training, my income increased and I transformed my house as planned in my PIP."* Farmer N in Muyinga province mentioned: *"I learnt in SE training the importance of saving and with other group members we formed a credit and saving association. I was then able to increase my livestock."*

The above testimonies support the importance of the SE trainings in developing the key components of SA, particularly through becoming more organised, learning to plan, building new relationships in their groups, and through saving and negotiation techniques. However, as clearly shown in some of the testimonies but also in the two-way ANOVA results (Table 5.4), group members benefited also from peer learning and the support from more experienced (PIP) farmers in their groups, which led to the replication and putting in practice of some sustainable agriculture practices. Farmers explicitly mentioned that the fact of having an educated person in the group (in many groups the PIs, one of the Innovative Farmers) who took notes of what was learnt during the training, helped them a lot in reminding them lessons learnt even after the SE training. The education level of the individual members of a group thus seems to have an important influence on the group and on how certain members learn and retain. Especially for entrepreneurial trainings like our SE trainings, which touch on several new and rather complicated topics for lower-educated (or illiterate) farmers, having people in the group with higher educational level and greater abilities to learn about business-related issues is a huge advantage (Cannon 1991). During the FGDs, Farmer V in group 4 in Gitega said that "*It wasn't easy for me to evaluate the profit of my small business as I was forgetting some details because of not recording because I am illiterate. I planned in my PIP to expand the small business but in two years it wasn't possible, until farmer Y helped me via my son - who knows writing - by teaching him the recording system and day to day evaluation".*

This combined effect of the SE training and farmers peer learning in their groups by sharing experiences is visible in the two-way ANOVA (table 5.4), and influences the 3 key components of SA as follows:

Related to **motivation to farm**, three sub-components show to be statistically significant, namely "farmers' intrinsic motivation"; "the future vision of the farm" and "farmers capabilities for problem solving and farm improvement". This means that SE training and experience-sharing among farmers from different PIP generations in the groups contribute to farmers' vision building, learning lessons to fulfil, adjust or reorient the activities, and to setting objectives for better and improved farms in the future. This suggests that the SE trainings indeed lead to more motivation and enthusiasm among farmers for farming, and most of them affirm also that they feel more proud with their farms. Moreover, lessons on credit and savings learnt in SE trainings plus experience-sharing in households incomes management, help farmers reaching higher autonomy levels to better manage their farms and work towards a more sustainable farming system. This is similar to findings of Truelove et al. (2015) who suggested that training farmers in new agriculture methods allows them to have higher levels of self-efficacy. Moreover Jambo *et al*. (2019) in their study in Tanzania and Malawi found that the use of sustainable intensification practices by smallholder farmers was positively influenced by their intrinsic motivation. Earlier studies by Deci and Ryan (2008) also found that intrinsic motivation is closely related to self-determination and the feeling of being competent, resulting – as in our research area and explained in the next paragraph – to improvements on the farm.

Related to **land health**, two sub-components show to be statistically significant: "status of the land" (its productivity, soil erosion, as well as loss of productive farm land) and "farmers' crop management" (crop rotations and associations as well as the management practices applied to prevent and control pests and weed infestations on the farm). The environmental sustainability part of the SE training focused on how to better care for the land and how to improve its productivity. As stated by Imaita (2013), training farmers is a process of imparting specific practical skills that let them better perform their farm production activities and that make them more competent and proficient in doing their farm work. Duveskog et al. (2011) in rural Kenya and Luther et al. (2018) in Indonesia moreover found that participation in trainings (in these cases by means of farmer field schools where farmers exchanged experiences) not only improved knowledge of participants, but also enabled them to practice more effective agricultural practices on their fields. In addition to training, experience-sharing and peer learning among farmers in the groups to which they belong help especially the less experienced farmers to start experimenting on their farms with improved practices. This effect was also found by Bouman et al. (2020) in their study on pro-environmental behaviour of people, where findings revel that groups can promote

pro-environmental engagement among its members, especially among those individuals who strongly identify with the group and who do not already strongly care about the environment. Hence, being trained in SE in these groups which have a strong cohesion, and where explicit attention is given to sustainability aspects, has a positive effect on the behaviour of the group members concerning the environment and the importance to invest in the health of their land, especially through better crop management, but also by means of land management practices.

Related to **farm resilience**, there are also two sub-components that show statistically significant effects, namely "living conditions" and "coping mechanisms" to mitigate shocks occurrence. This suggests that training, networking and experience-sharing among farmers – as fostered by the SE trainings in our research – contribute to developing better strategies and ways to improve household and farm conditions. This is also confirmed by the earlier testimonies, which show that due to the SE trainings farmers now have a different perspective and reflect more on options to improve their living; this often starts with investments in the house, another income generating activity, saving some money, etc. Darnhofer *et al*. (2016) have also pointed to the particular role of farmers' experiential learning and networking in increasing the resilience of family farms. In fact, the lack of information on appropriate coping mechanisms to become more resilient in farming may keep farmers vulnerable to all kind of shocks. Training them and organising regular experience-sharing sessions in their community makes them more aware and proactive to prevent themselves from possible external shocks that their farms may face. Moreover, farmers learn from both the "good and bad" experiences and farm scenarios of their neighbours and peers in the same group, and the mechanisms they have used to become more resilient. Bouman et al. (2020) also found that perceptions of group values – and particularly perceived environmental (biospheric) group values – clearly and consistently relate to individuals' pro-environmental engagement. Hence, groups can play an important role in promoting actions that help to mitigate the environmental problems (Adger et al., 2012; Hackmann et al., 2014).

Training Burundian farmers about sustainable entrepreneurship in their farming system should therefore be supported by all actors in Burundian agriculture, because it could actually change the farmers subsistence-oriented vision and state of passiveness, to embracing another perspective on the future while working more proactively and motivated to establish resilient farms with adequate crop and land management practices. This process in which the three key components of sustainable agriculture (motivation, good farming practices and a resilient farm) work in synergy is indeed essential to make farmers feel more confident and lift them out of poverty and food insecurity. As suggested by Kessler and van Reemst (2018), particularly motivation is a key driver to invest in and become a good steward of the farm, the land, and its natural resources. This was expressed so nicely during

the FGDs by farmer C in group 4 in Muyinga province, who said that in the past he was farming just as an obligation and was less motivated to farm, but the SE training made him see that he can benefit from his land and this motivated him to invest. Hence, there is a nice interplay here of the combined effect of the integrated SE trainings which pay attention to all 3 Ps of sustainability: for sure farmers are motivated by the fact of higher profitability from their land as clearly shown by the testimony from this farmer C in Muyinga, but at the same time they realize that land health and resilience are key; and that engaging in improved and better farming activities is not so difficult. They have good examples in their group, other farmers they value high, and who have already been trained, do farming differently and more sustainably, and show already a more pro-environmental behaviour. This motivation is crucial to start implementing improved farming practices, as also evidenced by many other authors (Willock et al., 1999, Zubair and Garforth, 2006, Duesberg et al., 2014; Home et al., 2014).

Hence, applying what is learnt during the SE training goes hand-in-hand with the motivation of the engaged farmers to overcome the challenges they face in their farming system, by investing in more sustainable agriculture and as such enhancing production and food security in their households. The fact that trainings are given in self-organized groups, and that these groups have a common goal to achieve (i.e. developing their business), leads to strong bonds and the willingness to learn from each other, even if all of them have different backgrounds and experience. In this context the less experienced learn from the more experienced farmers and their values (Bouman et al.,2020), leading in our case to continual learning and exchange of good and improved farming activities in the community and to more sustainable agriculture.

5.5 Conclusion

This study analysed the extent to which group trainings in sustainable entrepreneurship influence the three key components of sustainable agriculture at the level of rural households in Burundi. Two major findings were revealed for this Burundian case. *Firstly,* farmers belonging to trained groups in SE are more motivated to farm, invest more in practices to restore the health of their land and are more advanced towards establishing a resilient farming system. Hence, training Burundian farmers about including SE activities in their farming system should be supported by national rural development policies and actors, given that it could change farmers' subsistence attitude towards a vision of integrating environmental, social and economic profits on the farm.

Secondly, the qualitative and quantitative data revealed that beyond SE training, group members benefited also from peer learning and the support from more experienced farmers in their groups, which led to the replication and putting in practice of some sustainable agriculture practices. Therefore, next to trainings, farmer-to-farmer learning is also effective in triggering the development and adoption of improved farming technologies. This should be given much more attention in current extension approaches, and when it comes to group formation and trainings, ample attention should be given to stimulating diverse groups with members with different backgrounds and experience. Addressing this issue, for example in SE group trainings, will contribute to fostering learning and exchanges, and as such to more sustainable agriculture.

As most work on SE so far has been done in developed world contexts, with only few empirical studies that focus on emerging economies, SE and how it influences SA should be further investigated by other researchers in developing countries. Findings of this paper also demand for further research on other factors that could lead to the development of the three key components of SA; which is essential for a country like Burundi where urgent solutions are needed to avoid further degradation of the land and its natural resources.

6. Synthesis

6.1 Problem, objective and research questions

The great majority of the Burundian population lives in the rural area and practices subsistence agriculture on often overexploited lands, using traditional un-modernized technology (Oxfam, 2011; IFAD, 2012). Agricultural production is greatly affected by land degradation and the majority of farmers are facing food insecurity and limited opportunities of accessing markets. Many initiatives targeting farmers have been implemented in Burundi over the past decades, both by governmental and donor-led programs, but farmers still lack the necessary means to go beyond subsistence farming. As a consequence, farmers remain in a vicious circle of poverty and food insecurity. In response to the challenge of advancing towards sustainable agriculture (SA), the Burundian government has developed a vision for the agriculture sector that stresses that investments in agriculture are needed to go from subsistence to family-operated commercial agriculture, providing a decent income for households, and respectful of the environment and sound management of resources (MINAGRIE, 2011, page 5).

The Dutch project Fanning the Spark was implemented in Burundi from 2014 to 2016 as one of the "potential" responses to this vision on agriculture. In this project, farmers were empowered to develop integrated farm plans (PIPs) for their households, and to form organized farmer groups with integrated group plans (PICs) based on group's entrepreneurial ideas. These farmer groups with their PICs were seen as a solution to the problem faced by many Burundian farmers of not being able to identify and start a sustainable business opportunity individually, and benefitted from the collaboration and learning process that was set in motion in rural villages by the PIP approach. Scholars have only partially studied how these social networks of farmers in a village enable collaboration and social learning, and eventually lead to the adoption of sustainable entrepreneurial practices that improve agricultural productivity and farmers income (Foster and Rosenzweig, 1995; Conley and Udry, 2001; Romani, 2003; Pratiwi and Suzuki, 2017). However, the fact of being part of a farmer group is no guarantee that farmers are more able to adopt a joint process of entrepreneurial learning, and will identify and start a sustainable business opportunity. Many factors may influence this learning process, including factors that characterise the (group) learners as well as factors that influence the (social) learning process moving from idea to the actual pursuit of the business opportunities on the group level.

Using a mixed method approach (qualitative & quantitative), this thesis aimed at a better understanding of how developing entrepreneurial activities by farmer groups can contribute to more sustainable agriculture in Burundi. The research posed the following specific research questions:

1. What is the role of specific internal states in farmers group formation and how do these internal states further affect the identification of collective sustainable business opportunities?

2. What is the relation between prior knowledge, motivation and early stage outcomes in the early phase of sustainable agricultural entrepreneurship in Burundi?

3. To what extent do sustainable entrepreneurship trainings influence knowledge (learning) and practice (behaviour) of farmer groups?

4. To what extent does group training in sustainable entrepreneurship influence the three key components of sustainable agriculture at the level of rural households in Burundi?

These research questions have been addressed on the basis of empirical research in two provinces (Gitega and Muyinga) of Burundi, and the results of these studies have been presented in the previous chapters of this thesis. The structure connecting the different chapters is presented in Figure 6.1

The synopsis shows how the research questions are related in addition to the introduction and the synthesis. This thesis analyzed in *Chapter 2* the process of entrepreneurial group formation for starting a collective business project. It investigated the influence of group members' internal states (group members' sustainable values and motivation related to agriculture, namely motivation to farm, land health and farm resilience) in the group formation process and on the first decision in the entrepreneurial process, namely the development of a joint business idea: the (farming) activity the group is going to pursue as a collective. In *Chapter 3*, the thesis examined the relation between group members' prior knowledge on sustainability aspects, their motivation to join the group and the quality of the group sustainable business plan developed as an output of SE training. In *Chapter 4,* it examined the extent to which SE trainings influence the group knowledge and practice. Lastly in *Chapter 5*, the thesis analyzed the extent to which SE trainings influence the three components of sustainable agriculture at the level of household farming activities.

This synthesis brings together the findings from different chapters of the thesis, and discusses the cross-cutting issues and overall theoretical and policy implications. Section 6.2. provides a brief summary of the main findings in the research questions. Section 6.3 distils the cross-cutting issues and links them to the broader debates on sustainable entrepreneurship and sustainable agriculture. Subsequently section 6.4 reflects on policy implications of this study. Section 6.5 points out the contribution of the research to science and society more

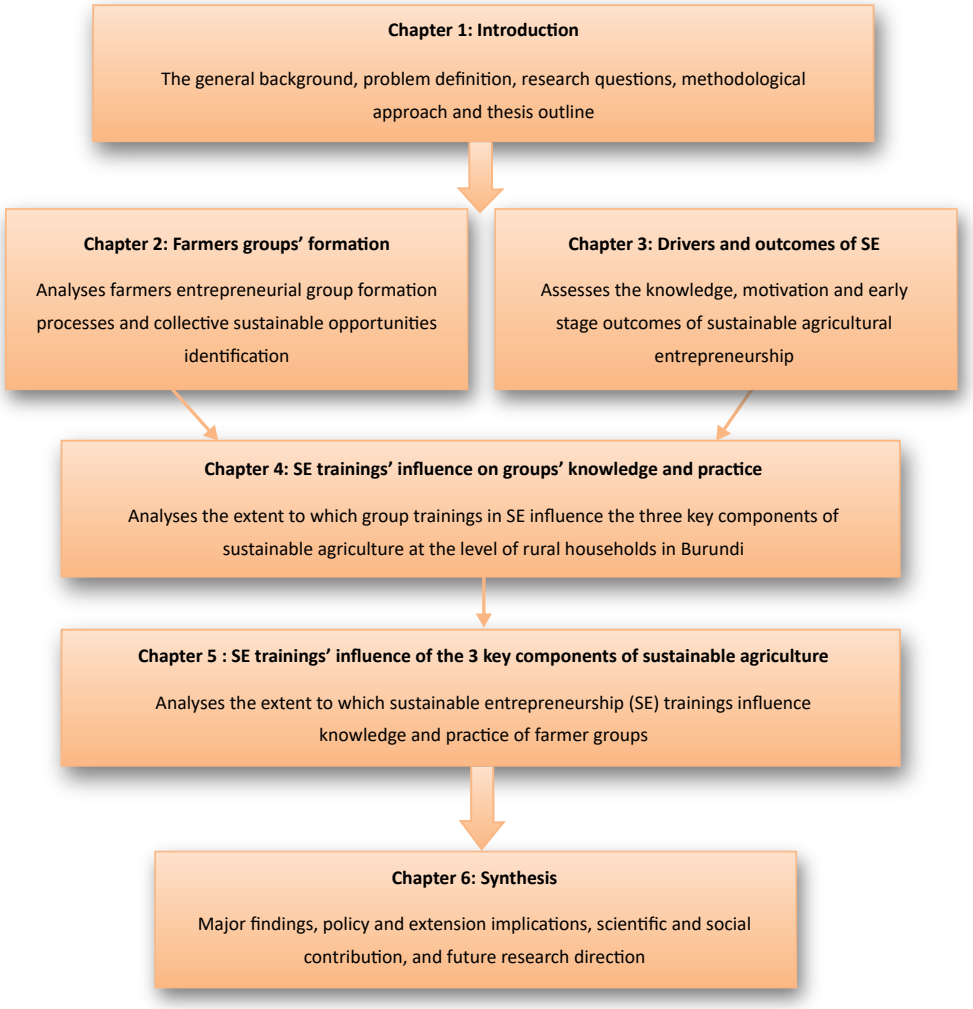


Figure 6.1 *Synopsis of exploring how developing entrepreneurial activities by farmer groups can contribute to more sustainable agriculture in Burundi*

generally. Section 6.6 presents the limitations of the study and recommendations for future research. The final section 6.7 presents the general conclusions.

6.2 Overview of the main findings of the research

6.2.1 The group formation process and sustainable business idea identification (Chapter 2)

As this thesis is looking on the role of farmers groups' entrepreneurial activities for more sustainable agriculture in rural Burundi, we judged that is was essential to start by understanding the process of farmers group formation and the early phase of group sustainable idea identification. This chapter examined the role of group members' internal states in the group formation process and joint sustainable business idea identification in a Burundian smallholder farming context. Findings revealed that farmer groups are not just formed on the basis of homophily (same level of internal states), but that heterogeneity in terms of gender, generation, experience and education may be also important in the group formation process as it helps these farmers to exchange knowledge and experience (Gruber et al., 2013). In many groups internal state patterns were different and such groups were formed on 'compensation' and 'committed leadership' principles, where one or two innovative farmers or leaders help to motivate and inspire the others. Our results are therefore contrary to the findings of Ruef et al. (2003) who show that team composition is predominantly driven by similarity; our study found that also "functionality considerations" - based on the idea that group members are looking for complementarity in terms of backgrounds to be able to be successful – played a role in the group formation process. For sustainable business idea identification of the groups, the findings revealed that prior sustainable behavior of members influences the sustainability of new group business ideas and its nature. As such, our work supports the work of Mathias et al. (2015) on the group level, who showed that 'sources of imprinting' (like prior experiences) guide entrepreneurs' perceptions and have a lasting impact on entrepreneurs and their ventures. More specifically, farmers who already invested more in land health (showing commitment to resilient farming) chose to continue with a farming-related, sustainable entrepreneurial activity on the group level. However, findings revealed that not all groups follow this pattern, suggesting that group members' prior sustainable values and behavior should not be seen as single indicators for collective sustainable, entrepreneurial practices.

6.2.2 Drivers and outcomes of sustainable entrepreneurship (Chapter 3)

In this chapter, we analyzed farmer groups' prior knowledge of sustainability aspects (environmental, economic and social). The results showed that in the Burundian agriculture context, groups high in prior knowledge in sustainability aspects seem to construct the business ideas more from an "inside-out" mode (i.e. stemming from ideas from group members) by identifying opportunities directly related to their prior knowledge. This

supports findings by Muñoz and Dimov (2017), who found a marginal significant direct effect of prior knowledge on sustainable opportunity intention. Groups low in prior knowledge seem to source their business ideas mainly from what is available in the direct environment (i.e. reacting to circumstance in the environment); similar to Choongo et al. (2016) in their study in Zambia, who found no significant relationships between prior knowledge and the identification of sustainable opportunities. This is an interesting finding as it confirms that multi-paths are possible in business idea identification (Vogel, 2017).

Secondly, we examined if farmer groups' prior knowledge of the sustainability aspects and farmer groups' motivation (entrepreneurial orientation, income motivation and knowledge motivation) are related to the quality of "sustainable" business plans (taken as an outcome in this study) developed at the end of the training by each farmer group. Findings revealed that 1) having prior knowledge of a sustainable opportunity, 2) being entrepreneurial oriented and 3) being motivated to increase knowledge (i.e. showing aspects of altruists motivation), positively influences the quality of the business plan. This is supporting the earlier work of Patzelt and Shepherd (2011), who propose that more knowledge of the natural or communal environment and altruistic motives drive the recognition of opportunities for sustainable development.

6.2.3 The role of SE training on knowledge and practice of farmer groups (chapter 4)

While Chapter 2 and 3 were oriented mostly on the early phase of sustainable opportunities identification by farmer groups, Chapter 4 is more related to sustainable opportunities exploitation, i.e. working on the planned sustainable entrepreneurial opportunities. In fact, the sustainable business plans developed by farmer groups were the outcomes of the training in sustainable entrepreneurship. This chapter examined therefore the extent to which group training in sustainable entrepreneurship influences the knowledge and practice in sustainability aspects of the farmer groups. For that we compared farmers' knowledge and practice on sustainability aspects before and three years after the training in SE, and we compared them for the similar periods with the not-trained farmers. Findings revealed that all groups trained and not-trained increased their knowledge and practice in all three sustainability aspects between 2016 and 2019, but that the trained groups perceived a higher increase than the not-trained groups. Related to the previous studies, apparently the prior knowledge on sustainability aspects is strengthened by the trainings. It was furthermore noticed that next to the trainings, peer learning and learning on the job through collaboration explain the observed increase both for the trained and not-trained farmers. Results also suggested that trained groups have more advanced levels of understanding and application of knowledge and practice in the three sustainability aspects compared to not-

trained farmers. This means that our findings are consistent with Kolb (2014) who stated that group trainings may provide a more complete learning cycle, including reflection as well as higher quality learning processes (Decuyper et al., 2010).

6.2.4 The influence of SE training on the three key components of sustainable agriculture at household level (Chapter 5)

After analyzing in Chapter 4 how SE trainings influence the knowledge and practice of sustainability aspects of the farmers groups, in this Chapter 5 we researched how the SE trainings contribute in improving the way of farming and in caring the land. Given that Nuñez and Musteen (2020) suggest that in order for individuals to initiate more sustainable actions they must first of all acquire a combination of environmentally-related and business-related knowledge and awareness, this Chapter analyzed the influence of group training in SE on the households' farming activities. In particular, this Chapter focused on the three key components of sustainable agriculture: motivation to farm, good farming practices and a resilient farm. Results revealed that farmers belonging to trained groups in SE are more motivated to farm, invest more in practices to restore the health of their land and are more advanced towards establishing a resilient farming system. Moreover, qualitative findings revealed that beyond SE training, group members benefited also from peer learning and the support from more experienced farmers in their groups, which led to the replication and putting in practice of some sustainable agriculture practices. This study therefore supports findings of other studies (e.g. Blackstock et al., 2010; Darnhofer et al., 2016) that awareness raising and experiential learning in training sessions is crucial in stimulating farmers to adopt certain practices and increase the resilience of family farms.

6.3 Towards sustainable agriculture in Burundi

The findings of the thesis touch upon several cross-cutting issues that contribute to theoretical debates about the role of farmer groups entrepreneurial activities in contributing to more sustainable agriculture. A reflection was done on the two major issues:

i. Promoting Burundian farmer groups to recognize sustainable opportunities

ii. The role of sustainable entrepreneurship training in stimulating more sustainable agriculture in rural Burundi;

6.3.1 Promoting Burundian farmer groups to recognize sustainable opportunities

This thesis shows the role of farmer groups entrepreneurial activities in contributing to more sustainable agriculture. It is known that opportunity recognition is considered to be an essential part of entrepreneurship – including sustainable entrepreneurship. The challenge is however how to promote that Burundian farmer groups better recognise the opportunities that sustain the environment, contribute to the society and also provide economic gains for a more sustainable farming system. Boahene et al. (1999) and Lyon (2000) stated that farmers often rely on information within their informal social network and transfer agricultural knowledge through social interactions (Conley and Udry 2010). Collaboration on inter-household level, for pursuing sustainable business opportunities is essential for Burundian farmers. In Burundi group entrepreneurship is particularly attractive because a majority of farmers are not able to start an entrepreneurial business on their own. For that, social networks play a key role in the initial steps of (sustainable) entrepreneurial opportunity recognition.

Quite some research has been carried out on opportunity recognition in entrepreneurship (e.g. Baron, 2006; Baron and Shane, 2007; Granovetter, 1973; Hills and Shrader, 1998; Kaish and Gilad, 1991; Shane and Venkataraman, 2000; Tang et al., 2012; Venkataraman, 1997), but few works exist on opportunity recognition in sustainable entrepreneurship. Literature in this area is scarce and largely conceptual in nature (e.g. Cohen and Winn, 2007; Patzelt and Shepherd, 2011) but some empirical works have been done as well (Choongo et al., 2016; Muñoz and Dimov, 2017; Hanohov and Baldacchino, 2018). These scholars argue that unlike opportunities for traditional entrepreneurship, which result from changes related to the business (i.e. changes in supply and demand), opportunities for sustainable entrepreneurship are a result of changes in the natural and communal environments. Therefore, those groups with farmers who are more keen on their natural and communal environments are more likely to identify opportunities for sustainable entrepreneurship. Kaijun and Sholihah (2015) argued that the relationship between opportunity recognition and sustainable entrepreneurship is effective. Particularly groups composed by individuals who possess prior knowledge of their natural and communal environments are argued to be more attentive to changes in these areas and would therefore be more likely to recognize opportunities for sustainable entrepreneurship. This is related to our findings in Chapters 2 and 3, which revealed that the prior sustainable behaviour of farmer groups' members influences the sustainability of new group business ideas and its nature and that members' prior knowledge in sustainability aspects helps them to identify opportunities directly related to their prior knowledge. Similar findings were obtained by Muñoz and Dimov's (2017) and Hanohov and Baldacchino(2018). They showed that prior knowledge of both negative and

positive trends, changes, and conditions can be influential on sustainable entrepreneurs' abilities to identify opportunities. Sargani et al. (2020)' findings revealed a positive effect between sustainability attitudes and intention towards sustainable entrepreneurship in agriculture.

Hence, in order to contribute to more sustainable agriculture among Burundian smallholder farmers, collaboration in small groups on inter household level is essential as farmers possess different and complementary prior knowledge on sustainability allowing them to recognise sustainable opportunities that are hard to recognise individually. Therefore, raising more awareness on sustainability aspects is needed for Burundian farmers in order to enhance their knowledge on the subject. In this thesis it was observed that the prior knowledge in sustainability aspects of some farmers came from their long experience in farming and from some knowledge gained in local organisations to which farmers belong; but many of those organisations were not empowering them in the 3Ps (planet, people and profit) of sustainability at the same time. Therefore, promoting collaboration among Burundian farmers to recognise sustainable opportunities will be beneficial only if awareness-raising and training take into account the interrelation between planet, people and profit; as such resulting in social and economic gains that contribute to more sustainable farming.

6.3.2 The role of sustainable entrepreneurship training in stimulating more sustainable agriculture in rural Burundi

In recent times, adoption of processes of sustainable practices within the agriculture sector have received growing global attention (Sher et al., 2019). Sustainability has been at the forefront of politics and public debate and has begun to capture the attention also in the area of entrepreneurship and many authors continue to contributed to its evolution, with the recently Terán-Yépez et al. (2020)' publication on "Sustainable entrepreneurship: Review of its evolution and new trends". This is not surprising since, according to a number of scholars (e.g. Hart, 2010; Schwab, 2018), business and business innovations must play an increasingly active role in bringing about positive changes towards more fair global economic development and preservation of nature and ecosystems. It is therefore essential to better understand sustainable entrepreneurship, as it lacks empirical studies from the developing world that allow to gain a better grasp of its unique aspects (Mellett et al., 2018; Nuñez and Musteen, 2020). Sustainable entrepreneurship (SE) refers to "a process aimed at achieving sustainable development, through the discovery, evaluation and exploitation of opportunities and the creation of value that results in economic prosperity, social cohesion and environmental protection" (Rodriguez, 2016, p. 427). According to Schaltegger and Wagner (2011), SE contributes to solving both societal and environmental problems through the accomplishment of a successful business, which includes corporate activities, small

or large, to create sustainable development. It consists of actions that can help preserve ecosystems, decrease environmental degradation and deforestation, provide more access to fresh water, neutralize climate change, maintain biodiversity and contribute to education and productivity (Nuñez and Musteen, 2020).

SE in the developing world is a new concept for potential entrepreneurs and in particular for Burundian rural farmers. Chapter 5 examined how SE training influences the farming activities of rural farmers. Given that Masri and Jaaron (2017) stated that training and development are a pre-requisite to support sustainable green entrepreneurial development, in the present section we go deeper into a reflection on how SE training can contribute to sustainable agriculture.

As achieving food security is still a major challenge in many Sub-Saharan African countries, including Burundi, sustainable agriculture and productive fertile soils are needed for increasing the production of good crops. So in order to enhance the sustainability of agriculture, contribute to food security, reduce land degradation and access markets for more profitable farming, Burundian farmers need to be empowered and trained in SE. As such they will come to see the opportunities that an entrepreneurial mindset offers to transform a subsistence farming system into a more sustainable agricultural production system. Furthermore, as clearly argued by Shepherd and Pratzelt (2011), entrepreneurial action can preserve the ecosystem, counteract climate change, reduce environmental degradation and deforestation, improve agricultural practices and freshwater supply, and maintain biodiversity. Once empowered in SE, farmers understand and apply the three (environmental, economic and social) aspects of sustainability in their farm entrepreneurial projects. *For the social part of the training*, farmers learn about the added value of collaboration by working in group with other farmers. This is essential especially in the Burundian context as farmers often lack the basic necessary means to go beyond subsistence level and access local market individually.

For the environmental part of the training, farmers learn about the benefits of conserving their land by using improved and integrated farming practices that lead to better soils and improved production. This enables them having enough food for consumption for their households and maybe the surplus that can be sold to the market. *In the economic part of the training*, farmers will achieve to understand the economic environment that surrounds them and their entrepreneurial project idea. This means the market in general and in particular the input suppliers, adequate places for selling their produce, fair prices, the connection to saving and credit organisations or microfinance, etc. This can lead to more “sustainable” Burundian farmers that collaborate in their community, care for their environment while benefiting from economic gains of their entrepreneurial projects. The farmers application of

what is learnt in SE training and the peer support in their communities will enable them to overcome one of the main challenges in the agriculture system: investing in more sustainable agriculture, which will result in increased production and food security for their households.

Eliminating hunger, ensuring food security, improving nutrition and promoting sustainable agriculture are among the Burundian priorities stated in the report on the prioritization of sustainable development goals in Burundi 2016-2030 and in Burundi's national development plan 2018-2020. Findings from Chapter 4 and 5 show that both SE training and peer learning, as well as exchanging experience through collaboration in groups, contributed to the increase of the farmer groups' knowledge and practice of sustainability aspects. This motivated these farmers to invest more in practices to restore the health of their land and as such advance towards establishing a resilient farming system. Orientation to training programs provide a human resource with the necessary knowledge and help to improve capabilities to overcome existing problems and create an environment which fosters cleaner production (Sarkis et al., 2010). Therefore SE training is important, as lack of entrepreneurial skills is a critical barrier hindering adoption of green practices (Farinelli et al., 2011; Silajdžić et al., 2015) Chapter 4 and 5 showed that in addition to training, peer learning in groups is also important. This is also often claimed in entrepreneurship literature, given that entrepreneurship is learning by doing, and learning on the job. However, this is partly true, because for this particular context of sustainable entrepreneurship, formal training is especially important as well, as it requires also systems thinking, zooming out, perspective taking and reflection. These are competencies that may not come naturally from learning-on-the-job, but require learning that is a bit more structured and facilitated.

6.4 Policy and extension implications

From the above cross-cutting analysis, several policy and extension implication can be derived:

- Chapter 2 and 3 findings showed that farmer group formation and prior knowledge on sustainability aspects are important in recognizing sustainable opportunities related to the agriculture system. It was observed that the knowledge on sustainability that some farmers possess is "basic" and that many still lack the knowledge on sustainability related to their farming system. The gap in knowledge on sustainability aspects for the majority of Burundian farmers and the "basic" knowledge on the subject of some farmers should be closed through raising awareness and informing them by using all possible channels and allowing them to collaborate in small groups. The farmer group

formation may be more beneficial if taking into consideration diversity within the groups meaning that difference in members backgrounds and experiences is essential for exchanging knowledge and practice for recognizing group entrepreneurial sustainable opportunities.

- From Chapter 4 and 5 results, we observed that both formal training in SE and peer learning help farmers to increase their knowledge and practices of sustainability aspects and to better develop the three key components of sustainable agriculture in their households. For the context of sustainability, which is a new topic for many Burundian farmers, it is therefore crucial to start by formal training and this should enable also farmer to farmer learning through collaboration in groups.

6.5 Contribution to science and society

The results of this research fill a gap in literature because there are few empirical studies on sustainable agricultural entrepreneurship that focus on the earliest phase of opportunity recognition, let alone studies that focus on sustainable opportunity recognition in the context of emerging economies such as Burundi (Chapters 2 & 3). Furthermore, this research contributes to the literature on the role and impact of SE training on group and household farming activities in emerging and development countries (Chapters 4 & 5). This thesis also provides a contribution to Burundi on the subject of sustainable entrepreneurship in general and in farming contexts in particular, which was still under-researched in the country. The present thesis gives possible solutions to Burundian priorities on the agriculture sector stated in many government plans like the prioritization of sustainable development goals in Burundi 2016-2030 and for Burundi's national development plan 2018-2020, by showing that developing entrepreneurial activities in farmer groups contributes to more sustainable agriculture that is needed to increase Burundian agriculture productivity and achieve food security.

6.6 Limitations of the study and recommendations for future

During the research, we had to collect all data ourselves with the support of 2 assistants, in order to follow the entire process from entrepreneurial group formation, the SE training process, farmer groups projects written in the farmer groups plans at the end of the SE training, analyzing the influence of SE training on farmers groups knowledge and practice,

and finally examine the influence of SE training on the household farming activities. Both quantitative and qualitative methods were used. We were confronted with several limitations. **First**, the fact that for the qualitative data we had to rely on what farmers told us may have caused a social desirability bias in our results. **Second**, the study areas (only two provinces of Burundi) as well as studied farmers (103 farmers in 20 groups) may limit the representativeness of the findings, making it difficult to generalize or extrapolate them to a larger population. **Third**, in Chapter 2, the focus on business plans only as an early outcome of the sustainable entrepreneurship process is a limitation for the present study. Therefore, the following recommendations are suggested for future research:

1. As this thesis was done on the early phase of the sustainable entrepreneurship, the focus on the business plan as an outcome may be completed by investigating later stage outcomes (during business plan application) of sustainable entrepreneurship.

2. Examine if the role of SE training in gaining deeper knowledge on sustainability aspects persists in the long run and results in better knowledge and practice of sustainable entrepreneurship aspects .

3. Analyze other factors that can support SE training in influencing the development of sustainable agriculture of rural households.

6.7 Overall conclusions

This thesis provided detailed insights on the role of farmer groups entrepreneurial activities in contributing to sustainable agriculture. The following general conclusions can be drawn from the findings of the study:

1. As prior knowledge of sustainability aspects is beneficial for recognizing “sustainable” entrepreneurial opportunities that sustain the farming system, it is important that the Burundian Government through the Ministry of Agriculture initiates an awareness campaign on the subject.

2. Farmers who are trained in sustainable entrepreneurship are more motivated to farm, invest more in practices to restore the health of their land and are more advanced towards establishing a resilient farming system. Hence, in order to enhance the production of smallholder farmers through sustainable agriculture and achieve food security, it is necessary to train them in sustainable entrepreneurship.

3. In order to invest in more sustainable agriculture for Burundian farmers, it is important that trainings are given in self-organized groups for stimulating collaboration among farmers with different background and experience leading to continual learning and exchange of good and improved farming activities in the community.

4. The Government should take the initiative to create an adequate environment for promoting sustainable entrepreneurship as a way to transform subsistence farming into more sustainable agriculture. Therefore a program supporting farmers to undertake entrepreneurial action is required in order to continue exploiting "future" sustainable opportunities that sustain the farming system for social wellbeing and sustainable agriculture development.

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English summary

In Burundi subsistence farming is practiced on fragmented farms and highly eroded soils that are becoming increasingly unproductive due to intensive farming. Sustainable agriculture (SA) is therefore crucial in order to maximize the economic and social benefits from the land while conserving it ecologically. Several support programs for SA have been implemented in Burundi over the past decade, but there is an urgent need for more action, as land is degrading at a very fast pace, and climate change increasingly impacts food security. Moreover, farmers have little or no capital to actually invest in agriculture for improving land quality. Promoting the collaboration among farmers in groups for sustainable entrepreneurship (SE) can be an alternative to stimulate SA. The overall aim of this study was to explore how developing entrepreneurial activities by farmer groups can contribute to more sustainable agriculture in Burundi.

Chapter 2 deals with the process of farmers entrepreneurial group formation for starting a collective entrepreneurial activity. It investigates the influence of group members' internal states (group members' sustainable values and motivation related to agriculture namely motivation to farm, land health and farm resilience) in group formation and joint sustainable business idea identification in a Burundian smallholder farming context. Findings reveal that farmer groups are formed based on both similarities (same level of internal states) and heterogeneity (difference in terms of gender, generation, experience and education). In many groups internal state patterns were different and such groups were formed on 'compensation' and 'committed leadership' principles, where one or two innovative farmers or leaders help to motivate and inspire the others. Moreover, prior sustainable behavior of members influences sustainability of new group business ideas and the nature (e.g. focus on farming) of that business idea.

Following up on the previous chapter, Chapter 3 focuses on the drivers and outcomes of sustainable entrepreneurship. It examines if farmer groups' prior knowledge of the sustainability aspects (environmental, economic and social) and farmer groups' motivation (entrepreneurial orientation, income motivation and knowledge motivation) are related to the quality of their "sustainable" business plan developed at the end of SE training by each farmer group. Findings reveal that having prior knowledge of a sustainable opportunity, being entrepreneurial oriented and being motivated to increase knowledge (i.e. showing aspects of altruists motivation), positively influence the quality of the business plan. This implies that more knowledge of the natural or communal environment and altruistic motives drive the recognition of opportunities for sustainable development.

The main lesson learned from chapters 2 and 3 is that farmers' prior knowledge on the sustainability aspects is important in recognizing sustainable opportunities that contribute to sustainable agriculture.

Chapter 4 analyses the extent to which group training in sustainable entrepreneurship influences the knowledge and practices in sustainability aspects of the farmer groups. For assessing that influence, two categories of groups of farmers (trained and not-trained) were compared for two periods (just after the group formation in 2016 and three years later). Findings reveal that all groups trained and not-trained increased their knowledge and practice in all three sustainability aspects between 2016 and 2019, but that the trained groups perceived a higher increase than the not-trained groups. It was noticed that next to the trainings in the trained groups, peer learning and learning on the job through collaboration explain the observed increase both for the trained and not-trained farmers. Findings furthermore show that trained groups have more advanced levels of understanding and application of knowledge and practice in the three sustainability aspects as compared to not-trained farmers.

Chapter 5 focuses on the analysis of the influence of group training in sustainable entrepreneurship on households' farming activities, particularly the three key components of sustainable agriculture (motivation to farm, good farming practices and a resilient farm). Results reveal that farmers belonging to trained groups in sustainable entrepreneurship are more motivated to farm, invest more in practices to restore the health of their land and are more advanced towards establishing a resilient farming system. Moreover next to sustainable entrepreneurship training, group members benefited also from peer learning and the support from more experienced farmers in their groups, which led to the replication and putting in practice of some sustainable agriculture practices.

The main lesson learned from chapters 4 and 5 is that sustainable entrepreneurship training and peer support in farmer groups contribute to more sustainable agriculture.

Chapter 6 presents the main insight from this thesis, namely that enhancing farmers' knowledge and understanding of sustainability aspects – like done during this research by means of the intensive trainings on sustainable entrepreneurship given in organized farmer groups – is required to advance towards more sustainable agriculture.

The final chapter of the thesis concludes that prior knowledge of sustainability aspects is beneficial for recognizing "sustainable" entrepreneurial opportunities that sustain the farming system. Moreover, farmers who are trained in sustainable entrepreneurship are more motivated to farm, invest more in practices to restore the health of their land and

are more resilient in their farms. It is therefore necessary to train them in sustainable entrepreneurship in order to enhance their production through sustainable agriculture and achieve food security. In addition to training, collaboration among farmers with different background and experience is important for continual learning and exchange of good and improved farming activities in the community. Hence, in order to invest in more sustainable agriculture for Burundian farmers, it is important that trainings are given in self-organized groups.

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About the author

Bélyse Mupfasoni was born on October 25, 1979 in Bujumbura, Burundi. She obtained her BSc degree in Management and Administration from University of Burundi in June 2006. She was employed by University of Burundi (UB) as junior lecturer in the Faculty of Economics and Administrative Sciences in May 2008.

In September 2010, she continued her MSc study at Makerere University Business School in Kampala, Uganda and received her MSc degree in Sciences of Entrepreneurship in June 2013. Her Master thesis focused on the relationship between cooperatives societies interventions, entrepreneurial capacities and growth of small businesses in rural Burundi.

After completing her MSc study, she continued working as a lecturer at University of Burundi and researcher in the university research center for research and social economic development (CURDES) at UB .

In September 2014, she joined Soil Physics and Land Management Group to pursue her PhD study at Wageningen University. The PhD project was funded by NUFFIC (Netherlands Universities Foundation for International Cooperation). Bélyse Mupfasoni conducted an interdisciplinary research in the field of sustainable land management. This dissertation presents the results of her PhD study, which also comprises published, peer-reviewed and submitted articles in scientific journals.

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Scientific Publications

Mupfasoni, B., Kessler, A., Lans, T. (2018), "Sustainable agricultural entrepreneurship in Burundi: drivers and outcomes", *J. Small Bus. Enterp. Dev*. Vol. 25, pp. 64-80.

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- L'outil économétriques de décisions économiques de croissance et de développement, University of Burundi (2017)

External training at a foreign research institute

- Workshop for the East African Network of Learning of Administrators and Researchers (EANLAR), Makerere University, Uganda (2018)

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- Panel member in four BSc students thesis projects '(2014-2016)
- Guest speaker 'Sustainable entrepreneurship' at the American Embassy, Burundi (2016)
- Supervising three BSc teams during the Food & Nutrition Security Excellence Programme (2019-2020)

Oral Presentations

- *Assessing entrepreneurial group differences in integrated farm activities*, Wageningen International conference in Network and value chain Management(WICANEM), 2-3 July 2018, Ancona , Italy
- *Burundi chapter report on the achievements and challenges of East Africa Network of Learning of Administrators and Researchers (EANLAR)*, International conference in sustainability of the EANLA network in Enhancing Third party funding for Research and Development, 19-22 November 2018, Juja, Kenya
- *Awareness raising for third party funded research projects: opportunities and EANLAR impact*, Conference on capacity building for third party funded research projects in East Africa, 23-26 September 2019, Kassel, Germany

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