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Understanding Innovation: Exploring Interactions between Large-Scale Land Investments and Small-Scale Farmers in Mozambique

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Declaration of Original Authorship

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

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Abstract

That small-scale farmers benefit from large-scale land investments (LSLIs) in developing countries is an argument put forward by supporters of LSLIs, which include governments in target countries and development partners, such as the World Bank. The aim of this study is to examine the interactions between LSLIs and small-scale farmers and to evaluate the extent to which these investments support or undermine innovations in small-scale farming, and how they do so. It employs an innovation system framework as an approach to explore interactions between small-scale farmers and LSLIs. With an emphasis on qualitative methods, it combines household surveys, in-depth interviews and group interviews in a mixed method research design. The findings highlight that the government's paternalistic attitude towards small-scale farmers encourages implementation of LSLIs as a development strategy. However, the findings reveal a complex picture of LSLIs, presenting features of both development opportunities and land grabbing. These two qualities of LSLIs are also related to the cropping system insofar as technological interactions characterise LSLIs and small-scale farmers' interactions in the vegetable sector, whereas land conflicts are important as a feature of their interactions in the sugarcane sector. The findings concerning the social relations of production in both vegetable and sugarcane sectors indicate that distribution of tasks and responsibilities, within households and associations, are based on age and gender. The older and male village inhabitants are able to control main sources of cash income whereas the female members of the community are for the most part engaged in subsistence agriculture and perform a secondary role in situations in which agriculture is the main source of cash for the household. In addition to this, the way in which small-scale farmers are organised within associations, i.e., as a collective farm in the sugarcane sector and as individual production units in the vegetable sector, affect how and the extent to which LSLIs contribute to innovation in small-scale farming.

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Dedication

In memory of my mother, my guide and source of inspiration. She passed away two months before the beginning of my PhD training. But all my achievements up to now I dedicate to her because she prepared me to deal with the important issues in life.

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List of Acronyms

$US – United States dollars

ACNA – Associação de Canavieiros de Nhassato

ADIPSA – Development Assistance for Private Sector Agriculture Initiative

AKIS – Agriculture Knowledge and Information System

BAGC – Beira Agricultural Growth Corridor

CEP – Provincial Business Council of Manica

CEPAGRI – Centre for the Promotion of Agriculture

CFS – Committee on Food Security (FAO)

CGIAR – Consultative Group of International Agricultural Research

CPI – Investment Promotion Centre

CSR – Corporate Social Responsibility

DINAGECA – National Department for Mapping and Land Registry Service

DUAT – Land Use Rights

FAO – Food and Agriculture Organization of the United Nations

FDA – Mozambican Agricultural Development Fund

FFL – Farmer-First-and-Last-model

FFS – Farmer field School

FRELIMO – Mozambican Liberation front

FSR – Farming System Research

G14 – Group of 14 Mozambican budget support donors

GAPPO – Office of Agricultural Production Support

GBP – Great Britain Sterling Pounds

IIAM – Mozambican Agricultural Research Institute

IMF – International Monetary Fund

IS – Innovation System

ISPM –Higher Learning Polytechnic Institute in Manica province

Kg – Kilograms

LSLIs – Large-Scale Land Investments

m – Million (s)

MZN – Mozambican Metical

N1– National Road Number One

N7 – National Road Number Seven

NGOs – Non-Governmental Organizations

ORAM – Rural Association for Mutual Support

PARP – Action Plan for Poverty Reduction in Mozambique

PEDSA – Agricultural Strategy and Development Plan

PNISA – Agricultural Investment Plan

PROAGRI – National Agricultural Development Program

PROIRRI – Sustainable Irrigation Development Project

RENAMO – Mozambican National Resistance

RIU – Research Into Use

SAPs – Structural Adjustment Programmes

SDAE – District Services for the Economic Activities

SEMOC – Seeds of Mozambique

T&V – Train and Visit

TOT – Transfer-of-technology

TPB – Theory of Planned Behaviour

TRA – Theory of Reasoned Action

UNAC – National Peasants' Union

USA – United States of America

USAID – United States Agency for International Development

WMO – World Meteorological organization

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1 Chapter one – Introduction

This study sets out to explore interactions between Large-Scale Land Investments (LSLIs) and small-scale farmers. It contributes to an understanding of modernisation in agriculture by considering the case of Mozambique where implementation of LSLIs is regarded by the government as a mechanism to provide agricultural support to small-scale farmers. This introductory chapter not only provides the rationale for the investigation into how LSLIs affect the livelihoods of small-scale farmers, it also revisits debates about LSLIs that contributed to the choice of topic and outlines the aims of the study, the research objectives, and the questions that guided the inquiry.

1.1 Background, Rationale, and Knowledge Gaps

1.1.1 Background

Since the world food and fuel crises in 2008, there has been an increase in LSLIs worldwide (Cotula, 2012). A significant number of such investments, predominantly undertaken by foreign companies, are under implementation in Sub-Saharan Africa (Schoneveld, 2014). As a result of LSLIs taking place following several years of declining funding for agriculture (Jayne et al., 2010), host country governments view such investments as a manifestation of a renewed interest in the sector, and therefore, an opportunity to support the agricultural sector (Cotula, 2012). Nevertheless, in spite of the potential benefits of LSLIs in terms of their contribution to national tax revenue, generation of employment, support of social infrastructure and provision of access to markets, as suggested by Deininger et al. (2011), concerns raised by activists from national and international non-governmental organisations are that LSLIs will contribute to land grabbing (Borras Jr, 2008; GRAIN, 2011; UNAC and GRAIN, 2015).

Within this frame, the scholarly debate has concentrated on the political economy and political ecology of LSLIs because of the geopolitical (Collier and Dercon, 2014), human rights (Wisborg, 2013, De Schutter, 2011) and environmental (Lazarus, 2014) implications for host countries. Diverse terms have been put forward to discuss LSLIs. For example, Nolte and Voget-Kleschin (2014) and Osabuohien (2014) employed the term *Large-Scale Land*

Acquisition, defined as the transfer of large areas of farmland to foreign investors; and, using the political ecology approach, the term *Green Grabs* is commonly employed in reference to land investments conducted predominantly for environmental purposes (Holmes, 2014).

Particularly important in this debate is the term *Land Grabs*, which conveys the concern that the negative impacts of LSLIs on the livelihoods of local communities outweigh their positive outcomes (Borras Jr and Franco, 2012). In this view, Land Grabs have been defined as:

- the recent phenomenon which involves (trans-) national large-scale commercial land transactions for the production and export of agro-fuels, food, animal feedstuff, timber, and minerals (Borras Jr and Franco, 2012);
- the change in control over large tracks of land from local to external powerful entities (Holmes, 2014).
- the purchase of large tracks of land by governments, private entities, or banks with the objective to earn enormous profits (OXFAM, 2014).

The above definitions not only suggest different perceptions about the phenomenon, but also illustrate the concerns generated by the contemporary LSLIs on the livelihoods of local communities. The discourse emphasises the transnational nature of LSLIs and contains features of the neo-Marxist political economy wherein class conflicts, power relations, and struggles to control state resources constitute some of the themes. In this view, Schoneveld (2014), for instance, highlights that in sub-Saharan Africa investors from Europe, Asia, and North America account for 40.5%, 19.4%, and 15% of the investments, respectively. These are countries from the Global North, including China, South Korea, India, and Gulf States, performing land investments in the Global South. McMichael (2012) maintained that this marks a shift in the corporate food regime where the aim is to profit from the differences in land prices between Global North and South. Furthermore, Li (2011) argued that LSLIs may contribute to the appropriation of labour. Given the characteristics of land and what it represents for current and future generations, change over its control from local to external actors will have negative impacts on the livelihoods of the rural households who rely on land and its natural resources for their subsistence. For example, Olanya (2013) asserted that land is the centre of political, social, and economic activities for indigenous peoples.

The concerns are exacerbated due to the participation of banks in LSLIs. This suggests that agricultural land is transformed into a financial asset (Gunnoe, 2014; Ouma, 2014), and thus decision-making about alternative land uses are based on expected financial profits and less consideration is given to food security and environmental concerns in host countries (McMichael, 2012). Furthermore, involvement of government investors also adds to the concerns about implications of LSLIs on food security for local communities because it suggests that LSLIs are likely to address the production needs of investor countries, rather than the needs of the host countries. Hence, it is important to understand whether such investments constitute land grabs or a development opportunity.

1.1.2 Rationale and Knowledge Gaps

In the context of decreasing funding for agricultural and rural development activities as outlined above, coupled with an emphasis on liberalisation by governments and donors (Dorward et al., 2004), developing countries have been increasing their reliance on private initiatives as a means to support agricultural and rural development programmes. Nevertheless, the effectiveness of agricultural and rural development driven by the private sector is yet to be understood (Chimhowu, 2013). As a result, there are conflicting views as to the appropriate development strategy for host countries. In terms of poverty reduction, De Schutter (2011) claimed that supporting activities of small-scale farmers has the greatest potential for improvement in the livelihoods of local households. In contrast, Wiggins and Kirsten (2010) argued that there is no evidence to support the idea that focusing on small farmers may contribute to reducing poverty. Furthermore, while questioning the principle that agriculture has to be the starting point for poverty reduction and growth, Collier and Dercon (2014) argued that considering current dynamics of the world markets, development models which focus on small-scale farmers are likely to fail. Within this frame, there are many uncertainties and knowledge gaps concerning the implications of LSLIs on host countries and on the livelihoods of targeted communities. This has led to a rapid increase in the LSLIs literature (Scoones et al., 2013) which initially focused on understanding drivers, trends, geography, and scale of LSLIs (Edelman, 2013; Oya, 2013; Scoones et al., 2013).

To a great extent, the literature has concentrated on the agrarian political economy of LSLIs (McMichael, 2012), the ethical implications (Wisborg, 2013; Hall et al., 2015), and conflicts

associated with these investments (Hall et al., 2015; Martiniello, 2015; Ren, 2017). However, in spite of substantial interest in the topic amongst policy makers at various levels, governments, journalists, academics, farmers, investors, and other stakeholders, there remained a lack of empirical research on LSLIs (Edelman, 2013; Oya, 2013; Scoones et al., 2013). Hence, in-depth and empirical investigations of such investments were called for in order to increase the reliability of the information about LSLIs, as well to understand the impact on local communities (Visser and Spoor, 2011; Borras Jr and Franco, 2012; Cotula et al., 2014). Therefore, in response to those calls for further empirical understanding of LSLIs, this study investigates LSLIs from the perspective of innovation, a holistic approach that also gives emphasis to the potential benefits of LSLIs.

Using an innovation system conceptual framework takes an optimistic stance towards LSLIs and avoids focusing on their negative features by concentrating on the under-researched proposition that LSLIs constitute an opportunity for agricultural and rural development. This also responds to calls for the creation of flexible frameworks, which take into consideration the new trends, the multifaceted interactions between new and old actors, the way in which learning processes are organized, and the institutions that facilitate or constrain those interactions and processes, to understand innovation processes in developing country agriculture (Spielman et al., 2009). In Africa, various factors, including availability of infrastructure, multilevel collaboration between stakeholders, and rural-urban linkages can impact the effective adoption and use of innovations in agriculture (Ambalam, 2014).

Furthermore, there remain few studies on how LSLI influences local innovation systems. Ambalam (2014) argued that lack of preparedness would limit applicability of technology and practices being introduced by LSLIs. A study on LSLIs in Ethiopia discusses technological transfers from LSLIs to small-farmers and, according to Ojulu (2013), there seems to be a relationship of competition, rather than complementarity, between LSLIs and small-scale farmers. In the same study, Ojulu (2013) stated that no technology transfer had taken place between LSLIs and local communities. However, the focus of those studies was not to assess technological interactions. Hence, the shortage of studies which assess LSLI from the perspective of innovation justifies current research. Within this frame, and taking into consideration the predominance of small-scale farmers in Africa (Jayne et al., 2010; Wiggins

and Kirsten, 2010; Collier and Dercon, 2014), this study focused on understanding the process of innovation in small-scale farming by exploring their interactions with LSLIs.

The study sought to examine the poorly understood processes that facilitate innovation in small-scale farming because, according to Gildemacher and Mur (2012), this is the basis for the identification of entry points for the support of agricultural innovation. Furthermore Leeuwis and van den Ban (2004) maintained that processes should be the primary focus of Communication and Innovation Studies. In line with these considerations, this study sought to understand processes occurring within and at the interface of the farming systems. By doing so, the study contributes to identification of entry points for the support of innovation in small-scale farming. Interchanges between actors which occur both within and outside of the system affect the farmer's innovation decisions and livelihood options. Nevertheless, this study also underscores the importance of context and the implications of cropping systems on how LSLIs influence innovation in small-scale farming. Hence, a case study approach was used and the comparison made between LSLIs and small-scale farmer's interactions in two markedly different cropping systems, namely the vegetable and sugarcane subsectors.

1.2 Research Aim, Objectives and Questions

1.2.1 Research Aim

This research aims to examine interactions between LSLIs and small-scale farmers, and to evaluate the extent to which these investments support or undermine innovation in small-scale farming.

1.2.2 Research Objectives

To account for the above Study Aim, three research objectives have been considered:

Research Objective 1: to explore the national and sub national drivers of LSLIs

Research Objective 2: to characterise interactions between LSLIs and small-scale farmers

Research Objective 3: to examine the outcomes of interactions between agricultural stakeholders in terms of innovation in small-scale farming.

For each research objective, a set of questions has been framed to guide the data collection at different stages of the research process.

1.2.3 Research Questions

The literature on LSLIs suggest that both internal and external drivers explain implementation of LSLI in host countries. Drivers are economic and political factors that have both triggered and provided incentives to LSLIs globally (Cotula, 2012). The bulk of LSLIs research focuses on their external drivers and disregards implementation of LSLIs as a development strategy. However, the outcome of LSLIs depends on the ability of host country governments and their citizens to guide investments in such a way that their benefits are maximised and their drawbacks minimised (German et al., 2013). Hence, detailed analysis of LSLIs entails additional knowledge of the incentives of specific stakeholders in addition to the political principles that shape the process from policy to practice (Wolford et al., 2013). To fill this knowledge gap, in relation to the **research objective one**, using the case of Mozambique, this research set out to answer three research questions:

- Why are the agricultural stakeholders promoting LSLIs?
- How are they implementing such promotion?
- How are LSLIs framed?

To understand the processes occurring in the areas where LSLIs are implemented and how they engage with local communities, **research objective two** characterises interactions between LSLIs and agricultural stakeholders with particular emphasis on small-scale farmers. This objective also sought to understand power relations to account for the interest and participation of national and subnational actors during implementation of LSLIs. The focus on foreign actors, as highlighted above in Section 1.1.1, masks another feature of the LSLIs whereby domestic actors are also involved (Cotula, 2012). Although it is acknowledged that participation of domestic individuals encourages implementation of LSLIs in host countries, little is known regarding their role and how the process is mediated. Taking into consideration an innovation system framework, specific research questions include:

- What are the opportunities for networking and exchange of information in the targeted areas?
- What forms of collaboration are present in the local innovation systems and to what extent are these investments inclusive of the most vulnerable groups?
- What are the roles of different innovation actors and to what extent do they complement each other?

Lastly, if LSLIs can operate as a source of knowledge and agricultural information to small farmers, it is important to understand the mechanisms whereby LSLIs engage in the innovation process. Hence, **research objective three** examines the outcomes of interactions amongst agricultural stakeholders in terms of innovation in small-scale farming. It predominantly explores the extent to which LSLIs influence the innovative capacity of small-scale farmers. From the perspective of social learning, it examines how the decision to innovate is put into effect. The research questions that guided the inquiry on this theme include:

- To what extent do agricultural stakeholders spur or suppress innovation?
- What are the innovations considering different classes of farmers?
- To what extent is the innovative capacity of small-scale farmers influenced by their interactions with LSLIs?

1.3 Thesis Overview

The thesis is structured into eight chapters as outlined in this section.

Chapter 2 revisits the debate on LSLIs worldwide as the first part of the literature review; the second part considers changing perspectives on agricultural innovation; meanwhile, the third part lays out an *Agricultural Innovation System* conceptual framework to explore interactions between LSLIs and small-scale farmers. This conceptual framework regards innovation as the outcome of the interactions between various components of the system. Such components encompass the enabling environment; actors and their roles; patterns of interactions; and attitudes and practices. While the theme 'actors and their roles' is discussed throughout the thesis, the remaining components of the conceptual framework constitute the main topic for specific chapters, as explained below.

Chapter 3 discusses the theoretical underpinnings of this research. It outlines the epistemological stance, the theoretical perspective, the methodology and methods. This chapter also describes the mixed method research design and the research procedure.

Chapter 4 provides a brief review of Mozambican history and presents the country's contemporary political situation. This chapter also describes characteristics of small-scale farmers in the vicinity of LSLIs and discusses their perception on how implementation of LSLIs impacts their livelihoods. Also introduced in this chapter are wealth ranking criteria which take into consideration: investments in housing; social capital; and ownership of land, livestock, and transport.

Chapters 5, 6, and 7 are empirical chapters. They present and discuss the research findings.

Chapter 5 explores the national and subnational drivers of LSLIs in Mozambique. This chapter addresses research objective one and, along with Chapter 4, accounts for the enabling environment in the conceptual framework. Accordingly, it examines how formal and informal institutions encourage LSLIs in Mozambique.

Chapter 6 examines interactions between small-scale farmers and LSLIs and factors that determine the ability of small-scale farmers to access opportunities. This chapter deals with research objective two and accounts for the patterns of interactions in the conceptual framework. Thus, it examines networking, negotiations between LSLIs and small-scale farmers, and the extent to which LSLIs include, or exclude, the most vulnerable groups.

Chapter 7 addresses research objective three and reflects on learning and innovation in small-scale farming that takes into consideration small-scale farmers' interactions with LSLIs. To investigate the outcomes of their interactions in terms of innovation, this chapter also considers the attitudes of innovation actors.

Chapter 8 is the concluding chapter and provides a synopsis of the main research findings which address the questions the study set out to answer while also discussing the implications of such findings for the livelihoods of small-scale farmers. Furthermore, the conclusion considers the theoretical and empirical implications, along with those of policy, and puts forward considerations for future studies.

2 Chapter two – Literature review and conceptual framework

2.1 Introduction to the chapter

This chapter provides a review of the literature which explores interactions between LSLIs and small-scale farmers. Accordingly, the chapter firstly discusses LSLIs in order to understand the context within which these investments are occurring, and how are they affecting farming communities. After briefly introducing recurrent themes from the debate concerning LSLIs, the review then focusses on the literature around agricultural innovation. More specifically, three main parts comprise the literature review. The first part, Section 2.2, discusses LSLIs generally. The second part reviews perspectives on agricultural innovation. Accordingly, Section 2.3 revisits linear and participatory approaches to innovation, and Section 2.4 discusses system approaches to innovation. The third and final part, section 2.5, puts forward a conceptual framework for an innovation system which explore interactions between LSLIs and small-scale farmers.

2.2 Large-scale land investments (LSLIs) in agriculture

This section explores some of the recurrent themes in the LSLIs literature in order to understand the context within which LSLIs are occurring. The section firstly defines LSLIs and small-scale farmers in terms of area, and also distinguishes them by considering their main objectives. Following this, the section introduces LSLIs from the historical perspective. Studies that have analysed this phenomenon from the historical perspective consider LSLIs to be a continuation of past occurrences (Alden Wily, 2012; Cotula, 2013). However, while acknowledging that LSLIs are not new phenomena, many argue that the contexts within which they are occurring worldwide differ (Friis and Reenberg, 2010; Hall et al., 2012; McMichael, 2012). Therefore, following discussion from the historical perspective, the review refers to the drivers of current LSLI. The literature, invariably, associates LSLIs in many developing countries with external drivers, such as the global financial crisis in addition to food and energy security concerns in the countries from where these investments originate (Cotula, 2012; McMichael, 2012).

Considering that drivers which triggered these investments are not local insofar as LSLIs may respond to external needs, there are concerns with regard to the potential outcomes of the

LSLI. Hence, after an overview of the drivers and the context that determined occurrence of these investments, the study focuses on the interactions between LSLIs and the local communities within which these investments are taking place. Hitherto, much of literature has concentrated on the acquisition process and the extent to which local communities are able to influence the occurrence of LSLI, disregarding interactions between the LSLIs and small farmers during the implementation of the investments. The next section provides a definition of LSLIs and small-scale farmers as employed in this study.

2.2.1 Definition of LSLIs and small-scale farmers

There are substantial variations in terms of areas considered to be LSLI. Studies, heretofore, have considered a wide range of land areas, for example, Holmes (2014) considered areas ranging from fewer than 50 hectares to areas exceeding 300 thousand hectares. Schoneveld (2014) considered a minimum area of 200 hectares; in his legal analysis of land deals, Cotula (2011) reviewed 12 contracts involving land deals of areas ranging from 500 hectares to areas slightly below 200 thousand hectares. An article concerning LSLIs in Mozambique by Arnall (2017), considered the case study of an eucalyptus plantation project that was granted land use rights for an area of 356 thousand hectares for a period of 50 years. Another controversial case from Mozambique, the programme Prosavanna, is projected to occupy 14 million hectares in Northern and Central Mozambique (Chichava et al., 2013). Noticeably, definitions of LSLIs by area are contextual.

Similarly, definitions of small-scale farmer vary. Although in Latin America farms occupying 10 hectares are considered smallholdings, the typical small-scale farm in developing countries occupies less than 2 hectares (Hazell and Rahman, 2014). Within this group, those encompassing less than one hectare are classified as marginal farm holdings (Chambers and Ghildyal, 1985). Beyond the size of the land holding, this study considers qualitative features, such as primary dependence on family labour and more flexibility, or less bureaucracy, in the management of their farms are important markers for the classification of a smallholder (Gasson and Errington, 1993). Furthermore, small-scale farmers are also characterised by their multiple objectives. In this regard, while LSLIs mainly focus on profit maximisation (Li, 2011; McMichael, 2012), small-scale farmers have multiple objectives. These may be related to their personal fulfilment in carrying out farming activities, e.g., the possibility of spending

additional time with their family members, maintaining family tradition, working independently with flexible working hours, in addition to the economic gains made by practicing agriculture (Gasson and Errington, 1993).

Following this brief distinction between LSLIs and small-scale farmers, the next section provides an historical account of LSLIs because this is a recurrent theme in the LSLIs literature and authors, such as McMichael (2012), Borras Jr and Franco (2012) and Wolford et al. (2013), regard current LSLIs a continuation of past episodes of land investments.

2.2.2 Historical and contemporary LSLIs worldwide

There are numerous accounts of land disputes in the history of humankind and some authors have associated current occurrences with past events of LSLIs (Alden Wily, 2012; Cotula, 2013). Historical accounts of these processes include enclosures in England during the early Tudor period (Cotula, 2013; Polanyi, 2014), where communal lands were enclosed by the lords and entire counties were endangered by depopulation; and, appropriation of communal land by the colonial powers which led to skewed land distribution in South Africa, Botswana, and Zimbabwe (Ramutsindela and Sinthumule, 2017). In relatively recent history, LSLIs have been associated with several episodes of eviction of local or indigenous communities from their lands during the colonial era (Olanya, 2013), and the clearing of forests and intensification of soya production in South America in the 1970s (Borras Jr and Franco, 2012). According to Ludden (2017), this process, currently described as land grabbing, is the continuation of what Marx termed ‘primitive accumulation’, and Harvey (2007) describes as ‘accumulation by dispossession’.

The historical perspective also underscores how legal mechanisms are put into effect to justify LSLIs. Alden Wily (2012) examined a number of historical accounts of land disputes and dispossession supported by legal mechanisms, and revealed how, for different historical contexts, biased interpretations of the law have justified appropriation of lands by powerful actors. These accounts include how the English and Scottish settlers became established in Ireland; how the settlers in America used the notion of vacant land to establish the right of discovery and to reject the Native Americans’ land rights; and the mechanisms employed by colonial and postcolonial African governments to control and restrict access to communal

lands (Alden Wily, 2012). Among other things, Alden Wily (2012) has re-counted how, in different historical contexts and societies, the notion of vacant land has been reinforced to justify occupation of communal lands.

The literature that focuses on the historical processes allows the identification of similarities between past and current LSLIs. For instance, there is an analogy between the notion of vacant land in the past (Alden Wily, 2012) and the present-day claims that 'idle', 'unused', or 'marginal' lands are targeted by LSLIs (Borras Jr et al., 2011). Nevertheless, these are contested notions. Examples from Indonesia (Obidzinski et al., 2013) and Mozambique (Borras Jr et al., 2011) have illustrated some misuse of the terms idle, unused, and unoccupied. Although the government considers the land to be unoccupied, in many instances it is actually used for several purposes. Preliminary studies of contemporary LSLIs have revealed that prime agricultural land is usually targeted (Borras Jr et al., 2011; Nolte and Voget-Kleschin, 2014).

Borras Jr et al. (2011) contested the notion of marginal lands using the case of Procana. This case refers to a land deal undertaken for biofuel production in the Gaza province of Mozambique. The deal involved acquisition of 30 thousand hectares of agricultural land for the production of biofuel, mostly for export markets. The concept of marginal, or underutilized, land is questioned because it is applied to land not used to its maximum extent economically. In the case of ProCana in Southern Mozambique, Borras Jr et al. (2011) revealed that the company was allocated prime agricultural land that was extensively used by the local communities for charcoal production, cattle herding, and subsistence agriculture.

As shown above, England enclosures, the colonial and postcolonial state appropriation and control of communal lands all appear to have similarities with current occurrences. Correspondingly, Lund and Peluso (2011) argued "that there is no one grand land grab, but a series of changing contexts, emergent processes and forces, and contestations that are producing new conditions and facilitating shifts in both *de jure* and *de facto* land control" (Lund and Peluso, 2011, p.669). Admittedly, there are similarities between historical and contemporary processes of LSLI, but there are also changing forces, processes, and different contexts that have triggered, and now shape, the 21st century LSLIs (Hall et al., 2012;

Schoenberger et al., 2017). To account for these contemporary processes, some features considered specific to the current LSLIs are reviewed in the next section.

2.2.3 Drivers of contemporary LSLIs

The literature attributes the contemporary surge of LSLIs to the conjunction of several crises, namely, climate, energy, food, and financial crises (Cotula, 2012; McMichael, 2012). The on-going environmental concerns related to climate change, peak oil and increased demand for biofuels, global financial crises, and food price increases have all, to some extent, contributed to the intensification of agricultural land-based investments (Harvey and Pilgrim, 2011). Starting with the food crisis, a brief description of such crises is considered next.

Over last decade, historically high food prices have translated into food crises. There was a food price increase in the first decade of the 21st century after almost a century of decline in the price of agricultural products (Rudel, 2013). From the beginning of 2007 to 2011, there was a twofold increase in grain prices, mainly caused by escalating demand and difficulties in making a rapid increase in supply (Brown, 2011). The first crisis occurred in 2008 and was the result of an increase of 51% in food prices from January 2007 to March 2008 (Bellemare, 2015). A second peak in food prices occurred in 2011, which resulted from an increase of 40 percent in food prices from January 2010 to February 2011 (Bellemare, 2015). Within this scenario, putting additional land into production was seen as a means to increase food supply in the short term. McMichael (2012) argued that the recent rush on land acquisitions was propelled by the 2007/08 food crisis. According to him, the food price increase, which is an expression of the current crisis, on the one hand generated short-term fears about food security justified by the growing hunger rates; on the other hand, long term concerns were generated, justified by the expected population growth. With regard to the latter, provided that a significant share of the land transferred to investors is not yet being used, large-scale land acquisitions are likely to respond to the long-term concerns about food security.

High food prices are partly explained by the increased demand for food in highly populous countries, such as India and China (Chongvilaivan, 2012). Demand for food also increases with income. Weinzettel et al. (2013) found that 35% of additional land is employed by each twofold increase in income. Demand for eggs, meat, and dairy products is growing as a result

of the increasing number of people entering the middle class in China and other parts of the world (Brown, 2011). These dietary changes, which involve increasing consumption of livestock products, entail augmented production of feed crops. Globally, since the 1960s there has been a 30% increase in land used for the production of feedstuff (Schneider, 2014). However, the population growth and larger incomes in some countries has led to land use displacement in other countries (Weinzettel et al., 2013). Thus, both population and income growth demand more land for the expansion of food production to feed the additional people and to account for the dietary changes that occur as people's incomes increase. However, within this scenario, land use changes and the expansion of food production does not always occur in the countries in which the demographic changes are taking place.

The two factors aforementioned, population growth and increasing incomes, also contribute to the energy crisis, which is considered another driver of LSLIs worldwide. Accordingly, two important aspects, with reference to the energy sector, that have contributed to the increased demand for biofuels are Peak Oil (defined below) and climate change related to human activities. Currently, fossil fuels account for the largest share of energy used worldwide, accordingly, Peak Oil is the view that oil production will attain its maximum rate of extraction in the next decade (Kerschner et al., 2013) and this will have serious political and economic implications (Schnoor, 2007; Kerschner et al., 2013). At the current rate of extraction, fossil fuel reserves are expected to last approximately 50 years (Kerschner et al., 2013). Accordingly, biofuel policies illustrate the maximum oil production and the point of necessity to discover a complementary and environmentally friendly energy source in order to decrease emissions of greenhouse gases (McMichael, 2014). For example, up to 2020, the European Union intends to increase the use of renewable energy sources, including biofuels, to 20% (European Commission, 2015). Therefore, peak oil, the prospect of the exhaustion of world fossil fuel reserves, and concerns related to climate change caused by GHG emissions, have contributed to increased support for the use of renewable energy sources in general, and biofuels in particular. Such forecasts regarding the increasing importance of biofuels contributes to an increasing demand for land worldwide.

Lastly, the financial sector plays a crucial role in these developments. Accordingly, industry intelligence and investment brochures have provided a set of arguments in support of

agriculture as an 'alternative asset class', emphasising a number of uniform market principles which characterise agricultural land (Ouma, 2014). This allows for conglomerates in agribusinesses, oil, chemicals, and the automobile sector to invest in agro-fuels (McMichael, 2012). Hence, the crisis, apart from driving and providing explanations for international investments in land as a means to resolve both food and energy concerns, has created new investment opportunities for capital investments. Within this framework, there are concerns that land is being transformed into a financial asset (Ouma, 2014). This process, described as financialisation of land (Gunnoe, 2014; Sippel et al., 2017; Visser, 2017), detaches land and agricultural activities from other ecological processes and considers environmental concerns external to agriculture. It also changes the control over land, and the natural resources within it, to external actors (Holmes, 2014; Sippel et al., 2017). Those incentives contribute to the explanation of why there is an increased demand for agricultural land, and perhaps why some countries are amongst the largest investors.

There is a diversity of countries involved in LSLIs, each involved for different reasons. The objectives of such investment vary according to the origin of the investors (Schoneveld, 2014). Accordingly, Biofuel Policies in the EU and USA, food security concerns in the Middle East, and the policies for investment abroad made by the Chinese Government (Cotula and Vermeulen, 2009) account for investments originating from those particular countries. Hence, European countries mostly invest in energy crops, China and India are mainly involved in the production of cash crops, and Middle Eastern countries are most concerned with their food security (Schoneveld, 2014). However, according to Schoneveld (2014), other countries, like the United Kingdom, United States, and Germany, participate in some markets solely for speculative purposes. Hence, the drivers of LSLIs in the countries from where such investments originate varies. As discussed above, while food-importing countries aim to secure a supply of food for their citizens, and oil-importing countries seek alternative sources of energy, these different objectives, although interrelated (Schneider, 2014), illustrate different motivations for LSLIs.

For developing countries where these investments are implemented, the convergence of food, climate, energy, and financial crises occurs after a sharp decrease in agricultural and rural development aid (Jayne et al., 2010), from nearly 43% in the late 1980s to

approximately 7% in the late 2000s (Chimhowu, 2013). Within this scenario, the governments of the targeted countries regard these investments as an opportunity to develop their agricultural sector (Borras Jr et al., 2011, Lavers, 2012, Huggins, 2014, Chinsinga et al., 2013). Accordingly, the actions of a diverse group of actors, including governments, Non- Government Organizations (NGOs), and investors, in response to temporary shocks or long-term trends, have encouraged LSLIs globally.

A detailed discussion of each of the crises mentioned is beyond the scope of this literature review. Instead, the negotiation process is considered in order to understand the extent to which the local communities are able to influence the implementation stage of LSLI. It has been argued that there is a "renewed interest in agriculture, but not necessarily in the smallholders" (Wiggins and Kirsten, 2010, p.1341). Thus, the ability of local communities to influence these processes is crucial to the extent that they may negotiate LSLIs by taking into account future scenarios which favour them. Scott (2008) coined the term 'weapons of the weak' to point out the different ways in which dispersed and uncoordinated groups resist dominance. This study looks at both the exclusion and the resistance of local communities, and the struggles for their incorporation in the LSLI programmes. Accordingly, the next section considers the negotiation processes and the inclusiveness of the different groups.

2.2.4 Negotiation processes and interactions with local communities

Different factors affect the ability of local communities to influence the negotiation process. In this part the review concentrates on two factors, namely: 1) the mediating institutions that affect interactions with local communities; and 2) the degree and quality of participation of local communities in the negotiation process.

The institutional setting determines the ability of local communities to influence the negotiation process. Scott (1987) explained that there are four different approaches to a better understanding of institutions. Accordingly, the first two approaches define institutionalisation as a process, but they differ in that the first emphasises that values are instilled, but does not explain how this occurs, and the second accepts a shared conception of reality which is independent of the individual experience. The third approach defines institutional systems as a distinctive class of elements which, according to Scott (1987),

explains the creation of organisational structures. This formulation of institutional systems places less emphasis on the process and underscores the nature of belief systems, the role of normative beliefs, cognitive systems, and the sources of these elements. The fourth conception provides a broader perspective which associates the idea of multiple belief systems and the relatively stable systems of social organised practices and social beliefs associated with work, religion, politics, and other functional social systems.

This study adopts the third approach, i.e., it views institutions as a distinctive class of elements. This view highlights the diversity of belief systems in modern societies, these include: education systems; public opinion; ideologies; regulatory structures; and government endorsements and requirements (Scott, 1987). Furthermore, this view also draws attention to the roles of different actors, including professional organisations and governments, in the creation of rationalised systems of laws, whereby symbolic systems and social beliefs are transformed into regulations, rules, and laws, and thereby impose constraints on organisations (Scott, 1987). The institutions herein refer to "the humanly devised constraints that structure political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct), and formal rules (constitutions, laws, property rights)" (North, 1991, p.1). Accordingly, such institutions are based on negotiations and allow cooperation between actors (High et al., 2005). The market is also a mechanism that mediates interactions between innovation actors. Particularly important for this research are the production agreements between small-scale farmers and LSLIs. This is an example of formal rules that aim to reduce transaction costs (Williamson, 1979).

The land tenure systems also constitute institutional mechanisms that not only constrain the way in which land can be used, but also limit the different types of transactions allowed in each institutional setting. Apparently, land tenure systems that provide unclear rights to local communities increase the likelihood that a country will be targeted for LSLIs (Deininger et al., 2011; Anseeuw et al., 2012; Nolte and Voget-Kleschin, 2014). However, the way in which the land tenure system affects implementation of LSLIs is influenced by other factors. For example, in Indonesia, the combination of different types of leadership reshapes the conceptual boundaries of legality and illegality, this allows local communities greater

influence in negotiations with LSLIs (Steinebach, 2017). Furthermore, land governance determines, and is determined by, the continuing interactions and contestations amongst numerous distinct social groups, classes, and the state, to effectively obtain control over the land; the contestants typically include state actors at national level, economic and political elites at regional level, and rural inhabitants at the local level (Borras Jr and Franco, 2010).

Basically, the negotiation for LSLIs involves two parties, the investor and the land provider (Cotula and Vermeulen, 2009). However, the composition, in terms of type of actors and organisations involved in the negotiation, varies. On the investor's side, this may be a private company, a government-owned company, or, in rare situations, governments directly involved in LSLIs in other countries (Cotula and Vermeulen, 2009). On the land provider's side, the land tenure system determines who participates in the negotiation of LSLIs (Aha and Ayitey, 2017). In some countries, like Brazil, private entities own the land and negotiate LSLIs (Cotula and Vermeulen, 2009), whereas in many African countries the government is actively involved in these deals. Nevertheless, there are differences amongst African countries. For instance, while Tanzania's and Ethiopia's governments exert a great deal of influence and play a significant role in the allocation of land to investors, in Ghana the situation is different, to some extent. In Ghana, the majority of land is privately owned by individuals, extended families, and customary chiefdoms (Cotula et al., 2014). Thus, the degree of participation also determines the ability of the local community to influence the negotiation process.

In terms of legislation, the law in many countries envisages participation of local communities in the negotiation process. For example, to analyse the participation of local households in large-scale investments, Nolte and Voget-Kleschin (2014) used two dimensions of participation to investigate LSLIs in Mali, namely, degree of influence and degree of inclusion. The first dimension, degree of influence, envisages the following situations, the community can: a) initiate negotiation; b) be part of a two-way participation process; or, c) simply be informed about the LSLIs before, or after, the project implementation. The second dimension, degree of inclusion, considers consultation processes wherein participation increases in the following order: 1) only local elites; 2) holders of property rights; 3) all affected users; and 4) vulnerable groups, who are given

special attention. In the case of Mali, similar to other reported cases in Mozambique (Tanner, 2010; Matavel et al., 2012; German et al., 2013; Porsani and Lalander, 2018), Ghana (German et al., 2013; Aha and Ayitey, 2017), and Malawi (Chinsinga et al., 2013), consultation was a one-way communication process invariably used simply to inform the local communities about the land investments. This suggests that local communities have limited influence in negotiations with LSLIs.

In terms of inclusion, the negotiation process involving LSLIs in the countries abovementioned were, for the most part, not inclusive due to limited participation of all affected users. In most cases, only local elites participate (Hanlon, 2004; Matavel et al., 2012; Chinsinga et al., 2013). The elite are the relatively wealthy and more influential rural households; they encompass teachers, village leaders, religious leaders, and para-professionals (Chambers, 2012). These commonly include other groups of actors located at the interface between the donors and the beneficiaries of development projects, who Bierschenk et al. (2002) classify as development brokers. As they tend to be more articulate, their views are regarded as the views of the community (Chambers, 2012), whereas the poor are less organised and usually have no representation within the community (Chambers, 2012). Under-representation of poor households in the negotiation with investors has implications during the implementation of LSLIs. Hence, the next section discusses impacts of LSLIs on the livelihoods of small-scale farmers.

2.2.5 Impacts of LSLIs

These investments are likely to have an impact on the livelihoods of the local people where the investments are established (Hufe and Heuermann, 2017). In-depth understanding of current LSLIs in agriculture is possible by focusing on a specific time and location because these investments are determined by "the institutions, practices, discourses of territories, sovereignty, authority and subjects" (Wolford et al., 2013, p.194). To a great extent the literature focuses on the impacts of LSLIs on the competition for land. For example, Jiao et al. (2015) found that there was a decrease in the size of livestock holdings and cropland by 49-54% and 26-37%, respectively, due to competition for land with LSLIs. Furthermore, Nyantakyi-Frimpong and Kerr (2017) employed an agrarian political economy and political

ecology framework to assess impacts of land grabbing on social differentiation in Ghana; they found that LSLIs are creating a new class of landless farmers in that country.

Landlessness and the decreasing amount of land available for cultivation contributes to the transformation of the rural population into wage labourers. In this regard, LSLIs are not likely to be a pro-poor development strategy for countries where the poor households have few livelihood options, apart from subsistence agriculture (Jayne et al., 2014). This is because, as argued by Li (2011), LSLIs may result in labour exploitation due to the profit maximization behaviour of private companies. Li (2011) points out that if there is no resistance, nor appropriate governance structures to control their behaviour, private companies invariably pursue cost-reducing strategies, which include: externalizing costs; pursuing beneficial regulation; gaining accessibility to free water, free land, and cheap labour. Furthermore, Li (2011) argues, poverty reduction is not the aim of investors. In fact, companies prefer to establish their plantations in areas with high poverty rates because this leads to higher profits due to availability of cheap labour (Li, 2011). Thus, the company's interest may be to maintain the status quo, rather than to reduce poverty.

Overall, the above-mentioned factors have an impact on the livelihoods and practices of communities in which the LSLIs are being implemented (Borras Jr et al., 2012; Jayne et al., 2014). However, not all individuals are equally affected in these processes. For example, the production of shrimp as a boom crop in Bangladesh, and its control by powerful households, has contributed to land conflicts and increasing marginalisation of poorer households in the country (Afroz et al., 2017). This suggests that LSLI affects, and is affected by, social differences between households. To account for impacts of LSLI on different groups of people, social differentiation is briefly discussed next because communities are seldom homogeneous to the extent that consensus is a commonplace occurrence in their daily activities.

On the contrary, communities are heterogeneous and may include people from different social strata and with divergent interests (Hoang et al., 2006; Borras Jr and Franco, 2012). In theory, the criteria for identifying social differences frequently occur in the choice of seemingly obvious categories, as in the case of ethnicity, age, gender, and class (Fairhead

and Leach, 1994). In addition to these apparently self-evident classification systems, social differentiation can be analysed using different criteria where the various categories are not as evident as in those aforementioned (Fairhead and Leach, 1994). For example, Fairhead and Leach (1994) suggested that by using a 'who knows what' approach it is possible to associate a group of people with a specific type of knowledge. In agriculture, this social differentiation with regard to knowledge is established by taking into consideration different aspects associated with the farmer's production systems and livelihoods, including soils, types of crops, and specific roles and responsibilities (Fairhead and Leach, 1994).

Hence, considering the multitude of factors affecting social differentiation, and thereby the relationship of different members of the community with LSLIs, there is a need for a disaggregated analysis of LSLIs, not only to deconstruct some stereotypes of local communities but also to understand how differences between small-scale farmers affect their interactions with LSLIs.

2.2.6 Summary of the recurrent themes on the LSLIs literature

The first part of this literature review introduced the debate on LSLIs worldwide. Accordingly, much of the literature has concentrated on the political economy aspects of this phenomenon. These studies, invariably, tend to focus on the implications of unequal power relations in the negotiation process and the extent to which local communities are able to influence that process. Studies have shown that social differences between members of rural communities have an impact on the likelihood that a person may participate in the negotiation process. Topics explored within this political economy framework include the drivers of LSLIs, potential outcomes in terms of competition for land (Ren, 2017), and historical LSLIs. In addition to political economy, alternative frameworks can be employed to investigate LSLIs. As highlighted in Section 1.1.1, political ecology, which constitutes a framework to analyse the relationships between humans and the environment, has been employed to investigate LSLIs. Hence a brief discussion of political ecology approaches based on Schubert (2005) is considered next.

Political ecology is an interdisciplinary research field. Although there is no consensus with regard to a coherent theory that include all different perspectives, according to Schubert

(2005), political ecology has the largest potential as a framework for researching human-environment relations, questions regarding sustainable development, and management and conflicts associated with natural resources. Political ecology, not as a term but as an approach that takes into consideration human actions to examine nature, originated in the decade of 1970s, and results from the contribution of various disciplines; more specifically, its theoretical foundation stems from neo-Marxist theories with its emphasis on social classes, and the criticism of neo-Malthusian perspectives as part of the conventional studies in environmental conflict and security. This study aims to have a balanced view of the LSLIs. The focus on conflict of the political ecology approaches is a drawback that limits their applicability to explore LSLIs and small-scale farmer's interactions.

Given those limitations, sustainable livelihoods framework, an approach based on local realities (Newton and Franklin, 2011), was also considered. Sustainable livelihoods framework has the potential to explore interactions between LSLIs and small-scale farmers based on local perspectives. As an analytical tool, it provides a comprehensive description of local realities and enables the interaction between professional from diverse subject areas (Chambers and Conway, 1992), which is an advantage when compared to frameworks that are rooted in only one discipline (Henao et al., 2012). However, sustainable livelihoods framework was not adopted for this study because: it emphasises the input-output relationships, it neither engages with issues related to power nor in debates regarding agrarian change, and it is considered as excessively complex and incompatible with ordinary decision making processes and challenges (Scoones, 2009).

This study adopted innovation system approach because it is a holistic approach which also takes into consideration context specific situations. A few studies have explored the implementation of LSLIs and co-existence of these investments with small-scale farmers in the targeted areas. Investments may contribute to, or hinder, the activities of small-scale farmers in numerous ways. In terms of benefits, LSLIs may increase opportunities for local producers to innovate and facilitate access to markets (Deininger et al., 2011). Hence, while acknowledging the potential implications of the unequal power relations associated with these investments, different perspectives on agricultural innovation are discussed in the second part of the literature review.

2.3 Perspectives on agricultural innovation

In this section, different perspectives of agricultural innovation are considered in order to understand how such perspectives have evolved from the linear model to the current concept of a pluralistic system of generation and diffusion of innovations. This will allow an exploration of the role of small-scale farmers in the innovation processes by considering different perspectives. These include the transfer-of-technology (TOT) model, different variants of participatory technology development (PTD), and innovation systems (IS) perspectives. As a means to understand the thinking with regard to innovations, firstly, an operational definition of innovation for this study is considered. Then, the diffusion of innovations theory is discussed. This theory has been influential since its conception in the middle of the 20th century. Diffusion of innovations tradition is associated with the TOT model for generation and diffusion of innovations, and they both consider innovation as a linear process.

2.3.1 Definition and categories of innovations

There are numerous definitions of innovation. Frequently cited in innovation studies is the definition by Rogers (2003, p.11): “An innovation is an idea, practice, or object that is perceived as new by the individual or other unit of adoption”. Innovation can also be defined as a process, i.e., it is the application of knowledge used to accomplish new changes in a specific context (Snapp and Pound, 2011). “The notion of the process of creating local change, new to the user, is fundamental to innovation” (The World Bank, 2006, p.18). Alternatively, innovation can be defined as a product which is the outcome that results from the discovery, development, dissemination, and use of knowledge, technology, or information in combination, or each separately (Engel, 1995).

Different criteria are employed for the classification of agricultural innovations (Sonnino et al., 2009; Luo et al., 2017). According to Sonnino et al. (2009), in the majority of cases the following criteria are used:

a) Excludability in its use. Private goods, if it is possible to exclude others from using the innovation through patents. Public goods, it is not possible to exclude others.

b) Number of people needed to adopt the innovation. Individual innovations, if only one person can adopt the innovation. Collective innovations, if a group of people is indispensable for its adoption.
c) The degree to which the innovation requires new knowledge, skills, or other investments. Continuous innovation, in which case neither new knowledge nor additional change is necessary; semi-continuous innovation, which requires a combination of existing and new assets and knowledge; and discontinuous innovation, which demands new knowledge, new skills, and possibly new assets.
d) Relative use of different inputs. Land saving innovations, increased land productivity; labour saving innovations, increased labour productivity.
e) The degree to which the final product is changed. Process innovation, in which a new technique is employed, but the final product does not change. Product innovation, in which the final product is changed.
f) Source of the innovation. Endogenous innovation, which is created within a local Agricultural knowledge and information system (AKIS); exogenous innovation, which is generated from an external source.

An additional classification criterion relevant for the present study considers the type of knowledge required to generate the innovation. Technological innovations involve new products and new methods, whereas institutional innovations are new forms of social organisation (Nelson and Nelson, 2002; Snapp and Pound, 2011). Technological innovations emanate from progress made in the natural sciences, and institutional innovations result from advancements in the social sciences (Koppel, 1995). Invariably, these two categories of innovations are interrelated; Leeuwis and van den Ban (2004) propound that it is important to consider both the social and the technical dimensions of innovation in any intervention.

Nevertheless, progress in the social and natural sciences are not the only sources of agricultural innovations; multiple actors, including small-scale farmers, also represent such sources (Chambers et al., 1989; Engel, 1995; Leeuwis and van den Ban, 2004). In fact, numerous studies have revealed alternative sources of innovations other than formal research organisations (Biggs, 1990; Possas et al., 1996; Haile et al., 2001). An example of a technological innovation created by small-scale farmers is a new tool made to harvest the

leaves of black nightshade (*Solanum nigrum*); and an example of institutional innovation is a committee established to manage irrigation water, each example occurring in north-west Cameroon (Tchawa, 2001). Additionally, Adjei-Nsiah et al. (2008) found that increased use of written contracts, as part of the land use agreements between households, was an important Institutional innovation in Ghana where oral agreements were commonplace, and problematic, due to the customary land tenure system in which genealogy and Inheritance affects land ownership and its contestation. Currently, it is generally accepted that innovations and learning result from the interactions and exchanges which occur between various social actors.

The thinking with regard to how innovations are generated is continuously changing. These changes are reflected in the approaches used to encourage innovations in small-scale farming. Thus, the following sections discuss different perspectives in innovation in order to understand how they have influenced practice. Diffusion of innovation theory and the TOT model, both associated with the linear model for research and promotion of innovation, are reviewed. This is followed by a discussion of participatory approaches to innovation, and finally, consideration is given to system-thinking approaches to innovation.

2.3.2 Diffusion of innovations theory

Diffusion research is a longstanding paradigm in innovation studies. It had its beginnings in the 1940s and during the following two decades, the 50s and 60s, there was a rapid increase in studies in this tradition, until the 1970s, which became a period of critical reflection (Rogers, 2003). There was an increasing awareness of the limitations of the TOT model, which was based on the diffusion of innovation research, and a continuous search for alternative approaches to facilitate agricultural innovation (Röling, 2006). The diffusion of innovation tradition considers time, innovations, innovators, and social systems as the four main elements of the innovations (Rogers, 2003).

Important contributions have been made in terms of the diffusion research tradition. These include the diffusion model, which illustrates that the adoption of innovations occurs progressively in any social system, and the classification of individuals into different adopter categories, which is based on the amount of time it takes for them to adopt an innovation

(Leeuwis and van den Ban, 2004). Furthermore, diffusion of innovation studies revealed a positive relationship between a number of variables that represent individual attributes and adoption of innovations, these include social status, size of unit, social participation, and interpersonal networks (Dimara and Skuras, 2003; Leeuwis and van den Ban, 2004).

In spite of these advantages, the contributions of the diffusion research tradition, as outlined above, have also been the focus of criticism. Much of the literature in this area concentrates on understanding the characteristics of the innovators, attributes of the innovations, and the amount of time it takes from the moment the farmer is aware of the innovation until its adoption (Rogers, 2003). Thus, it fails to consider the influence of other components of the system on the innovation process. These include access to input and product markets, as well as the nature of potential system disruptions caused by the innovation. Furthermore, the diffusion of innovations tradition is criticised for its emphasis on individuals with limited attention paid to processes which occur at the interface between extension agents and individual farmers (Leeuwis and van den Ban, 2004). An assessment which takes into account the whole farming system and the activities and processes in which the farmers are involved may provide different results in terms of farmers' innovative capacity.

Additionally, diffusion of innovation research has a pro-innovation bias (Douthwaite et al., 2002; Rogers, 2003; Leeuwis and van den Ban, 2004). Pro-innovation bias is the presupposition, in the majority of diffusion research, that all members of the social system should adopt the innovation without further adaptations (Rogers, 2003). However, changes are often necessary. Douthwaite et al. (2002) classify this as the fitness of technology. The expression 'fitness', in its biological sense, entails the changes that need to be made to ensure adoptability of the new technology (Douthwaite et al., 2002). Studies associated with diffusion of innovation tradition invariably assess adoption of exogenous innovations, thereby influencing the rationale behind the TOT model of research generation and dissemination.

The TOT model has influenced the organisation of national and international agricultural research centres. In this model, the innovation process is linear (Biggs, 1990; Röling, 1990), and the information and knowledge flow mainly from the international research centres to

the national research centres, which perform adaptive research and transfer the innovations to the extension organizations, and finally, the extension agencies disseminate the information to the farmers (Biggs, 1989). The research centres are seen as the only source of innovations (Röling, 1990). To comply with the requirements of the structural adjustment programmes (Janvry and Dethier, 1985), numerous African countries, including Mozambique, have adopted the TOT model.

An important policy implication of this model is that, in order to promote agricultural development, it is important to prioritise funding for agricultural research (Snapp and Pound, 2011). The World Bank's Train and Visit (T&V) extension system is a typical example of the hierarchical modus operandi of the TOT model (Biggs, 1989). Some features of the T&V system include the research and extension function as one, the messages to be transmitted to farmers are decided in advance, and there is a fixed schedule in terms of time and number of visits to each farmer (Whiteside, 1998). Chambers et al. (1989) have stressed that the TOT model has a great influence on standard professional training in which scientists decide research priorities, and communicate their research results to the extension agents, who then transmit the information, knowledge, or technology to the farmers.

The TOT model was the foundation for the Green Revolution which had a positive impact on productivity in comparatively favourable and uniform areas of Latin America and Asia (Whiteside, 1998). Nevertheless, the success of the TOT model in those areas was not repeated in most of sub-Saharan Africa, characterised as it is by huge variations in terms of agro-ecological conditions (Whiteside, 1998) and low use of external inputs. There has been increased recognition in the last 20-25 years that linear models, as is the case of the TOT model, and the suppositions of the central source of innovations are oversimplified and incomplete (Snapp and Pound, 2011).

The dominance of this model is reinforced by the typical bureaucratic system, which is simplified, standardised, and centralised (Chambers et al., 1989). The combination of the centralised model of innovation and the typical bureaucratic system is easy to replicate, and any resistance to change is decreased (Chambers et al., 1989). Hence, the TOT model was limited in its ability to respond to problems related to the complex environments within

which small-scale farmers operate (Chambers et al., 1989; Douthwaite et al., 2002; Sumberg, 2005). The adoption of the TOT model has resulted into a number of shortcomings for African countries, as described below.

The following features characterised the orientation of agricultural research in Africa under the TOT model. Any such research was not oriented towards the marginal rural environments where numerous farming communities live, rather it was: top-down, hence limiting participation; commodity-oriented, thereby overlooking other components of the system; focused on productivity, with consequences on sustainability; and more suited to well-endowed areas (Sumberg, 2005). As a consequence, technologies generated in the research centres were mostly adopted by resource-rich farmers (Röling, 1990; Douthwaite et al., 2002).

Adoption and utilisation of innovation generated in the formal research centres was limited. Small-scale farmers' utilisation of innovations generated in the research centres was constrained because it required incorporation of additional external inputs, such as labour, financial resources, and land, in the production process (Snapp and Pound, 2011). For example, from the middle of the 1970s to the beginning of the 1990s, the government of Malawi had a system of fertiliser subsidies for all farmers which terminated in the mid-90s (Dorward and Chirwa, 2011). Initially, the subsidy on fertiliser promoted its use for maize production amongst small-scale farmers and its removal created a crisis (Whiteside, 1998; Dorward and Chirwa, 2011). For the most part, as in this case, the formal system of research in agriculture did not respond to the needs of the small-scale farmers.

This section has discussed the linear model of innovation and its implication for the resource-poor farmer. In this regard, diffusion of innovation theory and the TOT model were considered. The diffusion of innovation theory was influential in the past, however, its assumptions regarding the source of innovations and its focus on the individual, rather than on the system, limits its applicability considering the current trend in innovation research. Even so, it appears to inspire the activities of policy makers, research and extension organisations worldwide whose values and activities are still rooted in the TOT model (Chambers et al., 1989; Röling, 2006). These values include simplification, centralisation, and

standardisation. Considering the limitation of the TOT model of innovation and the recognition of its incompatibility with requirements of resource-poor farmers, a number of approaches have been put forward in an attempt to incorporate and acknowledge the active participation of farmers in the innovation process. Therefore, participatory approaches to innovations will be discussed next.

2.3.3 Participatory approaches to innovation

There are numerous approaches to technological development that attempt to account for the needs of resource-poor farmers and to incorporate their ideas in the innovation process. These approaches include the farmer-first-and-last-model (FFL), some variations of farming system research (FSR), and PTD. The following section firstly considers farming system research and PTD approaches to account for the changes in methodology and thinking with regard to farmers' participation in the innovation process. The section then briefly introduces the farmer-first-and-last model.

FSR was introduced by the United States Agency for International Development (USAID) at the beginning of the 1980s (Whiteside, 1998). Its aim was to incorporate the contribution of farmers to the innovation process. The following features characterise FSR, according to Farrington and Martin (1987): it is multidisciplinary and problem-based research conducted in collaboration with farmers; the evaluation is conducted through consideration of the whole farming system; the clients are, normally, a group of farmers with similar characteristics; it uses an iterative and dynamic approach; and, the results of the on-farm research are expected to influence station trials. Moreover, FSR focuses on adaptive research, which is more relevant for resource-poor farmers (Sims and Leonard, 1990) because "the innovation is likely to fit farmers' existing systems and their availability of resources" (Dorward et al., 2003, p.99).

Within this context, farmers have been considered partners in the research process with various degrees of participation (Farrington and Martin, 1987). In terms of design and implementation of on-farm trials, participation may range from the farmer's total control of the trials, wherein the role of the researcher is limited to the evaluation of the trials at the

end of the season, to the researcher's total control of the trials, with the farmer's evaluation taking place at the end of the season (Farrington and Martin, 1987).

Although innovations generated within the FSR model are likely to be more compatible with the farming conditions of small-scale farmers, the model is based on the assumptions of the linear model of innovations (Snapp and Pound, 2011). In this regard, Chambers et al. (1989) maintain that on farm research has been misinterpreted and transformed into on farm trials; hence, he suggests that on farm trials should be used in conjunction with other methods, such as innovator workshops and the generation of systems diagrams, which complement each other.

In parallel to the introduction of participatory research methods, participatory extension methods have also been developed and put to use. One example is the FAO's farmer field school (FFS). FFS is a form of participatory approach to innovations (Friederichsen et al., 2013) which underscores the use of participatory techniques and other new methods to stimulate learning amongst the farmers. The methods may involve creating learning networks, observation, participation in practical activities, and discussion (FAO, 2015). A study by Brooks and Loevinsohn (2011) provides examples of successes of FFS in Asia where they have contributed to farmers' implementation of integrated pest management techniques and improved their response to pest related problems.

FFS is a form of PTD that encourages learning and interaction between small-scale farmers. PTD itself emanates from the understanding that rural households have Indigenous Technical Knowledge which is used to conduct research on their farms (Snapp and Pound, 2011). Indigenous knowledge is the knowledge a group accumulates throughout time and which encompasses experiences of earlier and current generations (Sanginga et al., 2009). This knowledge is expressed in different forms. For example, Dorward et al. (2003) proposed participatory farm management that complements conventional farm management methods. The participatory budgeting uses traditional knowledge about an African board game, known as mancala, allowing illiterate individuals to use their numerate skills for the budgeting and planning of farming activities (Dorward et al., 2003).

In line with the FSR and PTD, with regard to farmer's participation in the research process, Chambers et al. (1989) suggested a reversal of roles in terms of research agenda in order to put the farmer's agenda first. The purpose of the FFL model is to provide the farmers with methods and principles that will enhance their ability to learn (Chambers et al., 1989). The FFL model combines different approaches to innovation that focus on the farmers and the context within which they operate (Chambers and Ghildyal, 1985). Substantial changes in terms of primary research location, choice of technology, and analysis of experiments are necessary to enable an increased role for the farmer in the innovation process (Chambers et al., 1989). However, this brings the challenge of balancing a farmer's participation and effective employment of indigenous technical knowledge in the innovation process with practical use of scientific achievements. In this regard, it has been argued that participatory approaches, to some extent, neglect the effective advantage of the scientific knowledge (Hall, 2007).

Numerous studies have emphasised the importance of participatory approaches (Farrington and Martin, 1987; Chambers, 1994; Dorward et al., 2003). These approaches have been associated with increased advantages in terms of sustainability (Whiteside, 1998; Albicette et al., 2017), potential cost-effectiveness (Röling, 2006), and increased user control of the technology development process (Chambers et al., 1989). With regard to the last point, an example from Nepal shows a first attempt to introduce two-wheel tractors using the TOT model was unsuccessful; however, the involvement of different stakeholders, including links to other projects, increased adoption of the innovation (Goodrich et al., 2008). Emphasis on participation derives from the notion that the farmers, as the ultimate users of agricultural technology, may have important contributions to make in the technology development process (Pretty, 1995). However, there is a risk that participatory methods can be distorted and transformed into top down approaches during their implementation (Jiggins, 1994). Moreover, some approaches described in this section, such as FSR and FFS, to some extent still regard the formal research centres as the main source of innovation.

2.3.4 Summary of linear and participatory approaches to innovation

This section firstly adopted an operational definition of innovation and discussed different criteria for classifying innovations. In this study, the definition of innovation is in line with

Rogers (2003), to the extent that innovation is a practice, idea, or object considered as new to the user. Additionally, it defines innovation both as a product and as a process. Small-scale farming innovations can range from the adoption of technologies which originate in the formal research centres to the small adjustments that small-scale farmers make on their farms in response to the immediate constraints and long-term problems that confront society today, such as climate change and population growth.

In addition, Section 2.3.2 accounted for the linear model of diffusion of innovation. Generation and diffusion of innovation, according to this model, is a linear process whereby the research centres create innovations and then transfer them to the farmers (Leeuwis and van den Ban, 2004). This model is described as the TOT model (Biggs, 1989) which contributed to technological change and an increase in productivity worldwide; nevertheless, it appears to be biased against small-scale farmers and sustainability (Whiteside, 1998). The bias against small-scale farmers can take different forms. For example, adoption of high-yielding varieties may require application of pesticides or additional investments in irrigation, and this limits their adoption by small-scale farmers.

In the face of the limitations of the TOT model to respond effectively to the needs of the resource-poor farmers and to deal with sustainability problems, numerous approaches which emphasise the participation of multiple actors and their interaction in the process of generating innovations have been considered (Röling, 2006). Accordingly, Section 2.3.3 explored participatory approaches to innovation in agriculture. Non-adoption of innovations produced in the formal research centres is partly explained by non-participation of the farmers in the generation process. In the attempt to incorporate farmers' ideas in the research process, several participatory approaches have been introduced and implemented. These include FSR, the FFL model (Chambers and Ghildyal, 1985), and several variants of PTD.

These approaches have emphasised different degrees of farmer participation in the innovation process. Nevertheless, it has been argued that depending on its nature participation can result in different outcomes (Chambers, 1994; Sumberg et al., 2003; Kamoto et al., 2013), it can be harmful or beneficial. Therefore, understanding different

forms of farmer participation in the innovation process is crucial because the nature and the degree of their participation may determine the outcome of their interactions with LSLIs. Next, systems thinking approaches to innovation are reviewed.

2.4 Systems thinking approaches to innovation

These approaches stress the importance of interactions between different components of the system and take into consideration multiple sources of innovation. Interaction is the process that allows the integration and exchange of ideas from different sources, thereby facilitating innovation (Hall, 2007). An important feature of the interactive models of innovation is the plurality of actors involved in the generation of knowledge and dissemination of agricultural information (Chambers et al., 1989; Engel, 1995; Leeuwis and van den Ban, 2004). In the following paragraphs, two approaches, namely AKIS and the IS approach will be analysed. Firstly, a system is defined. While numerous definitions of a system exist (Engel, 1995), for this study the definition given by Carlsson et al. (2002) will be considered, i.e., a system can be defined "as a set of interrelated components working toward a common objective" (Carlsson, 2002, p.234). These components may include the market, the industry, and the public sector (Hekkert et al., 2007).

2.4.1 Agricultural Knowledge Information System (AKIS)

AKIS is an evolving concept which was initially conceptualised as an agricultural knowledge system (AKS) to designate the triangle comprised of research, extension, and agricultural education (Klerkx et al., 2015). In the 1990s the AKIS concept emerged to include additional public and private institutions involved in providing support services to farmers (Rivera et al., 2005). Recently, AKIS has been reconceptualised as an agricultural knowledge and *innovation* system, which makes it increasingly similar to the innovation system concept (Klerkx et al., 2015). In this study, the acronym AKIS refers to the concept of an agricultural knowledge and *information* system.

It is assumed that the desired outcome of knowledge systems is innovation, and that such outcomes can be achieved through the use of the system's main resources, namely knowledge, information, and technology (Engel, 1995). Knowledge encompasses concepts, ideas, habits, and aptitudes that people acquire over time in order to fulfil their needs (Engel,

1995). Related to knowledge is the notion of knowing, it is this which highlights the dynamic integration of learning and active utilisation of knowledge, as opposed to the static features of knowledge which involve descriptions of the world and guidelines on how to act (Engel, 1995). The literature has highlighted the existence of different forms of knowledge.

A dual classification system, wherein knowledge is classified as tacit or codified, is frequently adopted (Cohendet and Meyer-Krahmer, 2001; Rodríguez-Pose and Crescenzi, 2008). In this type of system, the intuitive knowledge that is commonly explored empirically is, on the one hand, described as tacit knowledge (Curry and Kirwan, 2014). On the other hand, codified knowledge encompasses all the knowledge that can be formalised and shared via information flows (Roberts and Howells, 2000; Cohendet and Meyer-Krahmer, 2001). Thus, while accumulation of tacit knowledge requires hands on experience and practice, codified knowledge can be assembled and shared with other entities as units of information. This illustrates the relationship between knowledge and information, but also draws attention to their differences. Roberts and Howells (2000) emphasise that unlike information, which flows in different forms of unitary data or combinations thereof, knowledge is essentially an individual phenomenon that entails using cognitive structures to absorb and interpret information.

Similarly, knowledge and technology are also related. Technology can be defined as a combination of the product and the knowledge of its application (Sahal, 1981). This, according to Bozeman (2000), emphasises that a knowledge base is essential to the application of technology. Sahal (1981) used the terms technology and innovation interchangeably. However, there is a difference in the use of such terms for this study in as much as technology may also represent the status quo involving products or techniques that have been employed by small-scale farmers over the years in a certain milieu, whereas innovation invariably involves change.

Furthermore, exploring the synergy associated with interaction between innovation actors in the context of knowledge systems involves the establishment of networks (Murdoch, 2000). Two concepts are important in these processes, namely, networks and networking. Networks are actors who interact with each other for a specific purpose (Aurenhammer,

2016), whereas networking involves building relationships (Engel, 1995). Networking is an activity conducted with the objective of establishing relationships which may not involve any commitment at the beginning, but which constitute the basis for future commitment (Leeuwis and van den Ban, 2004). As an alternative to 'system', Leeuwis and van den Ban (2004) suggested the usage of the term 'networks'. The concepts network and networking are relevant to this study as they help to map innovation systems by identifying the actors who comprise them, and they help in the analysis of the activities that promote interactions between different actors.

The literature has emphasised the importance of networks in the exchange of valuable information. Studying cross-scale adaptation to climate change in Mozambique, Osbahr et al. (2008) revealed that links with external organisations facilitate learning and increase opportunities for innovation amongst small-scale farmers in the southern province of Gaza, specifically in the village of Nwadjahane. However, local networks and associations were the main mechanisms through which the villagers had access to those opportunities (Osbahr et al., 2008). Investigating the asymmetric relationships among four agricultural subsectors in Flanders, Belgium, Lambrecht et al. (2015) found that farmers prefer horizontal interactions, i.e., collaboration with other farmers with similar characteristics.

There are some limitations of AKIS in the form by which it is employed conventionally. Firstly, the World Bank and FAO altered the initial conceptualization of AKIS which considered systemic interactions between actors by over accentuating the role of agricultural education (Hall, 2007). Secondly, although considering the importance of networks and partnership between actors, in AKIS this collaboration is not clearly evident and the technological interactions between the main sectors, i.e., agricultural education, research, and extension, with other stakeholders, appear to be linear (Sanginga et al., 2009). As stated above, normal bureaucratic systems, of which agricultural education, research, and extension is a part, tend to standardise, centralise, and simplify towards common practices, thereby reinforcing the features of the linear model.

Furthermore, some contend that AKIS is founded on the principles of a knowledge market unsuitable for sustainable agriculture (Curry and Kirwan, 2014). The promotion of

sustainable agriculture requires employment of diverse types of knowledge. As suggested by Röling (2006), it is crucial to remove restrictions from the concept of innovation in order to incorporate social learning, local development, and the notion that innovation originates from interaction and collaborative action. The IS perspectives, which will be discussed next, encompass all these features.

2.4.2 Innovation systems (IS) approach

The concept of IS has its origins in the 1970s and 1980s and arose as a result of debates over the analytical frameworks needed to describe industrial production and growth in developed countries (World Bank, 2006; Albuquerque, 2007). The theoretical foundation of the IS approach emanates from evolutionary economics (Markard and Truffer, 2008). The use of the IS concept in the agricultural sector is a result of practical studies which highlighted that the combination of important actors and synergies between them was central to the success of developments in Asia (Röling, 2006).

There are different dimensions for the analysis of IS. These include geographical, sectorial, and temporal dimensions (Carlsson et al., 2002). Regarding the geographical dimension, although the majority of studies underscore national innovation systems, other levels of analysis, such as local and regional IS, have been explored (Lundvall, 2007). The sector, or the technology domain, may also be the basis for intervention, or the criteria for the analysis of IS (Carlsson et al., 2002), as is the case of the innovation platforms initiated as part of the Research Into Use (RIU) programme in several African countries (Gildemacher and Mur, 2012). Each platform represents a different technology domain. Furthermore, the temporal dimension is important in a situation where the feedback mechanism is incorporated in the system because the attributes, relationships, and configurations of its components are dynamic (Carlsson et al., 2002).

The IS perspective encompasses a number of approaches which highlight, amongst other issues, the importance of social learning in contrast to individual learning in the innovation process, and emphasises the active role of multiple actors, including farmers, in various stages of that process (Leeuwis and van den Ban, 2004). There is not one standard IS approach, or a set of tools that are acceptable to most situations, instead, the IS concept

introduces a number of principles, such as multiple sources of knowledge and information, diverse configurations of actors and interactive learning processes, of which their operationalisation depends on the context and the objectives of the planners, researchers, or entrepreneurs (Hall, 2007).

Agricultural IS is regarded in this study as a complex adaptive system. This system, according to Hall and Clark (2010), is characterised by the interrelationships between various sub-systems. It has a boundary that constitutes the limit between the interior and the exterior of the system. Frequently, boundaries are created which depend on the degree of a system's interactions with its environment and which are to be considered by the analyst. In the case of open systems, there is an exchange of energy and matter with the exterior of the system (Hall and Clark, 2010). In addition, there is a set of characteristics which consider agricultural systems to be combinations of physical, biological, and socio-economic systems.

The term IS commonly refers to the social components that compose the system. Nevertheless, the biological element is a very important component of the agricultural IS which distinguishes it from other socio-economic systems. The performance of the system is dependent on its external conditions. Thus, in addition to market factors, formal and informal institutions and other factors, such as variation in the growing conditions for agricultural crops and livestock, pose some degree of uncertainty for the biological processes. These factors affect farmers' priorities in terms of innovations, and thereby influence the outcomes of the innovation process.

As for the living systems, they are organised continuously, their components change through their participation in the system's processes, and the transformation of the system's factors of production into the outputs is the result of the behaviour of the entire system (Hall and Clark, 2010). An additional characteristic of these systems is that they ought to be studied as a whole; analysis of individual components is insufficient to understand the system's behaviour which is determined by the exchange of information and resources between its elements (Hall and Clark, 2010). Considering this, the notion of pathway is important to an understanding of innovation processes because it accounts for the manner in which the system changes occur throughout time, focusing on the individual, the household, the IS, or

the various ways in which these different scales and systems overlap and interact (Leach et al., 2007).

In summary, IS can be regarded as complex adaptive systems because they are evolutionary, complex, adaptable, and present a holistic behaviour (Hall and Clark, 2010). As a result of these features, the attempt to influence IS by taking into consideration a specific purpose can be strengthened or offset by unanticipated outcomes of these actions, and by external events which are beyond the control of the innovation actors (Klerkx et al., 2010). Rigid planning may not achieve the goal of creating adaptive innovation policies, however, creating conditions that facilitate innovation appears to generate better results and the role of innovation brokers is crucial for facilitating innovation processes (Klerkx et al., 2010).

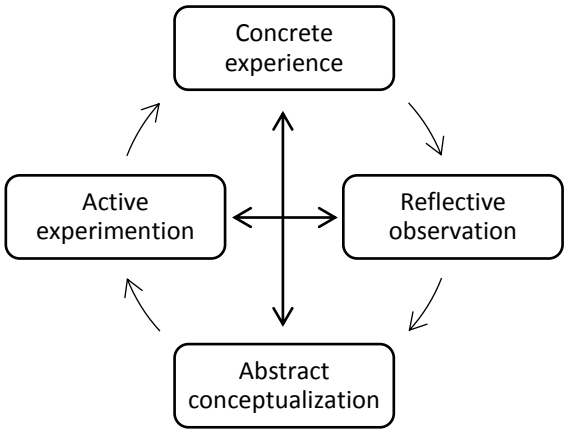
In the IS perspective, innovation is the result of a two-way interactive learning process between multiple interdependent actors (Tappeiner et al., 2008; van Mierlo et al., 2010; Turner et al., 2017). The role of learning is paramount to behavioural change, and social learning is particularly relevant in innovation processes. The network tradition emphasises the conceptualisation of innovation as a social process (Engel, 1995). Considering the importance of learning in innovation processes, the next section conceptualises learning and briefly presents Kolb's (1984) experiential learning model which is relevant to an understanding of innovation processes when using the IS approach.

2.4.3 Experiential learning

The best way to conceptualise learning is to consider it as a process (Kolb, 1984). "Learning is the process whereby knowledge is created through the transformation experience" (Kolb, 1984, p.38). It involves changes in the perception regarding one's identity (van Mierlo et al., 2010). "Experiential learning… is a molar concept describing the central process of human adaptation to the social and physical environment" (Kolb, 1984, p.31). The concept of experiential learning is relevant for this study because the innovation process is also an adaptation process. Kolb's model of experiential learning is commonly used as the foundation for the coordination of communication for innovation (Leeuwis and van den Ban, 2004).

Experiential learning involves four learning modes of adaptation that constitute two dimensions of adaptive orientations (Kolb, 1984). The four stages that represent the cycle of experiential learning, and the two dimensions representing the abstract/concrete and active/reflective dialectics are illustrated in Figure 2.1, below. Leeuwis and van den Ban (2004) remark that this model, in addition to describing the learning process, highlights the point that individuals have different learning styles. Experiential learning combines learning by using and learning by doing (Douthwaite et al., 2002). The purpose in this literature review is not to present an exhaustive discussion of these learning styles and processes, but to emphasise that, given differences amongst small-scale farmers, it is likely that there are differences in their learning styles. As a result, the process that leads to innovations on their farms may also differ. Acknowledging these differences may improve understanding of small-scale farmers' practices. Understanding these processes may also facilitate intervention to enhance their innovative capacity.

Figure 2.1 Experiential learning



Source: adapted from Kolb (1984)

Social learning occurs through interactions between different actors. Often it occurs through the observation of activities and practices of other individuals in the society (Bandura, 1977; Conley and Udry, 2001). Social learning gives emphasis to an interdependence between actors which requires simultaneous learning and stresses that coordinated action involves complementarity (Leeuwis and van den Ban, 2004). Wenger (2000) also conceptualised learning as a feature of the social system. Some of the characteristics of a community of practice, as described by Wenger (2000), such as regular interactions within a group of

people with shared interests, are also features of innovation systems. The assumption in this study is that learning results in innovation. Small-scale farmers constitute the majority of the agricultural population in developing countries and interactions between them and large-scale farmers may create learning opportunities for both the small-scale farmers and LSLIs.

While Leeuwis and van den Ban (2004) underscore the importance of coordinated action, Bergek et al. (2008) state that the goal of each actor may be different and, regardless of whether or not they share the same objective, they do not need to purposely cooperate to accomplish it. Differential goals among innovation actors may constitute an important weakness of the IS approach because if any actor perceives an innovation as threatening, the actor may intentionally hinder the innovation process (Klerkx et al., 2015). This may occur in the interactions between large-scale and small-scale farmers; if their objectives differ they may have contrasting attitudes towards a certain innovation. As emphasised before, while large large-scale farmers generally aim to increase productivity by considering unit costs, the objectives of the small-scale farmers are more often associated with the family unit, or with the people supported by the farming activities (Sumberg and Okali, 1989).

In the social and behavioural sciences, the theory of reasoned action and the theory of planned behaviour regard attitude as a predictor of behaviour (Ajzen, 2012). The next section reviews the theory of planned behaviour given its relevance to enable an understanding of the behaviours of small-scale farmers.

2.4.4 Theory of reasoned action (TRA) and theory of planned behaviour (TPB)

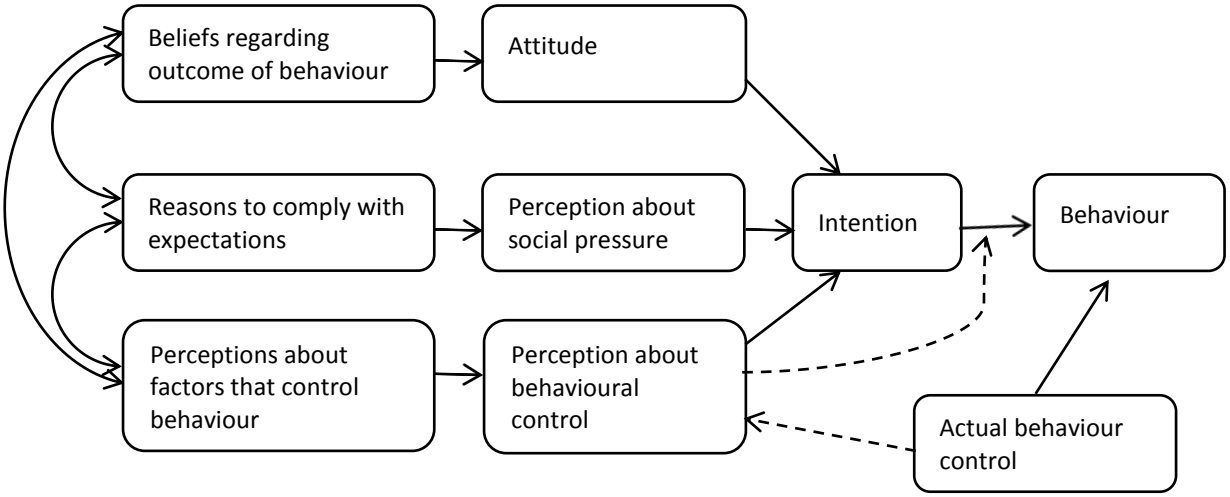
TRA establishes that the intention to carry out a certain behaviour is a combined function of unfavourable and favourable attitudes towards that behaviour and of a subjective norm that fosters or prevents its accomplishment, and that the corresponding behaviour is directly preceded by the intention (Ajzen, 2012). For example, Rehman et al. (2007) used the TRA to investigate factors that influence the adoption of technologies on dairy farms in southwest England. Their study highlighted the relevance of attitudes for effective adoption of innovations. Nevertheless, the scope of prediction of the TRA was limited to behaviour under one's volitional control (Ajzen, 2012). Hence, the TRA was expanded to allow prediction of behaviour under restricted volitional control. Accordingly, TPB represents this

extension, so that in addition to accounting for attitudes, subjective norms, and intentions to predict human behaviour, it also considers perceived behavioural control as a predictor of behaviour (Ajzen, 1991).

What follows is a brief explanation of the TPB according to Ajzen (2012). Three types of factors guide human actions, namely, behavioural beliefs, normative beliefs, and control beliefs. Behavioural beliefs are those which concern possible outcomes of a behaviour and the assessment of those outcomes. The combination of all behavioural beliefs results in a positive or negative attitude towards behaviour. Normative beliefs represent reasons for compliance with normative expectations, as well as the actions and expectations of people of great significance. The outcome of normative beliefs is the perception held with regards to social pressure, i.e., the subjective norm. Control beliefs are beliefs which concern the existence of factors that may encourage or prevent the execution of the behaviour, as well as the perception of the power of these factors. Control beliefs are conducive to perceptions with regards to behavioural control.

The combination of a person's attitude, their perception with regard to social pressure, and their perception about behavioural control, result in the emergence of behavioural intentions (Figure 2.2). For example, with regard to a farmer's attitude and its influence on the adoption of innovation, that is to say, behaviour, Ngutu and Recke (2006) suggest that farmers may be inclined to adopt innovations introduced by research officers or extension agents to avoid disappointing these actors by rejecting an innovation that is not of interest to the farmers. This attitude may result in posterior dis-adoption of such innovations. The expectation is that the intention will be carried out with consideration, for example, of the arrival of new opportunities, and if the person has sufficient actual control of their own behaviour.

Figure 2.2 Theory of Planned Behaviour



Source: (Ajzen, 1991, Ajzen, 2012)

2.4.5 Summary of system thinking approaches to innovation

System-thinking approaches to innovations were considered in this section of the literature review. These include AKIS and IS approaches. They emphasise the participation of multiple stakeholders in the innovation process and the interdependence between them; innovation is the outcome of their interaction. Furthermore, although the actors and organisations that compose the system may, or may not, purposively collaborate (Bergek et al., 2008), their activities synergically contribute to innovation, and this is why it is useful to consider it as a system. AKIS applies the system-thinking notion of synergy, wherein the system as a whole provides a better option than the sum of its parts (Leeuwis and van den Ban, 2004). In practice, AKIS does not work as a system but has the potential to do so; therefore, it can be useful to consider it as a system (Leeuwis and van den Ban, 2004). There are some criticisms of AKIS; it is, to some extent, linear and the interactions between actors are weak (Sanginga et al., 2009).

On the other hand, according to the IS approaches, the innovation process is a social learning process that involves the interactions of numerous stakeholders at various stages (Leeuwis and van den Ban, 2004). Similar to other perspectives on innovation which preceded it, there are criticisms of IS approaches because they place major emphasis on the system, rather than on the individual farmers, and their implementation in developing countries is limited (Lundvall, 2007). Moreover, IS approaches are also blamed for failing to account for power

relations (Lundvall, 2007). In spite of such limitations, the IS perspective appears to be particularly relevant for the assessment of the interactions between the small-scale farmers and LSLIs for a number of reasons, which are discussed below.

Firstly, IS focuses on the system as opposed to the individual farmers or technologies. Accordingly, it is crucial to analyse the behaviour of the system as a whole in order to understand small-scale farming innovations in the context of LSLIs. Secondly, it highlights the interactions between innovation actors. Thirdly, it gives particular attention to the learning processes; this is crucial because although behaviour change cannot be planned, as argued by Leeuwis and van den Ban (2004), it can be influenced (Bandura, 1977; Ajzen, 1991; Ajzen, 2012). Lastly, IS approaches are flexible and their analytical tools can be adapted to take into consideration the context and the objectives of the study.

Therefore, this study examines interactions between LSLIs and small-scale farmers from the perspective of innovation because introduction of these investments increases the opportunities for social learning. Furthermore, focusing on innovations not only provides a different perspective from which to understand the contribution of LSLIs to the wider society, but it also provides a broader perspective from which to analyse their interactions. In doing so, it may contribute to a better understanding of other forms of interaction between LSLIs and small-scale farmers by highlighting their synergies, complementarities, and social learning. Hence, the next section presents the IS conceptual framework that guides the investigation of the interactions between LSLIs and small-scale farmers in Mozambique.

2.5 Conceptual framework

The conceptual framework for the exploration of interactions between small-scale farmers and LSLIs is based on the IS approach. Adoption of the IS approach highlights the importance of the interactive learning processes wherein the plurality of actors is involved in the generation of knowledge and dissemination of agricultural information (Chambers et al., 1989; Engel, 1995; Leeuwis and van den Ban, 2004). In this study, it is assumed that innovation results from the interaction between various actors and organisations that

compose the system. This occurs because interactions between network actors facilitate the exchange of information. The new information enables learning which results in innovations in small-scale farming, depending on the farmers' specific needs and constraints. The focus of the study is to understand interactions between LSLIs and small-scale farmers, however, using an IS approach also allowed the actions of other network actors who influence the innovation process to be taken into account. Hence, the framework for analysing interaction between small-scale farmers and LSLIs is based on the preceding discussion. This framework has four main elements, adopted from the World Bank (2006), namely: a) an enabling environment; b) the actors and their roles; c) actors' attitudes and practices; and, d) the patterns of interaction for innovation.

2.5.1 Enabling environment

The enabling environment is determined by different dimensions and characteristics of the IS which shape the innovation processes. These may involve a combination of the spatial and temporal dimensions of the IS, as well as the institutional arrangements that govern the actions of the innovation actors. The World Bank (2006) highlights the importance of legal frameworks; the role of science, technology and fiscal policies; and the responsibility of farmers and other organisations in defining priorities for research and innovation. As discussed above, these are formal institutions. However, institutional settings are dynamic and characterised by disputed power relationships and incessant governance processes (Ansoms et al., 2014). Therefore, this study also considers informal institutions: more specifically, the subnational institutions and processes which shape interaction between small-scale farmers and LSLI. Locally, the system comprises the interchange of knowledge, information, ideas, skills, incentives, and resources between farmers, scientists, development agencies involved in agriculture, and various actors involved in off-farm activities (Chowdhury et al., 2013).

2.5.2 Actors and their roles

In any agricultural IS, numerous actors are involved in the generation and use of knowledge (Spielman et al., 2011). These actors include: public sector organisations, such as foreign universities, international research centres, higher learning institutes, state-owned

companies, state marketing agencies, organizations involved in agricultural research, extension, and education; for-profit firms, traders, and entrepreneurs from the private sector; collective action organisations, civil society organisations, community–based organisations, farmers, farming households, rural households, and agricultural labourers (Spielman et al., 2011). These individuals and organisations are designated as innovation actors. An innovation actor is defined in this study as a member of the IS who contributes to the process of bringing the main innovation resources into use. In addition to knowledge, the main innovation resources are information and technology. The terms innovation actor and network actors are used interchangeably.

With regard to their roles, and the activities with which they are involved, the World Bank (2006) stresses the role of private and public sectors, and the suitability of the roles they play for promoting innovation. Additionally, the following functions or processes identified by Hekkert et al. (2007) can serve as a guideline to identify and describe the IS activities, these include: entrepreneurship activities; knowledge development; knowledge diffusion; research guidance; market creation; mobilisation of resources; and, negotiation. Mapping the innovation system activities and identifying the actors who perform such activities can contribute to an understanding of the learning processes occurring within the system, as well as the identification of entry points for intervention.

2.5.3 Patterns of interaction

Interactive learning processes are crucial in innovation processes. Hence, this study applies the system-thinking notion of synergy, wherein the system as a whole provides a better option than the sum of its parts (Leeuwis and van den Ban, 2004). It is assumed that the interaction between actors creates opportunities for networking and the exchange of information (Tappeiner et al., 2008; Hermans et al., 2017). These processes result in the establishment of innovation networks. The networks facilitate knowledge sharing and promote social learning in the system (Osbahr et al., 2008; Hermans et al., 2017). Both the network of actors and the continuous processes of the exchange of information contribute to innovations in small-scale farming. In line with the World Bank (2006), this study focuses on: partnerships; inclusiveness, in relation to the poor; networks; and the existence of organizations responsible for coordinating the IS processes and their potential functions.

In addition to interactive learning processes, this study also considers power relations between innovation actors. The view taken is that power is ubiquitous, it cannot be contained or be restricted to a particular group of actors. It is found in the institutions, the resources, and in the social relations between different people (Few, 2002). Defining power as the capacity to influence outcomes, or to avoid being influenced, places power at multiple levels (Tjosvold, 1985). In view of this, domination and resistance invariably co-exist and both involve the exercise of power. Thus, power manifests in the ability to influence social interactions. Accordingly, Dennis and Martin (2005) argued that power is relational and cannot be separated from its situational use.

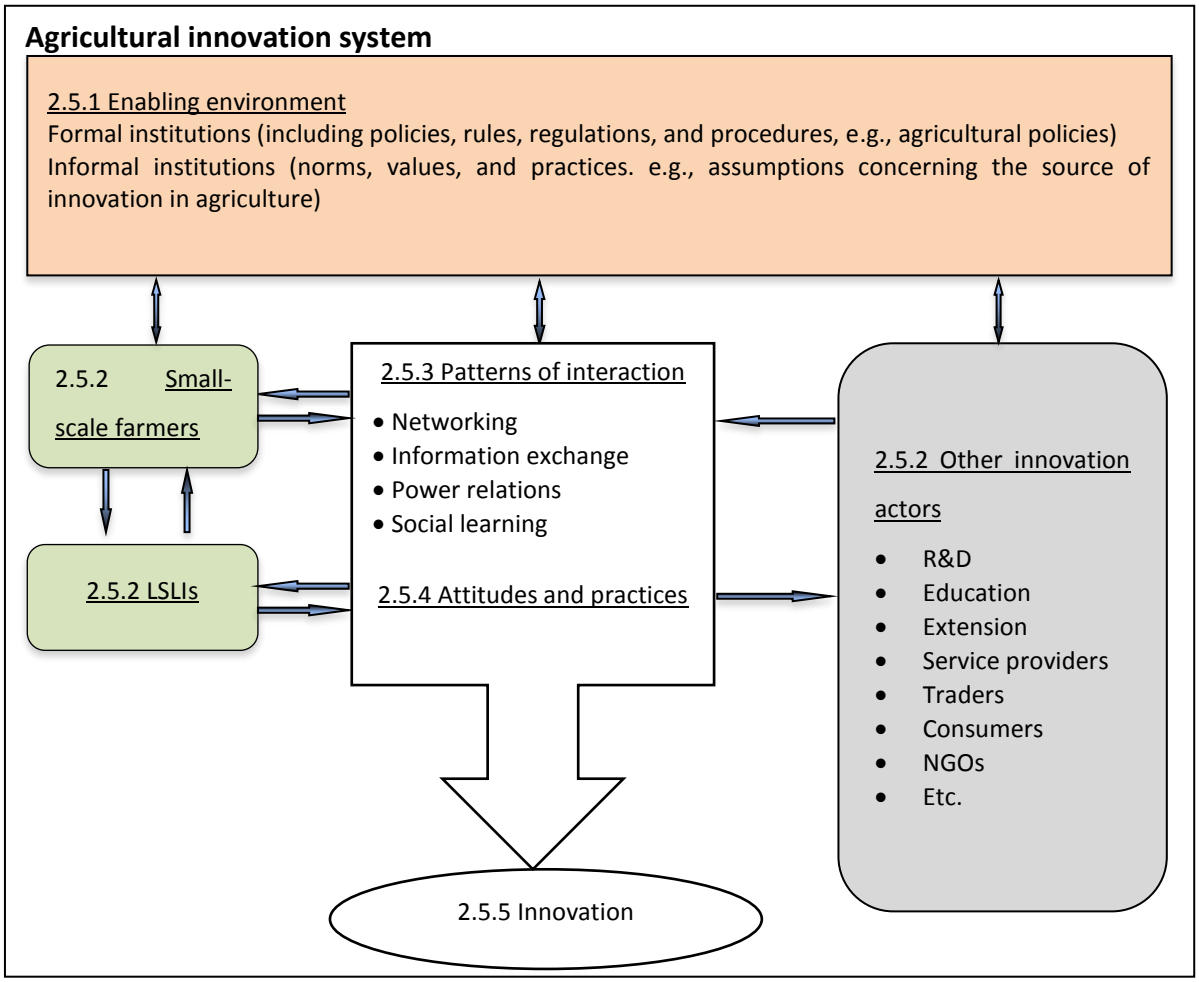
2.5.4 Attitudes and practices of main actors

The framework emphasises "collaboration, potential inefficiencies, patterns of trust, and the existence of a culture of innovation" (The World Bank, 2006, p.xvi). Among other characteristics, the frequency of a stakeholder's contact, consistency, and longevity of the relationship may all contribute to increase trust in the relationship between the small-scale farmers and agricultural stakeholders (Fisher, 2013). This study considers the TPB because, according to Ajzen (2012), it can be employed in behavioural change interventions through the identification of behaviours that are socially important, as well as alternative ways to change those behaviours considering their determinants. As the theory stipulates, attitudes, subjective norms, subjective behavioural control, and perceived behavioural control are predictors of intention, and human behaviour is directly related to intention. Section 2.4.4 of the literature review discusses the TRA and TPB. In the case of agricultural innovation, it is assumed that, among other points, the attitude of innovation actors will determine the outcome of the IS in terms of innovation in small-scale farming.

Figure 2.3 represents an IS conceptual framework for the analysis of interactions between LSLIs and small-scale farmers. The diagram is the researcher's own construct, but its components are adopted from the World Bank (2006). The different components of the innovation system are described as follows: the enabling environment (2.5.1) represents the broad conditions that facilitate or constrain innovations; the innovation actors (2.5.2) are represented by three boxes, one side of the diagram displays small-scale farmers and LSLIs, the other side illustrates other actors that compose the innovation system; the patterns of

interaction (2.5.3) represent the processes that facilitate learning and innovation; the attitudes and practices (2.5.4) represent the patterns of collaboration within the innovation system; innovations (2.5.5), which are the output of the agricultural IS, are the result of the interactions between the innovation actors.

Figure 2.3 Agricultural innovation system



Source: adapted from the World Bank (2006)

This conceptual framework highlights how the actors, their attitudes, the patterns of their interactions, and the institutions that mediate such interactions affect innovation in small-scale farming. The next chapter discusses the research methodology and methods employed at different stages of the research process.

3 Chapter three- Research methodology and methods

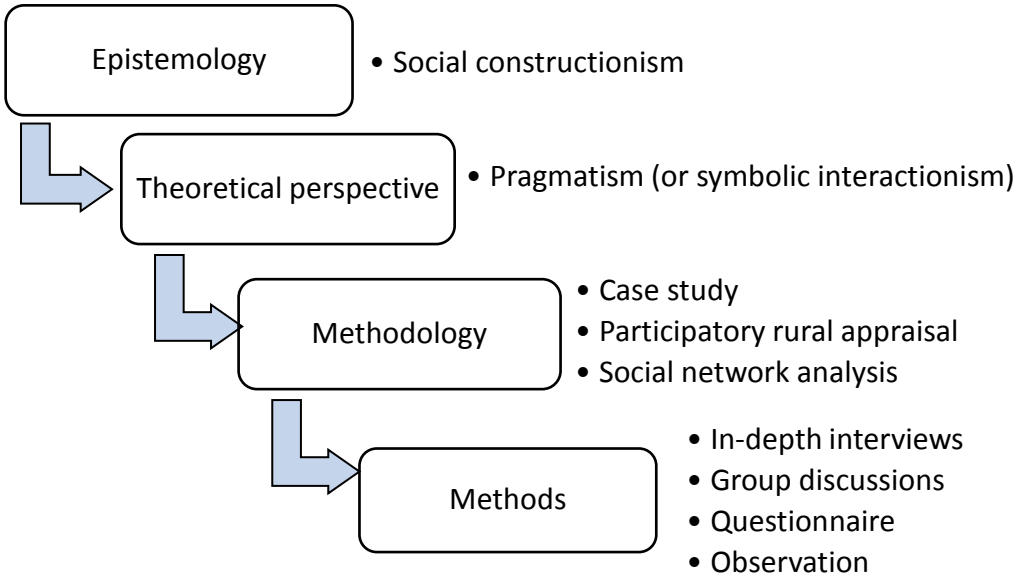
3.1 Introduction to the chapter

This chapter is divided into five mains sections. Section 3.2 uses four elements of the research process, as suggested by Crotty (1998), to discuss the philosophical foundations for this particular research. The importance of explicitly expressing the philosophical foundations is to justify and explain assumptions related to the research methodology and methods selected. In this regard, social constructionism justifies the use of both qualitative and quantitative methods to investigate interactions between LSLIs and small-scale farmers. Accordingly, the use of a mixed method research design is described in Section 3.3. Following this, and focusing on the fieldwork activities, Section 3.4 discusses the research procedure, which includes actions conducted before and during the fieldwork to ensure participation of different groups of people. This takes into consideration data quality issues as well as the University of Reading's principles of research ethics. This section also elucidates the criteria and the steps taken during the fieldwork to recruit research assistants, to identify interviewees, and to conduct interviews. This is followed by presentation of the sampling strategies at different stages of the research process in Section 3.5. Finally, Section 3.6 discusses data processing, analysis and the actions taken at different stages of the research process to increase validity and reliability.

3.2 Elements of the research process

Four elements that provide the foundations for the research process, according to Crotty (1998), are considered in this section. These elements, namely, epistemology, theoretical perspective, methodology, and methods are not properly comparable. Hence, by means of scaffolding, Figure 3.1 illustrates how Crotty (1998) associates the four elements of the research process. Scaffolding is a way to understand the research process that provides some sense of direction and stability (Crotty, 2003). Accordingly, this section firstly discusses the epistemology that has guided this research and then presents its theoretical perspective. Subsequently, methodology and methods are discussed.

Figure 3.1 Four elements of the research process



Source: Adapted from Crotty (1998)

3.2.1 Epistemology

The theory of knowledge that guided this research is **social constructionism**. According to this view, meaning is socially constructed (Crotty, 1998). In this process of meaning-making, knowledge can be either subjective or objective, but not both at once (Crotty, 1998). Thus, it is important to be a consistent subjectivist or objectivist. Objectivist constructionism distinguishes between objective scientific meaning and subjective meanings to which people ascribe on a daily basis, and it considers subjective meaning as an approximation of the scientifically objective meaning. A drawback is that objective constructionism implies that everyday subjective meanings are inferior to scientifically objective meanings (Crotty, 2003). On the other hand, subjective constructionism gives equal importance to all types of knowledge, whether scientific or not. It regards all knowledge as socially constructed and scientific knowledge as a particular form of construction. By adopting social constructionism, quantification is not ruled out in the research process. Social constructionism is compatible with both realist and relativist ontological worldviews (Crotty, 2003).

There is a difference between constructionism and constructivism. In constructionism the meaning is constructed collectively, in other words, constructionism accounts for the way in which culture influences personal worldviews (Crotty, 1998). Whereas in constructivism the focus is the meaning-making process which occurs in the minds of individuals, i.e., reality depends on the way each person interprets the world (Crotty, 1998). Both constructionism and constructivism are relevant to this research. By taking this stance, on the one hand, the researcher was aware that his personal views, which result from social construction and his unique interpretation of the world, do influence his interpretation of the research results. On the other hand, the research participants have their own interpretations of the world, both socially and individually. The researcher's role was to attempt to accurately capture reality as interpreted by the research participants.

3.2.2 Theoretical perspective

The theoretical perspective is "the philosophical stance lying behind a methodology" (Crotty, 1998, p.66). In other words, the assumptions made in association with the chosen methodology. The positivist tradition, and its successor post-positivism, have provided philosophical foundations for quantitative research methods. Teddlie and Tashakkori (2009) emphasised that for many years positivist philosophical standpoints have influenced the choice of research methods. However, the epistemological, ontological, and axiological views of positivists have been challenged. Increased refinement of qualitative research methods have led to a dichotomy between the positivism and constructivism stances associated with quantitative and qualitative research methods, respectively (Teddlie and Tashakkori, 2009).

On the one hand, positivists contend that there is one objective reality, and they maintain that it is possible for the social scientist to conduct research in an objective manner which is not influenced by their personal values (Teddlie and Tashakkori, 2009). On the other hand, according to the constructivist paradigm there are multiple realities (Teddlie and Tashakkori, 2009) and social reality is constructed by the individuals who inhabit that reality within which social scientists conduct their observations (Alford, 1998; Schutz, 2003). Accordingly, these individuals have "pre-selected and pre-interpreted" the world in which they live (Schutz, 2003, p.141). As asserted by Crotty (1998, p.58), the "social world is already interpreted

'before the scientist arrives'". Hence, to understand social realities the researcher needs to interact with the individuals in order to comprehend their perceptions of their world (Crotty, 1998). In this process, reality is co-constructed by interaction between the researchers and the participants (Teddlie and Tashakkori, 2009). Teddlie and Tashakkori (2009) reasoned that positivism and constructivism constitute two extreme philosophical worldviews on a continuum in which the practices of most researchers are found; therefore, alternative philosophical standpoints, including post-positivism, pragmatism, and transformative paradigms, have emerged to provide a philosophical basis for research practices other than those directly related to positivism and constructivism. The current study can be included within this continuum.

This study was guided by the philosophical worldview embraced by **pragmatism (or symbolic interactionism)**. Following Dennis and Martin (2005), pragmatism is relevant for this study because it is a perspective that attempts to overcome dualisms, such as idealistic/materialistic, rationalistic/empiricist, and dogmatic/sceptical. Accordingly, within pragmatism reality can be both subjective and objective (Teddlie and Tashakkori, 2009), and values are important in defining the choice of research topics and questions. Furthermore, there is an external reality independent of our minds and major emphasis is given to idiographic statements. Moreover, in pragmatism the choice of methods depends on the research questions and the stage at which the research is in terms of the inductive-deductive research cycle (Teddlie and Tashakkori, 2009). The use of pragmatism to explore interactions between small-scale farmers and LSLI in Mozambique highlights two important aspects.

Firstly, the research methods depended on the research questions. Some stages of the research cycle may involve intensive interaction between the researcher and the participants, whereas other stages may not require in-depth interactions (Teddlie and Tashakkori, 2009). Hence, both qualitative and quantitative research methods were considered depending on the research question. Secondly, the choice of the research questions is influenced by the values of the researcher. The researcher is from Mozambique and has lived most of his life there. Before beginning his doctoral training, and as an agronomist, he has worked in different capacities with small-scale farmers in Mozambique where such farmers tend to be the main focus of the agricultural development narrative. As

a result, and also due to the prevalence of this group of farmers in the country, major emphasis was given to small-scale farmers.

There is a widely held view that pragmatism does not account for conflict and power relationships. For example, Crotty (1998) introduces pragmatism as a theoretical perspective with conception of the world as a place without conflict where consensus can be achieved and, thereby, opportunities for growth can be created. Nevertheless, this view has been challenged by Dennis and Martin (2005) who argued that pragmatism studies investigate how power is enacted in real situations. By using an innovation system approach, as discussed in the literature review, this study seeks to take a holistic view of LSLIs which considers both its potential as a development opportunity and the power relationships and conflicts that arise with its implementation.

3.2.3 Methodology

At different stages of the research cycle, the study has employed various methods associated with the following approaches: case study; participatory rural appraisal techniques; and social network analysis. Each of these is discussed in the following sub-sections.

Case study approach

There are different ways to define what constitutes a case study. "Depending on one's research interest the 'cases' that are chosen and compared can be specific social actors, projects, technologies, innovative ideas, communities, intervention methods, organizations, problems, etc." (Leeuwis and van den Ban, 2004, p.374). For this research, two case studies, or as Gildemacher and Mur (2012) describe, two innovation platforms, which constitute the combination of the LSLI and the network of actors involved in various activities related to the crop or the subsector of agriculture, were considered at a broad level.

Innovation platforms "are defined by a common theme around which a network of partners works. The premise of the innovation platform approach is that platforms deliberately enhance interactions to forge strong linkages between stakeholders, which will result in better information exchange, and more ideas and opportunities for agricultural innovation

and development" (Gildemacher and Mur, 2012, p.16). In principle, working around a shared theme suggests that innovation actors collaborate and have common goals. Furthermore, Denscombe (2003) emphasises that a case study approach enables informal interviews to be combined with the observation of occurrences in the location of the case study and participation in official meetings. Hence, using a case study approach allowed the researcher to explore multiple sources and methods in the two selected case studies.

In each case study, the abovementioned research methods have been combined with a household survey of small-scale farmers in order to collect demographic data. Furthermore, during the fieldwork, for each case study the researcher participated in agricultural fairs organised by local governments which foster market access, meetings between stakeholders who are part of the vegetable and sugarcane sectors, and meetings between small-scale farmers which are association members. In both case studies only association members are involved in production relationships with LSLIs. The next subsection describes the sites where the fieldwork was conducted.

Selection of study sites

The fieldwork activities were conducted in Nhamatanda District, Sofala Province, and in Vanduzi District, Manica Province. Both study sites are located within the Beira Corridor in Central Mozambique (see Appendix 1). Due to its agricultural potential, this Corridor has been the favoured destination for land investment for a number of years (Hanlon, 2004; Gálvez Nogales, 2014). This geographical area covers transportation and communication infrastructure, roads and a railway system linking four countries in Southern Africa (namely, Mozambique; Malawi; Zambia; and Zimbabwe) with the Indian Ocean, using Beira port in Mozambique, hence designated the Beira Corridor. Investments and planning for the development of the Beira Corridor started in the 1960s, however, its progress stalled due to the civil war that afflicted the country from 1977 to 1992 (Gálvez Nogales, 2014). For comparison purposes, the study explored small-scale farmers and LSLIs interactions at two sites involved in the vegetable and the sugarcane subsectors in Manica and Sofala Provinces, respectively. As shown in Table 3.1, the study sites are comparable for several reasons.

Table 3.1 Overview of the study sites and LSLIs involved in the out-grower schemes.

Item	Case study 1	Case study 2
Province (District)	Manica (Vanduzi)	Sofala (Nhamatanda)
LSLIs	Companhia do Vanduzi	Tongaat Hulett Açucar
LSLI farm size	1600 hectares	8500 hectares
LSLI operation started	2004	1965
Cropping system	Vegetables	Sugarcane
Out-grower started	2004	2014
Form of organization	Individual plots managed separately	Collective farm
Other actors involved in the out-grower scheme	Farming associations in Manica, Vanduzi, and Sussundenga Districts; PROIRRI and BAGC	Association Muda Macequessa, PROIRRI1 [1] and BAGC[2]
Other crops grown by small-scale farmers	Maize, diverse vegetables, sweet potato, banana, avocado,	Millet, cowpea, pumpkin, maize, sorghum
Main study sites (villages)	Belas and Macora	Macequessa
Distance to national road	< 10 kilometres	< 10 kilometres
Irrigation infrastructure	Available	Available

Source: Author's construct using information from interviews with agricultural stakeholders

Firstly, in both case studies, small-scale farmers have a contractual agreement to supply products to LSLIs. In these out-grower schemes, LSLIs operate as the nuclei, the service providers, and the centre of production related activities, whereas the small-scale farmers operate at the periphery, arguably benefiting from the know-how and the market links provided by LSLIs. At both sites, association members have been beneficiaries of numerous development projects in the past and currently benefit from an irrigation project designated PROIRRI. PROIRRI is a World Bank financed project under implementation since 2011 in Manica, Sofala, and Zambezia Provinces in Central Mozambique. It involves rehabilitation or construction of irrigation systems to benefit association members and has a budget of $US90 m. Through PROIRRI, the government and its partners have improved access to irrigation for the association members in the communities where fieldwork was conducted. PROIRRI funding has contributed to the construction of the irrigation systems and provided complementary support to make it viable. As part of PROIRRI, association members and project managers have mentioned 'shared support' as a scheme in which PROIRRI contributes 70% of the production costs with association members expected to pay the

[1] PROIRRI is a public irrigation project that aims to foster links between LSLIs and small-scale farmers

[2] Beira Agricultural Growth Corridor (BAGC) is a NGO which provides services to PROIRRI.

remaining 30%. The rationale for this scheme is that the 30% contribution increases project ownership amongst association members.

Secondly, both sites have access to primary roads within Mozambique which facilitate links to national and export markets. As outlined in Table 3.1 the distance between the villages and the main roads are comparable. The village of Belas is located approximately eight kilometres away from the National road number seven (N7), and the village of Macequessa is located nearly seven kilometres away from the National road number six (N6). Both are important road infrastructures connecting different areas of Mozambique, they also link land locked countries, such as Zambia and Zimbabwe, to the Indian Ocean. Perhaps because of this a number of farming associations, such as Campo 4 and Nhamanembe in Manica and Macequessa and AGRIPEL in Sofala, are located on the previously colonial-owned plantations.

Furthermore, the two study sites were not only selected due to their comparability as outlined above, but also because of their potential differences. As shown in Table 3.1 the form of organisation differs at the two study sites. In the sugarcane sector the association farm is managed collectively as one production unit, whereas the vegetable plots are managed as individual production units. The vegetable sector is discussed next.

Vegetable sector

Although vegetable production is relatively important for the incomes of the smallholders in Mozambique, this sector is understudied when compared to other commodity crops, such as maize and rice. In part this occurs due to lack of funds. In this regard, Mozambican expenditure on agriculture between 2001 and 2007 was 6%, and during the same period agriculture contributed an average 25% to the Growth Domestic Product (Zavale et al., 2011). As result of this underfunding, public agricultural research tends to be in line with main international partners who are members of the Consultative Group of International Agricultural Research (CGIAR) (IIAM, 2018). However, vegetable production is not a major research theme within the CGIAR.

Fieldwork activities in the vegetable sector were concentrated in Vanduzi District where the latest population census indicates that it comprises 124,064 inhabitants, and thus constitutes 6.5% of the population of Manica Province (Instituto Nacional de Estatística, 2017). This area has been upgraded from an Administrative post, which is a low administrative level, to a District as a result of Law No. 16, from 13 December, 2013 (Machirica, 2014). This law created new administrative divisions throughout Mozambique. The vegetable sector in Manica Province was selected due to the existence of Companhia do Vanduzi, the only vegetable company in Manica Province and the largest exporter of vegetable products in the country. The company is also involved in out-grower schemes with small-scale farmers. Currently, it provides technical assistance and contributes to market creation by supporting small-scale farmers to export vegetables to countries such as South Africa, Ireland, and the United Kingdom.

Companhia do Vanduzi has been running an out-grower scheme since the beginning of its operations in 2004. The out-grower scheme is organised as follows. To be included in the list of farmers engaged in the productions of LSLI crops each time the productions factors are distributed, the association members inform the association production manager that they want to be part of that specific production cycle. The company then provides production factors, including seeds and fertilisers, to the production manager in each association who then distributes the inputs to previously selected association members. Each farmer receives enough seeds and inputs to cultivate 0.1 hectares. Accordingly, ten farmers cultivate one hectare. During the production cycle, the LSLI provides technical assistance and crop protection services, if necessary, and the association members take responsibility for managing the crop during the growing season. At the end of the season, the LSLI discounts the costs of the production factors.

Current operations are concentrated in Vanduzi and Sussundenga Districts, Manica Province. In the past, the out-grower scheme involved farmers in Nhamatanda District, Sofala Province, and Manica District, Manica Province. However, the operations in Manica and Nhamatanda Districts stopped in 2016, this coincided with the company's expansion to new areas, such as Rotanda, Sussundega District, and Mudzizi, Vanduzi District, both in Manica Province. This illustrates that after initial production the company's operations are not limited to the

initially targeted area. In some instances, their activities evolve to cover new areas, thereby involving different communities; on other occasions, the changes involve the company's withdrawal from areas already in operation. The production of sugarcane in the Association Muda Macequessa is also a result of the expansion of LSLI into new areas in the sugarcane sector. A brief description of the sugarcane sector is provided next.

Sugarcane sector

Large-scale farms dominate production of sugarcane in Mozambique. Interactions between small-scale farmers and LSLIs in this sector are different in nature when compared to the vegetable sector. Tongaat Hulett Açucar, locally known as Açucareira de Mozambique, is the result of a public private partnership between the Mozambican government and the South African group, Tongaat Hulett. The Mozambican government owns 15% of the company. The fact that Açucareira de Mozambique has been operating in the country since the colonial era also allows an understanding of the historical dimension of LSLIs and how the small-scale farmers have been involved in these developments.

Açucareira de Mozambique operates in both Dondo and Nhamatanda Districts in Sofala Province. However, most fieldwork activities were conducted in Nhamatanda District because this is the location of the small-scale farmers' sugarcane plantation. Association Muda Macequessa is the only producer organisation formed by small-scale farmers involved in sugarcane production in that district, which is located about 70 km away from Beira city and contains a population of 317,538 inhabitants (Instituto Nacional de Estatística, 2017). This figure represents 14.3% of the inhabitants of Sofala Province, according to the latest population census conducted in August, 2017.

In the sugarcane sector, PROIRRI provided 70% of the funds to operationalise sugarcane production in the association, from the construction of the irrigation system to the commercialisation of the sugarcane. According to a government extension officer in Lamego (I5_S_2016), more than $US1 m have been allocated to promote small-scale sugarcane production. After negotiations with BAGC on behalf of the small-scale farmers, Açucareira de Mozambique agreed to cover the remaining 30% of the costs to operationalise the irrigation system (I5_S_2016). Although all the funding for sugarcane production originated

from external sources, namely PROIRRI and LSLI, association members are entitled to the crop revenue at the end of the season. This agreement allowed the production of 32 hectares of sugarcane in the 2014/15 cropping season, the first year in which sugarcane was produced by Association Muda Macequessa. The contribution of LSLI to the project activities appears to influence how the LSLI and association members negotiate crop production and commercialisation, in particular, and use of the irrigation system, in general.

This subsection has presented justifications for the selection of the sugarcane and vegetable sectors to enable an understanding of interactions between LSLIs and small-scale farmers. It shows that the two cases are comparable due to their similarities in terms of the availability of improved irrigation systems financed by PROIRRI and accessibility to main road infrastructure, as well as their potential differences in terms of production technology and the nature of the interactions between agricultural stakeholders. Having explored the case study approach, the following section discusses the participatory tools used during the fieldwork in Mozambique.

Participatory rural appraisal

The term Participatory rural appraisal is employed to describe a group of methods and approaches that make it possible for local people to plan and to act by improving, analysing, and sharing knowledge about their lives and circumstances (Chambers, 1994). Each participatory exercise can be seen as different. It is adapted to the situation in which it is implemented through the interactions between the facilitator and the participants and takes into consideration the local conditions (Chambers, 1994; Dorward et al., 2003). Participatory tools were used sparingly during the fieldwork, usually as a technique to obtain practical information about the study area. To this end, participatory mapping was employed to understand the geographical location and limits of the farmers' associations in the villages of Belas and Macora in Vanduzi District; and the boundaries of the land allocated to Association Muda Macequessa in Lamego, Nhamatanda District. Analysis of the farming systems through the use of diagrams and maps designed by the farmers was also a means to promote interactions with small-scale farmers, as suggested by Chambers et al. (1989). Observation was frequently used in association with other data collection methods. Along with transect walks, observation was used for reconnaissance of the study area at different

stages of the fieldwork. A seasonal calendar exercise was employed to describe the farmers' occupation during the year and the crops produced during different seasons. Moreover, the ranking of income sources was embedded in the questionnaire for the rural households.

Social network analysis

Social network analysis is the study of the interactions between social actors (Freeman, 2004; Prell et al., 2009); it employs a "set of techniques used to study the exchange of resources among actors" (Haythornthwaite, 1996, p.323). The major difference between conventional and network data is that conventional data focus on actors and attributes, while network data focus on actors and relations (Hanneman and Riddle, 2005; Edwards, 2010). Relationships indicate a connection between two or more people or things. Pairs of actors who maintain a particular relationship are said to be linked by that relationship and tied by all the relationships they maintain (Haythornthwaite, 1996; Mehta et al., 2011). Information relationships indicate what kinds of information are being exchanged, between whom, and to what extent (Spielman et al., 2011). Moreover, Haythornthwaite (1996) highlight that pattern of relationships between actors reveals the likelihood that individuals will be exposed to particular kinds of information, and that patterns of forwarding and receiving describe networks that show how information moves around an environment, and how actors are positioned to facilitate or control the information flow.

Social network analysis uses conventional data collection tools which include interviews, focus group discussions, and questionnaires (Spielman et al., 2011). Accordingly, this study employed qualitative methods in the form of individual and group interviews, and quantitative methods in the form of questionnaires to understand interactions between the network actors that compose the local innovation systems. Biggs (1989) has suggested the use of a linking and functional analysis to evaluate the flow of information between actors involved in the agricultural research and extension system. Hence, this study employs social network analysis to assess the exchange of information (Haythornthwaite, 1996; Freeman, 2004). In this study, social network analysis not only established whether or not there are links between innovation actors, it also allowed the exploration of some of the attributes of their relationships. These attributes were identified by the following questions suggested by Haythornthwaite (1996): What type of information is exchanged? What are the sources of

information? How often do the innovation actors interact? They query the content, the direction, and the strength of the relationship, respectively.

3.3 Research design

3.3.1 Mixed method research

Assessment of the interactions between innovation actors followed mixed method research design. This design involves the combination of qualitative and quantitative data in the same study (Creswell, 2013) in order to increase the validity of the results through data and methodological triangulation (Teddlie and Tashakkori, 2009; Yin, 2010), and to explore the complementarity between statistical and case study methodological types (Bickman et al., 2012). Accordingly, the current study followed an exploratory sequential mixed methods strategy. It is exploratory because the design gives increased emphasis to qualitative research methods (Creswell, 2013). Furthermore, it is sequential because the exploratory stage, with its use of qualitative methods, and the explanatory stage, with its use of quantitative methods, are conducted in sequence. Sequential design is appropriate when one investigator conducts the research (Teddlie and Tashakkori, 2009). Hence, in each study case (see Table 3.2 overleaf), different stages of the research cycle were implemented as described in the following paragraphs.

The first stage involved employment of qualitative exploratory techniques in the initial stages of the study. This stage included the scoping exercise activities and the use of qualitative research methods, such as document reviews, group interviews, observations, and key informant interviews. Then, small-scale farmers were the focus of the fieldwork activities. Accordingly, group discussions, in-depth interviews, transect walks, and observations were employed to characterise the local farming systems and to explore interactions between small-scale farmers and LSLIs.

In the second stage of the research cycle, preliminary insights from the qualitative fieldwork and the scoping exercise were used to improve the questionnaire for the rural households and to explore the interactions between small-scale farmers and LSLIs with a larger sample. The fieldwork and inclusion of themes raised by research participants increases the

relevance of the research results (Hudson and Buckholdt, 1976). Accordingly, a rural household survey, which considered the main themes raised during the exploratory stage of the research cycle, was conducted in the villages of Belas and Macora in Vanduzi District, and in the village of Macequessa in Nhamatanda District. In parallel, using social network analysis tools another questionnaire was administered to stakeholders that compose the local innovation system.

The third stage of the research cycle involved conducting in-depth interviews with small-scale farmers (Appendix 5). By definition, the study employed an exploratory sequential mixed methods research design, although in-depth interviews and the survey were, to some extent, carried out in parallel in the latter stages of the fieldwork due to the availability of the respondents.

Table 3.2 Summary of research activities conducted in Mozambique

Period	Activity
March – April	Scoping exercise in Manica and Sofala Provinces Key informant interviews Contacting LSLI managers Supervisory visit
May – June	Case study 1 – Data collection in the vegetable production sector, in Manica Province with Companhia do Vanduzi
July	Case study 2 – Data collection in the sugarcane sector, in Sofala Province with Açucareira de Moçambique
August	Case study 1 - Innovation stories – vegetable production sector
September	Case study 2 - Innovation stories – Sugarcane sector Group interviews with association employees Additional visits to both sectors
October	Return to the University of Reading

Source: Author

3.3.2 Qualitative methods

A number of qualitative research methods, such as group discussion, in-depth interviews, and observation were used across all stages of the study. Open-ended questions are crucial in order to obtain the farmers' views in the diagnostic stage of research (Chambers et al., 1989). The fieldwork activities started with the collection of qualitative data through **key informant interviews**. These were instrumental in obtaining information about the study location and also about local agricultural organizations. The key informants were a diverse group of people. These individuals, although linked through their involvement in the

agricultural sector, include people involved in dissimilar activities, such as different types of farmers, government officers from different departments, NGO representatives, staff from the investment agencies, and local organisations engaged in agriculture. Key informant interviews facilitated the obtainment of relevant information that facilitated the research activities in Mozambique.

In-depth interviews with agricultural stakeholders were conducted to capture the views and perceptions of the agricultural stakeholders, with regards to the interactions between LSLIs and small-scale farmers, in addition to the contribution of LSLIs to the society as a whole (Appendix 4). The majority of the in-depth interviews were scheduled to occur at the beginning of the fieldwork activities as part of the scoping exercise and pilot research activities. However, in-depth interviews continued during seven months of fieldwork activities. Some of the interviews occurred later due to unavailability of the interviewees to participate in the research earlier.

Group interviews were conducted to explore the rural households' collective view on land and water usage within the village, the distribution of tasks within the associations, and interactions with LSLIs. Considering that communities are not homogeneous, neither are the group's views consensual (Lloyd-Evans, 2006; Porsani and Lalander, 2018). Thus, group interviews were crucial to explore group behaviours, to determine intragroup differential interests, and to access information.

Participant observation was opportunistically employed on several occasions. The possibility to take part in these events depended on various factors. Being affiliated with the ISPM, the organization that facilitated the fieldwork activities in Mozambique, provided access to some discussion forums in which it would otherwise be difficult to participate. Surprisingly, on numerous occasions, these activities were facilitated by the LSLIs. Two examples include: firstly, participation in the Beira Corridor coordination meeting in Sofala Province, information about the meeting and a request for an invitation to take part on the meeting were facilitated by Açucareira de Moçambique; secondly, in Manica Province the researcher participated in different activities involving Companhia do Vanduzi interactions with small-scale farmers.

Following the exploratory stage of the research cycle, qualitative methods were employed to collect comparative information about the small-scale farmers. These included the individual and group interviews and the questionnaire for the households (see Appendix 2), which used a majority of closed ended questions.

3.3.3 Quantitative methods

The quantitative methods included a survey for rural households and a questionnaire for the agricultural stakeholders. A **household survey** was conducted in Nhamatanda and Vanduzi districts of Sofala and Manica Provinces, respectively. The questionnaire (see Appendix 2), included five sections, as outlined in Table 3.3.

Table 3.3 Outline of the household survey

Sections	Topics
Section 1	Contains information about the questionnaire ID, the date and location of the interview, and the name of the inquirer. These details facilitate the retrieval of interview information at any stage of the research process while maintaining confidentiality.
Section 2	Comprises the household demographic information.
Section 3	Covers the characteristics of the production unit.
Section 4	Analyses the social networks, links with other organisations, and activities that facilitate the exchange of agricultural information.
Section 5	Deals with rural households' perceptions of the contribution of the LSLI to their community's livelihoods.

Source: Author

The questionnaire included both closed ended and open ended questions. Initially, the questionnaire included detailed closed ended questions about components of the Agricultural Knowledge and Information System (AKIS), as described by Rivera et al. (2005), in order to understand the interaction between small-scale farmers and other stakeholders within the agricultural sector. The aim of the questions, in different formats, was to assess attitudes and perceptions of small-scale farmers in relation to LSLIs. The survey instrument was firstly tested in March during the piloting exercise.

After the piloting exercise, which took place between March and April 2016, changes were made in response to feedback from the interviewees and the challenges faced in the implementation of the first version of the questionnaire. For example, details about AKIS

components and farming practices were removed and the same topics were incorporated in the form of open ended questions to allow respondents to focus on the organisations relevant to them (Babbie, 2005). Further changes were made to the questionnaire to incorporate information from the preliminary findings as to the main sources of agricultural information in Beira Corridor. Also, to reduce the number of less relevant questions and answer options in the questionnaire. The criteria to identify such questions were varied. As an example, some of the questions included in the first version of the questionnaire addressed aspects related to the agricultural practices of the small-scale farmers. The objective was to understand whether they were using agricultural techniques, such as planting in rows, and commercialised inputs, such as fertilisers and pesticides. However, the responses to these last two questions was positive for all small-scale farmers producing for Companhia do Vanduzi and for the associations the researcher was able to visit. As a result of these initial findings, supported by observation and transect walks in various fields within and outside the associations in the vegetable sector, those questions were removed from the questionnaire.

The questionnaire was administered face-to-face by the researcher and, in some instances, a research assistant. Interviewees provided the answers orally and their answers were noted down. This method has numerous advantages when compared to self-administered questionnaires, telephone interviews, and online surveys (Babbie, 2005). Administering the questionnaire in person, inter alia, allowed the researcher to further explore new issues raised during the interviews, to clarify interview questions that seemed to confuse the respondents, and to use observation when appropriate. Furthermore, the interview survey was the most feasible choice considering the context and the location of the fieldwork activities. As illustrated by information about the education levels of the respondents, the majority of interviewees, 59%, did not finish elementary education (Grade 5) and were, therefore, limited in terms of their reading and writing skills. In some cases, the research participants agreed to the interview but requested a copy of the questionnaire so they could follow the questions as they were being asked.

Two types of questionnaires were administered for different groups of research participants. In the previous section challenges in the administration of the questionnaires to the small-

scale farmers and the changes that were made to adapt to the circumstances in rural Mozambique have been discussed. The next paragraph describes the socio-metric tools administered to the agricultural stakeholders, to whom a different questionnaire was administered (see Appendix 3) as part of the social network analysis. This analysis uses socio-metric tools and attempts to explore the links between agricultural organisations and small-scale farmers.

The **questionnaire for agricultural stakeholders** complements the findings from the in-depth interviews by emphasising the links between individuals and organisations within the agricultural sector in Central Mozambique. For triangulation, social network analysis produced both qualitative and quantitative data. However, the response rate to the questionnaire for the innovation actors was low, only four and 13 participants completed questionnaires in the sugarcane and the vegetable sectors, respectively. The low response rate is explained by the fact that the target group in this case overlapped with the key informant interviewees. Some people were not able to participate at different stages of the research process due to time constraints. Thus, they participated in the interviews, but did not complete the questionnaire (Appendix 3) which attempted to capture their views on the LSLI interaction using a Likert scale. Due to the small sample size as outlined above, it was not possible to use this tool as planned, which was to examine the views of the agricultural stakeholders in a wider sample. Four sections compose the questionnaire for the stakeholders, summarised in Table 3.4.

Table 3.4 Summary of the questionnaire for the agricultural stakeholders

Sections	Topics
Section 1	As in the case of the questionnaires for the rural households, contains details of the inquirer, location and date of the interview, and the code assigned to the questionnaire.
Section 2	Explores links between the respondent, the organization they represent, and the small-scale farmers.
Section 3	Explores links between the respondent or their organization, and other agricultural stakeholders.
Section 4	Employs a Likert scale to measure the perceptions of the innovation actors regarding interactions between LSLI and small-scale farmers.

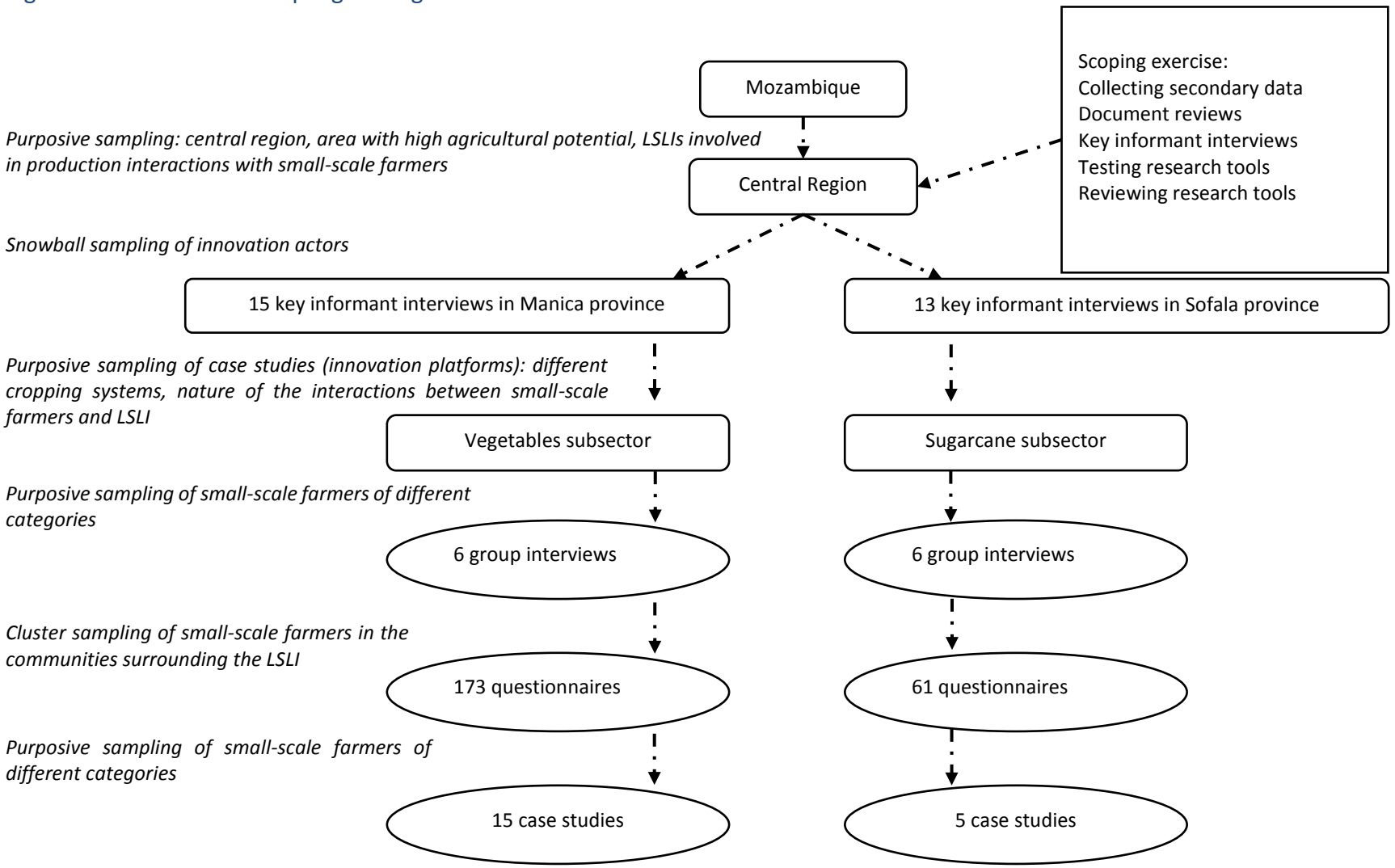
Source: Author

3.4 Sampling strategy

The sampling strategy depends on the type of data to be collected. As a general rule, quantitative studies employ **probabilistic sampling** techniques, in which case the research participants are randomly selected and the likelihood of including each unit of the population can be determined (Teddlie and Tashakkori, 2009). In contrast, qualitative studies normally employ **purposive sampling**. In this case, the selection of research participants depends on the topic to be investigated, and the study units are selected in order to include different views and to avoid bias (Yin, 2010). Purposive selection of the companies, and the small-scale farmer innovators in the third stage of the research process highlights the importance of the qualitative methods for this study. Furthermore, the **snowballing sampling** technique, in which existing research participants provide the information about prospective interviewees (Yin, 2010), is more appropriate for social network analysis (Salganik and Heckathorn, 2004). In this case, the sample size is not decided in advance, it results from the cumulative snowballing process whereby each research participant points to other people or organizations of interest for the research. Therefore, social network analysts rarely draw samples in their work (Hanneman and Riddle, 2005).

Hence, considering that the sampling strategy also involved a combination of probabilistic, purposive, and snowballing sampling techniques, as shown in Figure 3.2, and the sample sizes were based on a compromise between the qualitative and the quantitative components of the study (Teddlie and Tashakkori, 2009). For each data collection method, the following sampling procedures were considered.

Figure 3.2 Overview of sampling strategies.



Source: Author

3.4.1 In-depth interviews

As shown in Figure 3.2 above, snowball sampling was employed to identify 13 and 15 agricultural stakeholders in the sugarcane and vegetable subsectors, respectively. In exploratory qualitative studies, smaller samples allow for better engagement with the cases being studied (Crouch and McKenzie, 2006). Accordingly, in-depth interviews were conducted with managers and technicians from LSLIs, researchers, extension agents, input providers, agricultural education providers, NGOs, traders, and other individuals or organisations considered to be part of the agricultural innovation system by the local stakeholders. Interview guides were prepared in advance and adjusted to incorporate any new themes which emerged from the interactions with the research participants. After conducting the rural household survey, case studies were carried out with individual small-scale farmers using ethnographic methods (Donge, 2006), biographical analysis, and historical analysis (World Bank, 2006). Fifteen small-scale farmers were purposively selected for case studies in the vegetable sector, and five in the sugarcane sector.

3.4.2 Group interviews

Six group interviews were conducted in each sector. Teddlie and Tashakkori (2009) suggested three to four focus group discussions per group of people with some shared characteristic. Identification and selection of participants for focus groups was based on gender and association membership. Group interviews in the sugarcane sector also included non-members employed as association workers. These farmers were further subdivided into association workers with or without family links to association members, as shown in Table 3.5.

Table 3.5 Group interviews

	Vegetable	**Sugarcane**
Group 1	Four male association members	Two Members of the Muda Macequesa
Group 2	Three male and two female association members (Mixed)	Three male and one female association members (Mixed)
Group 3	Six male association members	Three female association members
Group 4	Four male non-members	Two male non-members who are not association workers
Group 5	Four male association members	Three male association workers who are neither relatives of association members nor members of the association
Group 6	Three female association members	Three male association members who are relatives (sons) of members of the association

Source: Author

The principle of saturation was considered. This is defined as, “Saturation in purposive sampling occurs when the addition of more units does not result in new information that can be used in the theme development” (Teddlie and Tashakkori, 2009, p.183). This principle was also employed for other qualitative methods during the exploratory stage of the research cycle.

3.4.3 Questionnaire

For the purpose of triangulation, questionnaires were employed to explore the interactions between LSLIs and small-scale farmers in a wider sample. Two-stage cluster sampling ensured that farmers from different communities had equal probability of participating in the study. This entailed using cluster sampling in the first stage and systematic sampling in the second stage. Cluster sampling involves selecting sample groups, such as schools or neighbourhoods, and then to randomly select research participants from within these groups to increase efficiency in generating samples (Teddlie and Tashakkori, 2009). In this study, clusters are defined as the communities in which LSLI operates. Accordingly, the study included two villages in Manica Province, namely Belas and Macora, and the Macequessa village in Sofala Province. These villages were purposively selected because they include farming associations engaged in production relationships with LSLIs. After these communities were identified and it was ensured that both association members and non-members were included, interviews took place on the association farms and in the villages. Table 3.6 summarizes the survey respondent characteristics in the vegetable and sugarcane sectors.

Table 3.6 Summary of the survey respondent characteristics

	Vegetable, n = 173	Sugarcane, n = 61
Age		
15 – 25	57 (32.9)	5 (8.2)
26 - 35	45 (26)	12 (19.7)
36 – 45	22 (12.7)	10 (16.4)
46 – 55	23 (13.3)	7 (11.5)
56 – 65	14 (8.1)	9 (14.8)
66 - 75	5 (2.9)	3 (4.9)
75 - 85	4 (2.3)	3 (4.9)
Total	170 (98.3)	49 (80.3)
Don't know	3 (1.7)	12 (19.7)
Education		
Never went to school	9 (5.2)	26 (42.6)
Did not finish elementary school	43 (24.9)	14 (23)
Finished elementary 1 (grade 5)	38 (22)	8 (13.1)
Finished elementary 2 (grade 7)	63 (36.4)	11 (18)
Finished secondary 1 (grade 10)	19 (11)	1 (1.6)
Finished secondary 2 (grade 12)	0 (0)	1 (1.6)
Total	172 (99.4)	
No response	1 (0.6)	
Total	173 (100%)	61 (100%)

Source: survey results

During the initial months of the fieldwork, namely in March, April, and May 2016, the research activities focused on the association members. The majority of interviews with the association members took place on their farms. In the vegetable sector, the sample of association members was drawn from information about each association and their members provided by the LSLI. However, in addition to collecting some of the innovation stories (ethnographies) of the small-scale farmers identified as innovators, and in order to account for the households not involved in the associations, during the fieldwork (specifically in weeks 1, 2, and 3, August, 2016), household surveys were conducted within the villages of Belas and Macora in the vegetable sector.

The preliminary findings revealed that association membership was a necessary condition for the small-scale farmers to have direct access to Companhia do Vanduzi products and markets. Taking this into consideration, and in order to capture the views of the rural households whose members are not integrated with any association, the survey was also conducted within the village. These interviews not only allowed incorporation of the views of the non-member village inhabitants, but also allowed verification of some of the information about those households that are association members. This triangulation of sources helps to validate those data (Denscombe, 2003).

However, the organization of houses within the villages is not systematic. There are no house numbers, there is no clear geometric pattern or arrangement of the houses within the village, and demographic data about the village inhabitants was not accessible. Given the unavailability of information about the population of the area, the sample sizes could not be determined with precision. Factors to consider when determining sample sizes include data quality, the nature of the topic, and the research design (Morse, 2000). Morse (2000) recommends overestimation of the sample sizes, and the inclusion of at least 30 participants when semi-structured interviews are used as a data collection method because each interview question generates a small amount of data. Therefore, 173 and 61 interviews were conducted in the vegetable and sugarcane sectors, respectively, using surveys as the data collection method, also shown in Table 3.6. To conduct the survey in the village of Belas, three assistants (students of ISPM) and the researcher adopted a systematic sampling strategy (Deaton, 1997). The group used two reference points, the primary school located at entrance of the village and the main road within the village of Belas, shown in the figure 3.3.

Figure 3.3 Rural road in Belas, Manica province

Source: Author, August 2016

In Belas, the sampling of households started at the school and the group walked down the main road to the end of the village. Every second house in the village was visited and interviewed. This meant that if a house was selected, the immediate neighbour was not. In this activity, the researcher interviewed the residents of the houses along the main road, at the same time supervising the research assistants who interviewed the residents of the houses that extended to the areas perpendicular to the main road. By doing this there was a risk of duplicating an interview with any household that had already been interviewed on their farm. To avoid this, a document containing the names of the households already interviewed on their farms was readily available for consultation.

In the sugarcane sector, a sample of 20 association members was drawn from a list of 36 association members provided by BAGC. The same procedure above described was employed in the village of Macequessa. In this case, and assisted by a translator, the researcher took the association shed, located at the entrance to Macequessa village, as a reference point. Similar to the procedure undertaken in Belas, every second household located in the proximity of the three main roads was interviewed. One road, near the river Muda, led to the house of the village secretary on the eastern side of the village. The second road linked the association shed to the house of the president of the Association Muda Macequessa, located on the western side of the village. A third road linked the house of the secretary and the house of the association president. These three roads, forming a triangle, encompass the main vehicle routes within the village.

In summary, probabilistic sampling was employed for the household survey, purposive sampling was used to identify small-scale farmers for in-depth interviews, and snowball sampling techniques were used to conduct social network analysis.

3.5 Research procedure and ethical considerations

3.5.1 Positionality

It is important to be aware of, and to reveal, the characteristics and the roles of the researcher which can influence the research results. Yin (2010) states that the demographic profile of the researcher, in terms of social class, age, gender, ethnicity, and race, may affect participants' reactions, it may also determine the choice of topics for discussion and the

participant responses. In this regard, the researcher's role and personal characteristics are disclosed next.

The researcher is affiliated as a lecturer of the Instituto Superior Politécnico de Manica (ISPM), a higher learning institute based in Manica Province, Mozambique. The ISPM was created in 2005, since then it has been operational in the area as an organization that provides training in agriculture. ISPM is part of the AKIS, thereby it is part of the agricultural innovation system. For this reason, on the one hand, the researcher can be considered as an insider in the sense that the organization to which he is affiliated is part of the agricultural innovation system in Central Mozambique. Yin (2010) classifies insider research as the situation in which the researcher is part of the social groups, organisations, or communities under investigation. Being a member of the ISPM facilitated links with other organisations that compose the innovation system. However, the researcher tried, to a great extent, to incorporate organisations that do not have direct links with the ISPM.

On the other hand, the researcher was viewed as an outsider because he is not a native of Central Mozambique and he is not able to communicate using the local languages of the area wherein the fieldwork was conducted. To deal with this situation translators were used and, when entering the community, the researcher first contacted the local authorities before interacting with the small-scale farmers. Furthermore, the researcher was aware that LSLIs can be a controversial topic which may be associated with political struggles and power relations between individuals and organisations. Although the study explores the topic of LSLIs from the perspective of innovations, during the fieldwork the researcher was confronted with controversial aspects associated with LSLIs, and was sometimes perceived as a LSLI employee. Whenever necessary, the researcher explained that he was not affiliated to the LSLI and emphasised that he was a student at the University of Reading, UK.

3.5.2 Ethical considerations

Data collection for this study involved interactions with human participants using interviews, focus group discussions, and questionnaires. For this reason, University of Reading research ethics procedures were followed. At different stages of the research process, the ethical considerations were addressed as follows.

a) Submission of the Ethical Clearance Form before the fieldwork began, and preparation of the Participant Consent Form, and Participant Information Sheet.
b) At the beginning of the exercise each participant's consent was requested and all the relevant information concerning the study was provided during the fieldwork. The Participant Information Sheet was attached to the questionnaires (See Appendix 2).
c) The final research results will be shared with research participants on completion of the study. After the PhD training, the researcher will return to Mozambique where he plans to share the research findings in networking activities with local agricultural stakeholders.

3.5.3 Identification and selection of research assistants

The research assistants performed the role of facilitators and translators. They were selected according to two factors. Firstly, language, i.e., having the ability to communicate in the local language in the areas where the field activities occurred. In this regard, two languages were of particular importance: Sena in Sofala Province; and Shona in Manica Province. Secondly, gender, i.e., to account for potential limitations of a male researcher being able to engage effectively with female farmers, the group included both male and female facilitators.

The research assistants were students of the ISPM. Binns (2006) states that university students are normally eager to work as research assistants in projects involving researchers from other countries. Although the researcher is from Mozambique, as a student at the University of Reading based in the United Kingdom, the researcher was able to recruit four students who supported the research activities at different stages of the research process. In terms of payment, Binns (2006) suggests paying all the costs associated with the research and to present the assistants with gifts upon its satisfactory completion. As an incentive for their participation, the researcher paid all the expenses related to the students' activities during the fieldwork. As the researcher is affiliated as a lecturer to the ISPM, additional incentive for the students was the support the researcher was able to provide for their academic activities within the ISPM. During the recruitment process the prospective research assistants were assured that their academic work would not be judged or affected by either agreeing or not to take part in the research.

3.5.4 The research participants and incentives for their participation

The research participants can be categorised into three groups. The first group are the **innovation actors**, these are the stakeholders involved in the agricultural sector within the Beira corridor. The second group, **LSLI employees**, can be divided into two subgroups: the field-based workers who interact daily with small-scale farmers; and the management personnel who interact occasionally with small-scale farmers. The third group are the **small-scale farmers** themselves, the main target group for the current research. For the most part, this research focused on the activities of the small-scale farmers who include members of eight farming associations: Campo 4, 7 de Abril, Anexa, Munharare, Nhaumbwe, Nhamanhembe, and Mudzizi in the vegetable sector; and Association Muda Macequessa in the sugarcane sector. These associations benefited from the government irrigation project. The research activities also involved inhabitants of the villages near to the farming associations.

The incentives for participating in this research depended upon the situation. For the various organisations operating in the Beira corridor, it was a mechanism for maintenance of the on-going relationship with ISPM, the organization that was facilitating the fieldwork activities. As a higher education institution based in Central Mozambique, ISPM is a source of interns and agricultural labour for agricultural organizations located in Central Mozambique, it is also involved in development projects within the agricultural sector in the Beira corridor.

As regards small-scale farmers, the main strategy to encourage their participation was to create rapport, and also to contribute to the economic activities occurring within the village. To create rapport the researcher spent prolonged hours in the field, promoting repeated interactions by going numerous times to the same field setting to meet the same individual more than once. For the majority of participants there were no direct material benefits to be gained as a result of participation in the research. In most cases, the provision of information about the research objectives sufficed for the participants to concede to interviews and to provide relevant information for the research. Occasionally, there was an attempt to provide indirect material benefits to the small-scale farmers through contribution to the local economic activities in which the research participant was involved.

There are multiple ways to contribute to these activities. Camerer and Hogarth (1999) have argued that monetary incentives can have mixed results. On the one hand, they can increase performance when the amount of effort leads to improved performance, on the other hand, when performance is not correlated with the amount of effort, monetary incentives do not improve performance, occasionally such incentives may undermine performance. Thus, instead of making monetary payment, the researcher purchased products commercialised by the research participants, thereby making an indirect economic contribution as an alternative to direct financial incentives for participating in the research.

In developing countries, monetary compensation for participating in the research process is justified to cover costs associated with transport, meals, and accommodation which individuals may incur to take part in the research. However, when payment surpasses these basic thresholds, monetary incentives are likely to change the behaviour of the research participants (Camerer and Hogarth, 1999). For this research, there were no additional costs associated with transport or accommodation because the research activities were conducted within the villages and farms. Furthermore, there are implications for development research when monetary compensation beyond the incurred costs is put into practice. That is, it can influence the research process because the participants may want to gratify the researcher and say what they believe the researcher wants to hear. This behavioural change affects the research results.

Moreover, monetary compensation may create expectations for future research by decreasing the willingness to participate in a research process that does not involves direct financial compensation for participants. Considering these implications and the shortage of research funds to compensate all the research participants, an alternative form of incentive is to make a contribution to their economic activities. Such financial incentives also help to create rapport between the researcher and the research participants. For example, if the research participant produced bamboo products, such as mats and chairs, as their main or alternative source of income, the researcher showed willingness to buy their products. The purchase could take place before or after the interview. This form of incentive was materialised in various forms. The purchased product could be a mat, a chair, vegetables, sugarcane sticks, or other products produced by the small-scale farmers.

With the farmers involved in vegetable production, the researcher frequently ordered local vegetables. Thus, the contribution to their economic activities was an alternative to provide cash as an incentive for participating in the research. Nevertheless, the opposite also was very common in that the small-scale farmers presented the researcher with different gifts, including vegetable products, chicken, local fruits, cassava, and other products from their farms, for which they did not want payment. The researcher interpreted this as a gesture which showed he was welcomed to their household or farm. When this happened, it was a sign that some rapport had been created and the researcher indeed felt welcomed.

Alternatively, to create rapport the researcher shared meals with the small-scale farmers. There were more opportunities to share meals in Nhamatanda because of the work schedule. Apart from the security guards, who work at night to protect the pump house, the association workers conduct their activities between 7:00am and 5:00pm. It was common for them to make small monetary contributions to buy vegetables and bread for their breakfast in the local market. This provided a unique opportunity for the researcher to create rapport with the members of the association Muda Macequessa by sharing these morning meals with its members and employees. Sometimes, the researcher volunteered to pay for the breakfast for the group, usually three to four members of the association on each occasion. Near the end of the first field trip in Nhamatanda, the researcher offered to buy a meal for a larger group of people to express his gratitude for their participation in the research activities. The group of 15 individuals included employees and members of the association.

In the vegetable sector, association members work independently. The association land is subdivided into various small plots managed by individual farmers or their households. This allows them not only to work flexible hours but also to vary their decision-making about the time and location of their meals. They have multiple possibilities, including bringing food from home, going home for a meal, or having a meal brought to the farm by another family member. The independent work schedule and the form of organisation in the vegetable sector did not allow the sharing of meals as a strategy to create rapport with the small-scale farmers. In this case, the incentives as described above were provided.

3.6 Data processing, analysis, and quality issues

3.6.1 Units of analysis

The choice of the units of analysis depended on the objective and the variables to be analysed. Yin (2010) states that the same study can have units of analysis at several levels. This study considers three levels of data collection. At a **broad level**, the unit of analysis is the innovation platform that encompasses individuals and organizations at different administrative levels, including the small-scale farmers. At the **intermediate level**, the small social group can be a unit of analysis (Babbie, 2005; Yin, 2010). This occurs in situations in which collective decision-making is the norm (Rogers, 2003). In this study, group refers to the farming associations, the households, or each subgroup of farmers selected for the group interviews. The household was the unit of analysis for conducting the survey with the small-scale farmers using the questionnaire. At the **narrow level**, the individual is the unit of analysis. The individual as a unit of analysis is appropriate to account for the intra-household differential access to resources and distribution of tasks based on several criteria, including gender (Whiteside, 1998). The individual was the unit of analysis for the interviews with small-scale farmers and innovation actors.

3.6.2 Data processing

Before each interview and focus group discussion the researcher requested each participant's permission to record the discussions. In some cases, it was not possible to record the interviews with agricultural stakeholders because the research participants were not at ease knowing that their opinions concerning a specific organisation or issue was recorded. As an example, in one occasion, a research participant gave consent to record the interview, but during the course of the interview he showed discomfort by continuously staring at the Dictaphone and by avoiding mentioning the name of an organisation. When the researcher became aware of the situation, asked the permission of the interviewee to switch off the Dictaphone. After this, the interviewee talked about several topics without visible hesitation and mentioned the name of the organisation, which he was formerly avoiding, multiple times. In these cases, the researcher made notes during the interviews, to the extent this was possible, while at the same time avoiding disruption to the flow of the discussion. Immediately after the appointment additional notes were made while the topics and content of the conversation were fresh in the memory of the researcher.

The translation of the interviews, from Portuguese to English, and their transcriptions were performed manually and concurrently by the researcher. The transcribed interviews are stored in the qualitative data analysis software NVIVO for Mac 10.2.2, hereinafter designated NVIVO. The findings of the household survey were entered into the software IBM SPSS statistics Version 21, hereinafter designated SPSS. For the most part, coding of the quantitative data was performed while producing the questionnaires. However, new codes or response categories were created during the data analysis. The response categories included the following codes: 0 – 'not applicable'; 8 – 'I don't know'; and 9 – No response. For the most part, these responses were not included in the analysis. Exceptions were made where the answer 'I don't know' had a relevant meaning. One example is shown in the Table 3.6, which indicates that 1.7 and 19.7 percent of respondents in the vegetables and sugarcane sector, respectively, did not know their age.

Attribution of codes for each interview was based on three features, as described below.

- Participant group and interview number. Separate numeration was assigned to each group of participants: the small-scale farmers represented as S; group interviews as G; and other stakeholders within the innovation systems as I.
- The agricultural subsector, where S represents the sugarcane sector, and V the vegetable production sector.
- The year of interview.

In short, the code takes the following form: (Participant group and interview number_ agricultural sector_interview year). Thus, examples of coding are: a small-scale farmer in the vegetable sector (S67_V_2016); a stakeholder in the sugarcane sector (I3_S_2016); a group interview in the vegetable sector (G3_V_2016).

3.6.3 Data analysis

The research involves both qualitative and quantitative data, each of which involved different treatment. **Quantitative data** collected with the administration of the household survey was analysed using SPSS. Following the coding process and the creation of the database, analysis of these data involved the use of descriptive statistics to compare and contrast different variables. Furthermore, chi square (χ^2) analysis for independence between variables was employed to test independence between membership of farming groups and difference wealth ranking criteria, as summarised in Table 3.7. The Chi square

test is used to verify any association between two categorical variables. The analysis involves cross tabulation of the variables of interest and the creation of a contingency table (Table 3.7), followed by the use of statistics to test significance of the difference between the two variables.

Table 3.7 Example of a 2x2 contingency table

		Variable A (Association membership)		
		Yes	No	Total
Variable B (Wealth criterion)	Yes	Count (%)	Count (%)	Count (%)
	No	Count (%)	Count (%)	Count (%)
	Total	Count (%)	Count (%)	Count (%)

Source: Author

The use of a chi-square test is suitable when variables are mutually exclusive, when the data originates from random samples, and when the expected percentages in each cell in the contingency table are greater than five. If these assumptions hold, chi square tests can be used to determine whether an association between two variables is statistically significant. Performing the chi-square test involves using probability to make the decision to reject or accept the null hypothesis. In this case, a null hypothesis indicates that there is no association between the row and the column variables in the contingency table. If the null hypothesis is rejected, then it can be concluded that the alternative hypothesis is true. In other words, there is an association between the variables. Failing to reject the null hypotheses, considering for instance a 95% confidence level adopted for this study, and the corresponding significant level of 0.05, means there is insufficient evidence of an association between the variables (Appendix 6 contains the results of the chi-square test for independence of variables).

In addition to collecting demographic information about the farming households, the survey was an important component of the research design that facilitated the identification of small-scale farmers with different characteristics and the selection of those farmers for in-depth interview in the third stage of the research cycle. However, given that the research focused on understanding the processes which govern the interactions between LSLIs and small-scale farmers, the qualitative methods were more appropriate to address the research questions.

The **qualitative data** was analysed using NVIVO. This software was used for coding and data analysis. Coding is the process whereby data is condensed into units that can be analysed by the generation of categories. This process facilitates organization, management, and retrieval of the qualitative data (Coffey and Atkinson, 1996). Coffey and Atkinson (1996) stress that codes and categories can originate from diverse sources, which can include theory and the theoretical frameworks, the review of literature, or alternatively, it can start inductively from the research questions which gave rise to the research project. In this study, in conjunction with data processing, qualitative data was firstly categorised by taking into consideration themes from the literature. Moreover, codes and categories also resulted from the data collected during the fieldwork. In terms of procedure, analysis of qualitative data followed the five phases identified by Yin (2010):

1) Compilation of the database was the first phase, and involved organising data systematically, based on the study sites and units of analysis using NVIVO;

2) In the second phase, data was disassembled and reassembled multiple times for testing new codes generated during the fieldwork in a trial and error manner;

3) The third phase involved reorganisation of the data into different categories and codes which were then used to create a narrative;

4) The fourth phase encompassed the creation of a new narrative generated from the reassembled data using themes and categories generated in the third phase. This phase included interpretation of the data;

5) In the final phase, conclusions were made based on the interpreted data.

Yin (2010) emphasises that data analysis is an iterative and recursive process whereby some stages can be repeated multiple times. The first three phases of the data analysis described above, i.e., compiling, disassembling, and reassembling of the data, were performed using NVIVO. This software does not perform any analysis itself (Coffey and Atkinson, 1996; Yin, 2010), rather it facilitates the data management process, but it is the responsibility of the researcher to make sense of the data. Furthermore, while considerations about methodological designs are important when using mixed methods research design, Teddlie and Tashakkori (2006) highlight that the priority in terms of the methodological approach cannot be conclusively determined beforehand. In line with this thinking, the qualitative data provided more appropriate responses to the research questions during data analysis.

3.6.4 Data quality issues

Quality of data from mixed method research involves ensuring separately the validation and credibility of the qualitative and quantitative strands of the research design (Teddlie and Tashakkori, 2009). For both the qualitative and quantitative research, it is important to answer two questions. Firstly, regarding measurement validity/credibility, is the research truly capturing/measuring/recording what it intends to, or something else? Secondly, regarding measurement reliability/dependability, assuming that measurement validity/credibility is achieved, is it consistent and accurate? (Teddlie and Tashakkori, 2009). These questions contribute to an assurance of trustworthiness in the research process.

In qualitative research, trustworthiness involves the employment of verification strategies to ensure credibility, dependability (Teddlie and Tashakkori, 2009), transferability, and confirmability (Drisko, 1997). It refers to the judgments which concern the data quality and the rigour with which the research is conducted (Rolfe, 2006). This study employed the criteria of trustworthiness illustrated in Table 3.8 (Pretty, 1995; Teddlie and Tashakkori, 2009), which places greater emphasis on the qualitative methods.

Table 3.8 Criteria of trustworthiness

Criteria	Actions conducted
Prolonged engagement	Participating in the local activities, such as seminars and community meetings, with the objective of engagement with research participants and to create rapport during the fieldwork.
Persistent observation	Spending long hours in the field to observe the practices of the small-scale farmers.
Triangulation of methods	Using both qualitative and quantitative methods. These include techniques associated with social network analysis, participatory rural appraisal tools, and a case study approach.
Triangulation of sources	This was achieved by conducting the study in two locations. The comparison between the two case studies at the broader level enabled a better understanding of the interactions between LSLI and small-scale farmers across different cropping systems.
Checking the findings with participants	One way to increase validity of the research, considering that reality is socially constructed, is by attempting to understand the meaning that research participants assign to certain actions and words. Through group discussions and triangulation of sources, the researcher attempted to understand how the some of the findings were interpreted by the research participants. Teddlie and Tashakkori (2009) maintain that the objective of the qualitative researcher is to capture an accurate representation of the qualitative data as interpreted by the research participants.
Involving different sets of participants	Using purposive sampling enabled the researcher to select participants with different characteristics. These included actors with different roles in the innovation systems and different categories of farmers.
Thick descriptions	Photography was used to capture details of the context in which the fieldwork was conducted. With permission of the research participants, meetings with agricultural stakeholders, group discussions with small-scale farmers, and interviews were recorded. Systematic note-taking was performed before, during, and after the interviews with each participant group. These different types of data allow deeper characterisation of the events and the landscapes.
Reflexive journal	A reflexive journal about the research was kept. Pillow (2003) identifies four strategies of reflexivity. Namely, reflexivity as self-awareness, as knowing the other, as knowing the truth, and reflexivity as transcendence that occurs as a result of knowing the self, the other, and the truth. The journal included notes and observations about the research activities. Reflexivity attempts to reveal how meaning is co-constructed in the interaction between the researcher and the researched (Finlay, 2002). As the research progressed, the researcher registered and attempted to be aware of the factors affecting his perception of the research situation and how the research participants viewed the researcher.
Discussing findings with supervisors	After the scoping exercise, there was a supervisory visit in which the preliminary findings were discussed. The necessary changes were made in the subsequent activities as a response to the supervisor's recommendations made as a result of the visit. This included making a decision about the selection of case studies. For the remainder of the fieldwork, there was regular communication with the supervisors via Skype.
Discussing findings with other colleagues	Collaboration with other doctoral students through participation in the regular activities occurring within the Department of International Development. These included weekly meetings of the International Development Research Group and fortnightly participation in a reading group, comprised of doctoral students in their 3rd year and beyond, to discuss thesis chapters of group members. Furthermore, this research was presented to the Human Environment Research Group workshop on governing the Anthropocene in 2015, in the Land Symposium in 2017, and in the Economics and Social Science Division conferences in 2015 and 2017.

Source: Author, based on Pretty (1995) and Teddlie and Tashakkori (2009)

3.7 Summary of the chapter

This chapter has discussed the methodological issues in researching LSLI in Mozambique. Taking as the point of departure the philosophical foundations to justify the choice of research methods, the research adopted social constructionism as the epistemological stance because it acknowledges both objective and subjective knowledge, it is thereby compatible with both quantitative and qualitative research methods and justifies the use of a mixed method research design. Furthermore, adoption of social constructionism as the epistemological stance is consistent with pragmatism as the theoretical perspective, and both are compatible with realist and relativist ontological worldviews. Accordingly, mixed methods research design was employed for both triangulation and exploration of complementarities between qualitative and quantitative research methods. This allowed deeper understanding of certain themes through their investigation in specific contexts and quantitative investigation of the selected topics in wider samples.

To act in accordance with the University of Reading's ethics principles and to safeguard data quality issues, the researcher's position has been made explicit. At the level of the innovation system, this was insider research because of the researcher's affiliation to a local higher learning institute which facilitated access to local agricultural fora not open to people without links to those organizations. However, the researcher was regarded as an outsider at the level of the farming system due to his inability to communicate in Shona and Sena, two languages spoken at the study sites. Moreover, the process of identification and selection of the research assistants, and the identification of the research participants and incentives for their participation have been described. For each group of research participants and different units of analysis, the sampling strategy has been explained. Qualitative data were analysed using NVIVO, and SPSS was employed for the storage, processing, and analysis of quantitative data.

4 Chapter four – Context

4.1 Introduction to the chapter

Mozambique presents a suitable context for the study of interactions between LSLI and small-scale farmers due to its dual agricultural sector, of which subsistence farmers constitute approximately 99% of the workforce (Governo de Moçambique, 2005; Cunguara and Hanlon, 2012), and the large-scale agricultural enterprises which have been in operation through different stages of the country's history (O'Laughlin, 1995). Two additional contrasting features characterise the country's economy. Namely, an impressive economic growth of nearly 7.5% per year for the last two decades, which is in stark contrast to the inability to reduce poverty (Castel-Branco, 2014). Using official poverty statistics from consumption expenditure surveys, Cunguara and Hanlon (2012) revealed that the country's poverty rate slightly increased from 54% in 2002-03 to 55% in 2008-09.

With the renewed interest in agriculture following the food, fuel, and financial crises of the last decade, Mozambique became a major destination for LSLIs (Cotula, 2012). In its strategic plan for agricultural development in the period 2011-2020, the Government of Mozambique reports that there are 36 million hectares of arable land in the country (Governo de Moçambique, 2011), of which less than 10% is in use (Governo de Moçambique, 2011; FAO, 2017). In this context of a perceived abundance of land, numerous investments are currently being implemented in the country. For example, Deininger et al. (2011) reported that more than 2.5 million hectares in Mozambique had been transferred to investors between 2004 and 2009. However, considering the country's persistent rural poverty, the outcomes of such initiatives and their impact on the livelihoods of the small-scale farmers are yet to be understood (Wiggins and Kirsten, 2010; Deininger et al., 2011).

This chapter uses a historical perspective to characterise Mozambican rural society and explores the extent to which contemporary practices and institutions are a legacy of the country's colonial and the socialist past. The aim is to understand whether path dependency explains policy choices and agricultural intervention strategies performed by the Government of Mozambique. Path dependency occurs because movements in one direction lead to further movements in the same direction (Pierson, 2000). Accordingly,

historical precedents contribute to an understanding of current pathways and trajectories of change (Leach et al., 2007).

This chapter encompasses a review of the literature and findings of the fieldwork conducted between March and September 2016 in Central Mozambique. The remainder of the chapter is presented as follows. A brief review of Mozambican history, which includes agricultural intervention strategies during the colonial, the socialist, and the post-socialist era, is provided in Section 4.2. This section also considers the contemporary political situation that influenced the fieldwork activities in Mozambique and which affects the country's investment options. Section 4.3 introduces the main characteristics of the small-scale farmers who inhabit the vicinity of the LSLIs. This will be done in two ways: one by discussing the literature, and second, given the limitations of the literature on small-scale farming in central Mozambique, which lacks in details, for the most part this section presents primary data.

4.2 Brief review of Mozambican history and contemporary politics

Mozambique's governance system has undergone radical change over the past 50 years. The country's history during the last century can be divided into three main stages which reflect the governance system and the resultant choices made with regard to agricultural and rural development strategies. These stages include: the colonial era, which lasted until Mozambique's independence from Portugal in 1975; the socialist era, which started immediately after independence, when the newly formed government from Frente de Libertação de Moçambique (FRELIMO) adopted a single-party state system of government, and encompasses the time of the civil war, 1977 to 1992, between the rebel movement, Resistência Nacional Moçambicana (RENAMO), and the FRELIMO government (Jone, 2005); and, the post socialist era which began with the implementation of the Structural Adjustment Programmes (SAPs) in 1987 (Mosca, 2011). In the late 1980s and the early 1990s, the country experienced a series of structural transformations, including: adoption of a market based economy (Amanor and Chichava, 2016); the end of civil war, with a peace agreement signed in 1992; and, establishment of the first multi-party elections in 1994. In terms of agricultural and rural development strategies, Table 4.1 summarises Agricultural strategies during the colonial, socialist, and post-socialist periods.

Table 4.1 Changes in agricultural strategies in Mozambique

Main features and strategies	Implications for small-scale farmers
Colonial period: until 1975	
Mozambique was regarded as a province of Portugal. Portuguese war veterans were encouraged to live in new settlements as farmers.	- Forced labour regime. - Focus on export crops. - Small-scale farmers played a secondary role with their gradual integration into the market.
Socialist period: from June 1975 to 1987	
One-party state and centrally planned economy. Nationalisation. In July 1975, the land was nationalised. Inefficient companies in operation in war zones were maintained to ensure territorial occupation. From 1975 to 1983, administrative price controls introduced. From 1983 to 1987, economic reforms which also involved distribution of the land of the previously colonial-owned farms to rural households. 1987, SAPs launched.	- Rural population concentrated in communal villages. Production organised into cooperatives. - Small-scale farmers played a secondary role, were politically marginalised, and forbidden to engage with the market. - Urban bias whereby urban consumption is subsidised by the rural producers. - At first, products to supply urban areas within the country were prioritised. - From the mid-1980s export crops became the priority.
Post socialist Period: 1988 to present	
Market based economy and implementation of SAPs between 1987 and 2000.	
Decree 21/89 from 23 May, regulation of the privatisation of state companies.	- With land remaining the property of the state.
In 1989, General Guidelines for Medium-term Agricultural Development.	- Which suggested continuity of the socialist model and disregarded on-going reforms.
1988/89, a Priority Districts Programme was proposed, but not put into effect.	- Its aim was to assess production capabilities and to define resource allocation priorities.
In 1990, the Alternative Agricultural Development Strategy, as an alternative to the SAPs, was proposed.	- With emphasis on the small-scale farmers and people displaced by the war. - Like the Priority Districts Programme, this document was never implemented.
Resolution number 11/95 from 31 October, this defined the Agrarian Policy and the Respective Implementation Strategies.	- It envisaged promotion of food security, sustainable economic development, decreases in both unemployment and levels of absolute poverty.
Agenda 2025, written in 2003 with the support of the UNDP.	- Placed greater emphasis on markets links and agricultural sector financing.
Rural Development Strategy, approved by the Council of Ministers in 2000, presented in 2007.	- Highlighted the need to change the dominant patterns of accumulations to reduce urban bias.
In 2008, as a result of the food price increase, an Action Plan for Food Production was proposed.	- This plan focused on smallholders and on subsistence products.
In 2009, increased prices for fossil fuels also led to the creation of a Biofuels Policy and Strategy, approved by Resolution number 22/2009 from 21 May.	- After the food and fuel crises in 2008, the Green Revolution speech, with the same goals included in the documents of the 1960s/70s and also announced by FRELIMO leadership in 1977, became part of the agricultural and rural development narrative.
In 2008, Programme for the Support of the Intensification and Diversification of Crop production and Animal Husbandry, underlined the importance of learning from previous experiences and PROAGRI.	- This was an overly optimistic programme which emphasised increased market integration and use of commercialised inputs, and envisaged a 90 to 100% increase in agricultural productivity and employment in five years.
In 2009, the Strategic Plan for Agricultural Development was written as an instrument to operationalise the green revolution in the short-, medium-, and long-term.	- This plan gives a greater role to private sector in agricultural and rural development activities.

Source: (Mosca, 2011)

Furthermore, notwithstanding the differences in the political systems before and after independence, Mosca (2011) highlights that the policies and actions taken to promote agriculture during the colonial and the socialist eras had both political and economic objectives. Accordingly, in both phases the investments were intended to ensure control of the population, to guarantee territorial occupation, to maintain sovereignty, and to support the war.

Table 4.1 also shows that the Government of Mozambique created new strategies for the agricultural sector in response to the food and fuel crises that occurred between 2007 and 2008. As discussed in the review of the literature, such crises led to an increase in LSLIs worldwide. In Mozambique, the creation of the Biofuel Policy and Strategies and the Green Revolution narrative envisaged the country would be attractive to new investors, and would thereby support LSLIs. As a result of such actions, and the vigorous government support given to LSLIs (Hanlon, 2004; Borras Jr et al., 2011), which included the launch of a nationwide campaign to promote production of biofuels (Ribeiro and Matavel, 2009), when compared with other Southern African countries Mozambique took the lead in the pursuit of biofuel enterprises (Hall, 2011). Nevertheless, LSLIs is not new to Mozambique. Accordingly, contemporary land investment represents the continuity of past trends, whereby LSLIs are favoured and small-scale farmers perform a secondary role.

Mozambique has a long history of LSLIs. During the colonial era, due to a lack of funds and the inability to ensure de facto occupation of its territorial claims, the Portuguese passed the responsibility for territorial administration for most of Northern and Central Mozambique to private companies (Allina-Pisano, 2002; Weinstein, 2002). The central region, which includes Manica and Sofala Provinces, was managed by a private company, Companhia de Moçambique (Allina-Pisano, 2002), who not only took full control of the land resources, but also took control of the labour. Hence, Mozambican farmers were submitted to a forced labour regime that lasted nearly 20 years between 1911 and the early 1930s (Allina-Pisano, 2002). The Company was not directly involved in economic activities, instead, it used its quasi-sovereign powers to make concessions and sub-concessions for large-scale agricultural projects and its main sources of revenue included different types of taxes and fees (Allina-Pisano, 2002). During this time, the agricultural policy was oriented towards

export crops (Mosca, 2011) and large-scale agricultural projects were involved in the production of plantation crops, such as copra, cotton, and sugarcane.

At the end of Portuguese rule in 1975, the government of Mozambique nationalised the previously colonial-owned farms (Arnall et al., 2013b). As a centrally planned economy, the new state concentrated its agricultural support on the former colonial plantations, disregarding the small-scale farmers' production systems (O'Laughlin, 1995; Jone, 2005). The socialist project also involved forcing rural inhabitants to live in communal villages, and organising farmers into cooperatives (Hermele, 1988; Weinstein, 2002). The aim of these policies was to enforce state control of the economy, to ensure the participation of the rural communities in the socialist political project, and to control their influence on the on-going struggle with RENAMO (Mosca, 2011). However, during the socialist era large plantations failed, not only because of inefficiencies but also due to the civil war (O'Laughlin, 1995).

The post-socialist era, and the transition from the socialist centrally planned economy to a market-based economy, encompassed the period following the implementation of the structural adjustment programme launched in 1987 (International Monetary Fund, 1999). This year also marked the creation of the Mozambican extension system. In 1987, extension services were mainly provided by technicians from the state companies and NGOs and were associated with emergency activities (Gemo and Rivera, 2001). With the end of the war in 1992, there was an added focus on production activities. This occurred with the introduction of the World Bank's Train and Visit extension system in the same year (Gemo and Rivera, 2001). This system, as discussed in Chapter 2, is based on the transfer of technology model and tends to benefit relatively wealthy farmers (Biggs, 1989).

In 1998, the National Agricultural Development Program (PROAGRI) was introduced; it envisaged diversification of agricultural extension providers by outsourcing to the private sector (Gemo and Rivera, 2001). As a result, the Mozambican government has been gradually decreasing its direct influence on the agricultural sector while, at the same time, increasing and diversifying organizations responsible for the provision of extension services to small-scale farmers (Gemo and Rivera, 2001). With these changes in the role of the government, services previously considered to be for the public good are now provided by

a coalition of organisations designated as public private partnerships. Accordingly, introduction of LSLI is part of this strategy.

In parallel with the structural adjustment programmes occurring elsewhere in the developing world during the 1980s, Mozambique dismantled its entire apparatus for support of the agricultural sector (Cunguara and Hanlon, 2012). For acting in accordance with the demands of donors, the country was rewarded with a continual increase in development aid during the 2000s (Cunguara and Hanlon, 2012). As a result, for many years Mozambique was acclaimed as an African success story due to its rapid economic growth and stability post-conflict (Weinstein, 2002; Sabaratnam, 2017). Nevertheless, economic growth has stalled, and the period of stability has ceased.

Since the last general elections in October 2014, the country has been politically unstable and has undergone low-level military conflict between the FRELIMO government and the militia of the former rebel movement, now the main opposition party, RENAMO. This military conflict was on-going during the fieldwork undertaken for this research and limited the circulation of vehicles on parts of the national roads numbers one (N1) and seven (N7). At first, the limitation affected the movement of people and goods on the N1 between Muchungue, Sofala Province, and Inchope, Manica Province. This part of the N1 is located approximately 90 kilometres away from the first study site (Vanduzi), and nearly 50 kilometres away from the second study site (Nhamatanda). In June of 2016, confrontation between the two forces increased in Manica Province. As a result of this, a new line of convoys between Vanduzi District, Manica Province, and Changara District, Tete Province, was started. The restrictions in the movement of goods and people was a hindrance to economic activities in Central Mozambique where the confrontation between the two forces were concentrated (I11_V_2016). In 2017, there was an agreement between the conflicting parties, as a result the transportation of goods and people no longer relied on military convoys for protection.

In addition to the military conflict, the country has been confronted with an economic crisis. The economic difficulties in part result from the discontinuation of official budget support provided by the main development partners, including the World Bank, the G14 group of donors, and the Japanese International Cooperation Agency (Hanlon, 2017). Suspension of

budget support occurred due to the increase, by $US2,007 m in the Mozambican public debt, which was apparently incurred illegally.

A parliamentary commission, created to investigate the case, observed that the government concealed information about the debt to the International Monetary Fund (IMF), and concluded that the government guarantees to the three private companies (EMATUM, SA; PROINDICUS, SA; and MAM, SA) violated the Mozambican Constitution and the country's budget limits imposed by Budget Law No. 1 from 7 January 2013, and Budget Law No. 1 from 24 January 2014 (Comissão Parlamentar de Inquérito, 2016). Both laws established MZN183.5m as the maximum limit for government guarantees, and the requirement to request the approval of the Mozambican parliament for any guarantee beyond that limit (Comissão Parlamentar de Inquérito, 2016). Using Bank of England (2018) exchange rates from 23 February 2018, the budget limits are estimated at approximately £GB2.16m, and the government guarantee involved a loan of more than £GB1,444.38m. Nevertheless, the aim of this chapter is not to delve into Mozambican public debt or related issues.

This section has sought to provide a brief overview of historical events that shaped the lives of Mozambicans in general, and the rural inhabitants in the vicinity of the LSLI in particular. The overview includes the political and economic context in which LSLI operates at present, and the security conditions which were in place during the fieldwork conducted in Mozambique between March and October, 2016. The section showed that there is a historical interest in large-scale agricultural enterprises in Mozambique and that land investments have been deployed as a means to ensure territorial administration during the colonial and socialist eras, and as a way to diversify agricultural service providers in the post-socialist era.

In Mozambique where political and economic affairs are to a great extent dominated by FRELIMO, the political environment is analogous to other African countries and characterised by corruption, rent-seeking and clientelism (Kelsall, 2011). Within this context wherein exchange of goods and services for political support is commonplace, and in analogy to the District Development Fund, which since the its inception in 2006 has for the most part benefited FRELIMO members throughout the country (Orre and Forquilha, 2012), LSLIs are likely to be another mechanisms through which national actors are able to provide

financial support to local political elites. However, despite the importance of those multilevel linkages between political elites, neither those governance processes nor the wider political context was the focus of the thesis. Instead the study aim was to understand the underlying interactions between LSLI and small-scale farmers during the implementation of LSLIs in two specific cropping systems as outlined in Section 3.2.3.

Having looked at the broad aspects, encompassing historical background and contemporary political situation in Mozambique, the next section characterises small-scale farmers in the vicinity of the LSLI with a focus on their livelihood activities and the potential implications for them of LSLIs. As discussed in Chapter 2, the predominant use of family labour, less bureaucratic management of their small farms, and the combination of multiple objectives characterises small-scale farmers (Gasson and Errington, 1993). With these general features, small-scale farmers dominate the agricultural landscape in rural Mozambique.

4.3 Characteristics of small-scale farmers

Using survey data and interview results, this section characterises the inhabitants of the communities where the fieldwork for this study was conducted in order to help understanding the extent to which LSLI influences their livelihoods. As a point of departure, the section discusses farmers' livelihood strategies. This includes identifying the main crops produced, discussing the rationale behind decisions made about crops, and recognising the organisation of production. Furthermore, two typologies are considered to classify small-scale farmers. The first is employed to examine how LSLIs affect social differentiation. In this regard, households are classified into wealth groups that take into consideration ownership of transport, land, and livestock, as well as social capital and new investments in housing. The second typology which considers small-scale farmer's attitudes toward farming is used to link their individual characteristics and how they innovate. Lastly, because the preliminary findings suggest that there are differential societal roles of based on gender and this influence how farmers interact with LSLIs, the section discusses how gender affects the distribution of tasks and access to opportunities.

4.3.1 Livelihood activities

Although diversification of activities is now a common practice among different groups of farmers (Sourisseau, 2015), farming is still the most important source of income for rural households in developing countries (World Bank, 2007), and Mozambique is no exception. Table 4.2 illustrates that people engage in farming for multiple reasons.

Table 4.2 Farmers views on agriculture

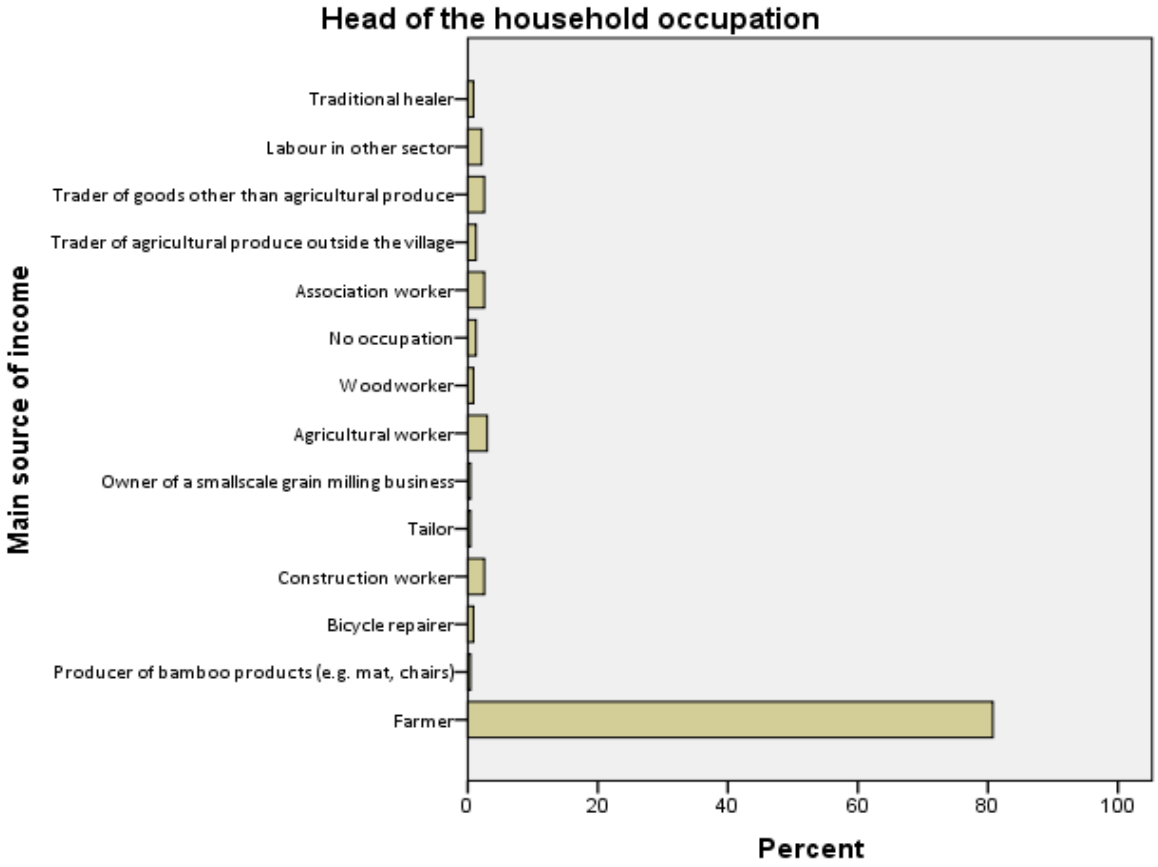
Farmers	Purpose	Illustrative quotations
Association member (S032_V_2016)	Lack of alternatives	*"There is no other business apart from agriculture. Except from petty trade that involves selling part of the production, but a profitable business that allows your family to survive is not possible*."
Association worker (S061_S_2016)	Insurance against uncertainties	*"You have to work in a company and maintain your farm. You must have your production at home. One day you might lose your job and if you don't farm you will have nothing to do and you will not have money. That's why everyone has to farm*."
Association member (S025_V_2016)	Income diversification; lump sum.	*"Agriculture takes three to four months to earn some money, for this reason we have a small shop so that the family can have money on a daily basis. Agriculture is important to have a lot of money at once."*
Commercial farmer (I13_V_2016), former SEMOC[3] employee	Lifestyle	*"I left the city. I don't do it anymore. No matter what happens, I don't want it. I do not want to go back, I will stay here in the countryside. I want to use what I have learnt."*

Source: Author, based on interview results

Non-farming sources of income are vital to allow rural societies to function, yet agriculture persists as the predominant activity. The above table also suggests that farming is paramount, even when rural inhabitants derive their income from alternative sources. In line with the overall country statistics (MINAG, 2008), agriculture is also the main livelihood activity of rural inhabitants in Central Mozambique. The study findings, as shown in Figure 4.1, reveal that farming is the main occupation of approximately 80% of the heads of the households in the study area.

[3] SEMOC is a public company engaged in the commercialisation of production factors, mainly seed.

Figure 4.1 Main sources of income amongst small-scale farmers



Source: survey results

Farming, as a livelihood pathway, manifests in various forms. In addition to production on their own farms and providing services to others as agricultural workers, the majority of farmers at the study sites are involved in agricultural trade to some extent. For example, when the researcher asked about their source of cash to buy clothing and other manufactured goods, farmers mentioned that they sell part of their produce to pay for non-farming products and services. This corroborates World Bank (2007) claims which indicate that smallholders may be involved as: subsistence farmers; commercial farmers; agricultural workers; and as traders.

In terms of traders, there are two ways in which smallholders are involved in the commercialisation of agricultural products in Central Mozambique. One involves buying and selling agricultural produce within their own and nearby villages. This activity is predominantly performed by women. They buy small quantities of vegetables within the associations and other farms in the village and sell them in the village markets. In the second

form, agricultural traders create market links between the producing areas and the main consumption centres in Manica and Sofala Provinces through the commercialisation of large quantities of agricultural products. The combination of various livelihood strategies is very common. As illustrated by the household survey, most households are engaged in more than one livelihood pathway.

Rural households are also involved in non-farming activities. These include: production of artisanal products, such as bamboo mats; repairing bicycles; baking bread; and brewing traditional drinks. Cooper et al. (2008) argued that in the semi-arid tropics, which includes large areas of Mozambique, viability of agriculture as a livelihood pathway is decreasing due to a combination of population growth in areas with high agricultural potential, resource degradation, and agricultural intensification. In the case of Mozambique, as shown in Figure 4.1, farming continues to be the predominant livelihood activity. However, implementation of LSLI may contribute to undermine the viability of farming and alternative livelihood activities which rely on land and its resources due to land conflicts triggered by such competing land uses. Hence, the next section explores availability of land and examines the extent to which LSLI complements, or undermines, existing livelihood activities.

4.3.2 Availability of land

This section particularly explores how the idea of marginal land is put forward in Mozambique to encourage LSLI and the extent to which that idea can be substantiated. One of the arguments put forward by the supporters of LSLI is that it may contribute to a more effective and efficient use of marginal land. As discussed in the literature review, arguments surrounding the use of vacant land have been historically employed to justify its occupation by colonial settlers (Allina-Pisano, 2002; Alden Wily, 2012). By the same token, and to dismiss protestation against contemporary LSLIs, governments in host countries, including Mozambique, claimed that investments would be made in marginal land (Borras Jr et al., 2011). In the case of Mozambique, this idea is embedded in the national investment plan (PNISA) which envisages the reduction of fallow lands as a means to promote agricultural development (Government of Mozambique, 2012).

It is assumed that the so-called marginal lands have no inhabitants and are located in remotes areas where essential infrastructure is unavailable. However, this is a simplistic

way of assessing the environment where small-scale farmers operate. Borras Jr et al. (2011), argued that the classification of land as marginal overlooks the different resources that local communities derive from their surroundings. Local community is described in the Mozambican Land Law as a group of families or persons living in a circumscribed territory at the level of the locality or lower, which aims to safeguard common interests through the protection of habitational areas, agricultural areas in use or fallow, forests, places of cultural importance, grazing areas, sources of water, and areas for expansion (Assembleia da República Moçambique, 1997). In this study, the survey results suggest that the livelihoods of the local communities are heavily dependent on the local resources. For example, the survey results shown in Table 4.3 indicate that the production of bamboo products is an important livelihood activity for small-scale farmers in the village of Macequessa, Sofala Province. Table 4.3 shows absolute and relative frequencies (given in brackets) of main and alternative sources of income in the vicinity of LSLI in Central Mozambique.

Table 4.3 Main and alternative sources of income

Province		**Head of the household**		**Other economically active member of the household**	
	Relative importance	**Main**	**Alternative**	**Main**	**Alternative**
	Livelihood activities				
Manica	Farmer	137 (79.2)	30 (17.3)	108 (62.4)	10 (5.8)
	Producer of bamboo products	1 (0.6)	1 (0.6)	-	1 (0.6)
	No income	3 (1.7)	106 (61.3)	28 (16.2)	103 (59.5)
	Total	173	173	173	173
Sofala	Farmer	52 (85.2)	7 (11.5)	35 (57.4)	3 (4.9)
	Producer of bamboo products	-	16 (26.2)	1 (1.6)	2 (3.3)
	Association dividends (sugarcane)	-	9 (14.8)	-	-
	Association worker (sugarcane)	6 (9.8)	1 (1.6)	3 (4.9)	2 (3.3)
	No income	-	21 (34.4)	6 (9.8)	39 (63.9)
	Total	61	61	61	61

Source: survey results

Table 4.3 shows that the production of sugarcane is the main or alternative source of cash for 9.8% and 16.4% of the respondents, respectively. These are association members and plantation workers. The above table also reveals that 61.3% and 34.4% of the heads of the households in Manica and Sofala Provinces, respectively, do not have an alternative source of income. As a source of cash, the inhabitants of Macequessa take advantage of their proximity to the river to collect bamboo with which they produce numerous products, including mats, baskets, and hats. Bamboo products also constitute an important source of income for the small-scale farmers in the vicinity of the LSLI in Sofala Province, contributing as a source of cash for more than 25% of the small-scale farmers interviewed.

A further disaggregation of the information concerning the production of bamboo products and the alternative livelihood activities of the heads of households by cross tabulation shows that non-members are more dependent on mat production as a source of cash than are members (Table 4.4).

Table 4.4 Cross tabulation association membership and production of bamboo products

	Association membership		
	Yes	No	Total
Producer of bamboo products (Sofala)	1	15	16

Source: survey results

The production of mats and other bamboo products is commonly performed by male members of the household who start this activity at a very young age, as shown in Case study 4.1 below.

Case study 4.1 Production of mats as a source of cash

Antonio Nota (S043_S_2016) is the head of a household comprised of seven members, five males and two females. All male members of the household aged 13 or older are involved in the production of mats. Antonio produces on average 3 mats per day. They mentioned that the production of mats complements their income from farming. They use the money from this activity to pay for hospital bills, to send the harvested maize to mill, and for other activities that require cash. Antonio's married son, who has formed an independent household, also mentioned that he produces mats as a source of cash. The mats are sold for MZN70 each by their wives on market day in Lamego.

This livelihood activity is facilitated by the proximity of Macequessa village to the river Muda, where they gather raw materials to produce the mats, and to the main village market in Lamego, where they sell the finished products.

The land regarded as marginal is also a source of construction materials, including clay, grass, and timber to build the houses, as shown in Figure 4.2 below. The walls are built with clay sourced near the location of the house, usually less than ten metres away. The roof is mainly made of locally available grass. The branches supporting the roof are obtained from the trees near the compound. The door is made of elephant grass collected near the river. At the village level, none of these materials are marketable, making this type of house

affordable to everyone as long as they are willing to build it themselves, or are able to pay someone to build it for them.

Figure 4.2 Typical house in rural area

Source: Author, July 2016

A number of features of the location of the sugarcane plantations and where the out-grower schemes are being implemented suggest that prime land is targeted for LSLIs. Some of the land attributes in both study locations include: availability of water; irrigation infrastructure; availability of labour; and proximity to main roads. These are essential conditions for commercial agriculture (O'Laughlin, 1995). It appears that the land is acquired precisely because of it agricultural potential. As explained by an inhabitant of Macequessa *(S020_S_2016)*: "*There is empty land over there, but they want to destroy our houses and plant sugarcane here*." These findings corroborate those of Borras Jr et al. (2011) who explored investments in sugarcane production in the south of Mozambique and found that LSLI activity was located on land in a populated area with high agricultural potential near the Elefantes river and close to main road infrastructure. The findings also contradict the notion of marginal land which governments use to justify LSLI.

During the period of the fieldwork undertaken in Mozambique, between March and October 2016, there was some pressure from the local government on some inhabitants in the village of Macequessa to abandon their farms and houses within the village. Statements given by those inhabitants who are not association members, the occupants of the land regarded as marginal revealed the following:

"There was a meeting with the head of the locality, he said that Açucareira is going to send bulldozers to clean the area." (S025_S_2016)

*"They told us: 'don't be surprised that people will come to register the houses and after that they will destroy the houses to plant sugarcane.'" (*S020_S_2016)

"No one wants to leave. Where are we going? We have our farms here, if we leave we will suffer." (S016_S_2016)

"We do not want to leave this place, to find another farm is difficult." (S050_S_2016)

These are reactions expressed following a meeting in July 2017, during which farmers were told to vacate their land to allow for the plantation of sugarcane. With regard to their local livelihoods, many farmers referred to the value of their fruit trees to their households. Table 4.5 below show quotations from village inhabitants concerned about their fruit trees.

Table 4.5 Fruit trees as long-term investment and a source of livelihood

Farmer	Illustrative quotations
Female non-member (S027_S_2016)	*"We have our mango, Jujube, and orange trees here."*[4]
Female non-member S064_S_2016)	*"It came to our knowledge that they want to plant sugarcane in this area, we questioned them about our mango trees and they said it is not their business"*
Male non-member (S018_S_2016)	*"Each family possesses their own mango trees"*
Male non-member (S043_S_2016),	"*I have planted all the trees in this plot*. *If we leave this land we will have to buy fruit, now each person could eat the amount of fruit they needed*".

Source: interviews

Fruit trees, for their multiple uses, constitute a long-term investment for the rural households and increase the value of their land. Not only are they an important source of income, but they also provide food and shade near their compounds, and construction materials for their houses. Considering the various objectives with which people engage in farming activities, as shown in Table 4.2, and in line with Gasson and Errington (1993), leaving the village of Macequessa affects their livelihood choices in multiple ways. In rural Mozambique farms tend to be located near the houses, living near the farm is practical because, as explained by a female small-scale farmer (S027_S_2016), families are used to living near their farms, they are able to harvest the farm products and prepare their meals without the need to travel far. However, land available for cultivation near the population

[4] Jujube tree (*Zizyphus mauritania*), Mango tree (*Mangifera indica*), and orange tree (*Citrus Sinensis*) are tropical fruit trees commonly found in Mozambique.

settlements is limited. With the introduction of LSLIs and the allocation of village land to the production of LSLIs' crops, rural households in both the vegetable and sugarcane sectors must travel further from their villages to farm, sometimes even travelling to different districts to obtain land (I13_V_2016).

The case of sugarcane production in central Mozambique supports the view that prime land is targeted for the implementation of LSLIs. It also shows that interaction with small-scale farmers and the potential for land conflicts with LSLI is not a one-off event which began with the introduction of land investment. Potentially new conflicts have emerged as LSLI expands to new areas. Açucareira de Moçambique, operating in Mozambique since the colonial era, concentrate their activities in the village of Mafambisse, Dondo District. A report from the Mozambican National research institute indicated that in 1991 Açucareira de Moçambique occupied approximately 8500 hectares in the left margin of Púnguè River about 55 km in the west of Beira City (Dykshoorn et al., 1992). At the time, the boundaries included national road number 6 and Púnguè River in the north and south, respectively; and Dondo Village in the Eastern side and the bridge over Púnguè River in the west.

Notwithstanding that Açucareira currently controls more than 8,500 hectares, they have been continually expanding into new areas, including the Village of Macequeesa, Nhamatanda District, in order to counterbalance the negative impact of soil degradation which is a result of monoculture and agricultural intensification of their fields (S001_S_2016; I5_S_2016). This finding is supported by an African Development Bank report by Amadou (2005) which revealed that yields in the Açucareira de Moçambique fields have stagnated at approximately 50 tons/ha since the middle of the 90s and that production increases have been achieved by area expansion. The report further indicates that in 2004 the sugarcane company abandoned poorly performing 901 hectares affected by sodicity and salinity (Amadou, 2005).

The expansion of sugarcane planting controlled by the LSLI within the village of Macequessa, reveals divisions and conflicting interests between association members and other village inhabitants whose livelihood activities and resources are put at risk. Association members aim to plant sugarcane on the same land, adjacent to the river Muda, which constitutes the means for diversification of the livelihood activities of non-members. The land provides

places of shelter and the materials to build their houses, it contains their farms, with long-term investments in the form of fruit trees, and it facilitates their access to the river Muda, where they collect bamboo to produce mats.

With the relocation of the non-members away from the village of Macequessa and from the river Muda, their livelihoods may be disrupted. Nevertheless, negative impacts of LSLIs on the livelihoods of local communities are not uncommon in Mozambique; Matavel et al. (2012) revealed that implementation of land investments in southern and northern Mozambique have resulted in diminished access to water resources due to blockades and restrictions imposed on the former land users. Considering implications of this, Zoomers and Otsuki (2017) suggest that appraisal of development outcomes of the LSLI should take into consideration all livelihood options in order to maximise their benefits and minimise negative impacts. As implementation of LSLI is likely to impact their livelihoods pathways, social differentiation amongst small-scale farmers in central Mozambique occurs.

The next section discusses how different group of farmers are affected by LSLI. In addition to access to land, the section puts forward different criteria to classify small-scale farmers into wealth categories.

4.3.3 Social differentiation

This section aims to understand how the interactions between LSLI and small-scale farmers affect, or is affected by, social differentiation. Five main criteria were employed to examine social differentiation. Chimhowu and Manjengwa (2012) suggested that access to land, and the ownership of livestock and agricultural equipment are important in rural areas. Taking this into consideration, land and livestock ownership were important elements for this study. However, ownership of farm equipment was not included because the scoping exercise revealed that the majority of households use hand hoes for the bulk of their crop management activities, and they occasionally hire tractors or draught animals for ploughing services. Instead, transport ownership was included because small-scale farmers regarded personal transport to be a valuable asset and it was often mentioned as a wealth indicator. The fourth criterion was social capital. This included households whose members possess at least one of the following features listed by World Bank (2007) to assess social capital: association membership; formal employment; and a relatively high level of education. The

fifth criterion is investment in housing. Such investment, as shown in Table 4.6, is another way in which social differentiation manifests.

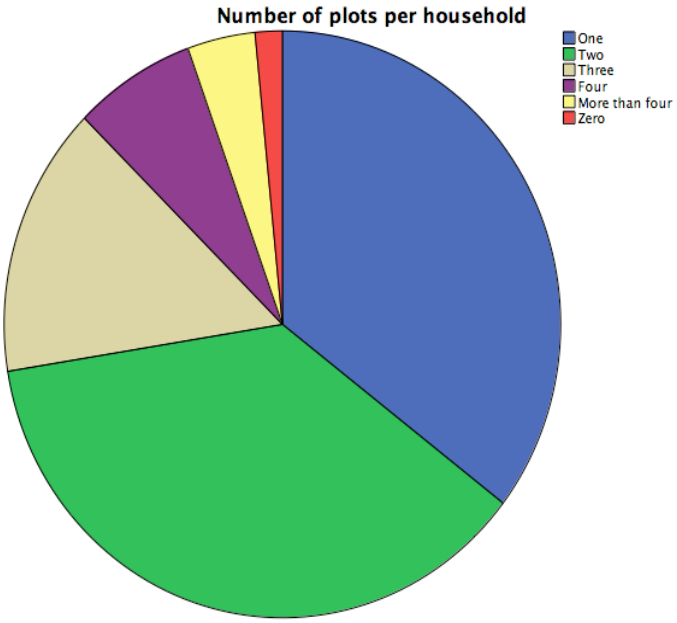
Table 4.6 Wealth ranking criteria and wealth categories.

Category	Land plots	Livestock type	Transport ownership	Social capital	Housing
Poor	0 - 1	None, or some chicken	None	Non-member; no alternative source of income, commonly subsistence farmer; never been to school, or did not finish elementary education	Mud huts; predominantly use of local materials (Figure 4.2)
Intermediate	2 - 3	Chicken, small ruminants and/or non-ruminants	Bicycle and or cattle-drawn wagon	May or not be a member of the association; usually no source of income other than farming, but may also produce for the market; usually finished elementary education	Mix of different types of local and commercialised materials (Figure 4.5).
Better off	>3	Chicken, small and large-ruminants and/or non-ruminants	Any or all of the following: Bicycle; motorbike; car; wagon	Commonly association member, some have employment elsewhere and farming is not their main source of income. Finished elementary education and attended short term training	Investment in improved housing (Figure 4.6).

Source: Author's construct based on interviews

In terms of access to land, the aggregate survey results revealed that more than 60% of small-scale farmers have access to two or more land plots, as shown in Figure 4.3.

Figure 4.3 Differential accesses to land



Source: survey results

Figure 4.3 displays differential access to land in Central Mozambique, where **poor households** have access to only one plot for rain-fed agriculture, either within or outside the associations. This situation restricts their ability to diversify crops and to implement conservation practices, such as crop rotation, with negative implications for sustainability due to the loss of soil fertility. A piece of land used for rain-fed agriculture is generally referred to as machamba in Mozambique (munda in Shona). Machambas are relatively large areas, as shown in Table 4.7, in which the small-scale farmers produce a mixture of various crops that are important for their subsistence, this includes: maize; sorghum; pumpkin; millet; cassava; cowpeas; peas; and pigeon peas.

Table 4.7 Land size in different production environments

Land size	Irrigated Land/floodplain	Rain fed agriculture
	Count (%)	Count (%)
< 0.1 ha	1 (1.5)	
0.1 ha to 0.2 ha	9(13.6)	
> 0.2 ha to 0.5 ha	25(37.9)	3 (2.4)
> 0.5 to 1 ha	14(21.2)	31 (25.2)
> 1 to 2 ha	13(19.7)	36 (29.3)
> 2 to 3 ha	2(3.0)	26 (21.1)
> 3 ha to 5 ha	2(3.0)	11 (8.9)
> 5 ha		16 (13.0)
Total	66 (100.0)	123 (100.0)

Source: survey results

In the machambas, farmers rarely apply fertilisers. However, machamba can also be a generic term to refer to other production environments available for small-scale farmers, namely riverbanks and irrigated plots. The majority of households in Nhamatanda District, 42.4% in the sugarcane sector and 33% in the vegetable sector, are included in this category.

The second category of farmers, the intermediate class, possess two or three land plots. They tend to have one piece of land for the production of subsistence crops under a rain-fed system, and access to one, or both, of two production environments, floodplains or irrigated plots. The above Table 4.7 also shows more than 50 per cent of the farmers with access to floodplains or irrigated plots cultivate areas smaller than 0.5 hectares. The floodplains (baixa in Portuguese, matoro in Shona) are plots located near the riverbanks or other sources of water. Farmers predominantly use these plots to farm crops characterised by high water requirements when compared to other subsistence crops produced locally, these include yam, bananas, and sugarcane. However, these plots are very versatile, to the extent that farmers also use them to produce vegetables and maize off season. The farmers who possess a floodplain plot produce maize more than once a year. When produced offseason, the objective is normally to harvest the green cobs and not the grain. The irrigated plots are used mainly to plant vegetables. The predominant vegetable crops in these areas include: lettuce; carrot; tomato; pepper; cucumber; cabbage; and other species of the genus brassica. These plots allow the small-scale farmers to diversify crops and obtain income from different cropping systems. Crop diversification also insulates small-scale farmers against the climatic and financial risks associated with this farming activity because the failure of one crop, such as maize, is offset by the successful production of other crops, such as vegetables or fruit.

The better-off farmers are able to access three or more plots of land. These generally include: a floodplain plot; an irrigated plot, commonly within the association; and a piece of land for rain-fed agriculture. These farmers also diversify their crops in response to specific crop requirements in terms of the environments to which they have access. Table 4.6 shows that households which follow diversified livelihood strategies are wealthier than households who have few alternative livelihood strategies and largely rely on farming as their source of income. Thus, access to multiple land plots allow wealthier farmers to spread their risk while deriving income from different environments. Accordingly, livestock

ownership is another way in which small-scale farmers diversify their incomes and deal with uncertainties intrinsic to crop production. Hence, Table 4.6 also presents livestock ownership as a wealth ranking criteria.

Cattle perform multiple roles in sub-Saharan Africa. In addition to the expected functions, i.e., as sources of manure and milk and as draught animals (Ainslie, 2005), cattle also represent a saving mechanism in as much as rural inhabitants use them as a resource that can be transformed into cash, if necessary. Cattle are also central to some societal cultural practices. For example, Ainslie (2005) referred to marriage practices in which the groom is expected to pay bridewealth to the bride's family. Bridewealth is called lobolo in a number of Bantu languages spoken in Central and Southern Mozambique (e.g., Sena, Shona, Changana) where such practices are commonplace.

Admittedly, the socio-economic value of cattle is un-matched when compared to other small ruminants, such as goats, and non-ruminant farm animals, such as chicken and pigs. Nevertheless, ownership of small-ruminants and non-ruminants is important for their use as an offsetting tool during a crisis. As a form of capital, livestock ownership is mainly considered as an insurance against risks associated with farming activities. For instance, as a result of the El Nino event that had its peak in 2015 (Hirons, 2016), ownership of farm animals mitigated the impacts of drought when crop production under the rain-fed system failed and farmers in Central and Southern Mozambique had to sell their livestock to buy food.

Cattle ownership also facilitates access to land within the association. Cattle owners are given temporary access to association land through the provision of ploughing services using animal traction. For example, Beto (S173_V_2016) provides ploughing services to association members and, in exchange, he is allowed to use land within a farming association in Vanduzi District. Cooper et al. (2008) argued that population growth, land scarcity, and resource degradation is decreasing the viability of crop production, resulting in a trend to increase the numbers of livestock in the semi-arid tropics. The situation at the study sites is different, although important for the economic and social reasons as outlined above, livestock production in Central Mozambique is embryonic and performs a complementary role as a livelihood activity. Table 4.8 summarises livestock ownership

amongst farmers in Manica and Sofala Provinces. It shows the percentage of households who possess different types of farm animals.

Table 4.8 Livestock ownership amongst small-scale farmers

Province	Cattle	Goats	Pigs	Chickens	Others (duck, turkey, etc.)
Manica	43.9	38.7	9.8	63.3	4
Sofala	6.6	18	8.1	60.7	8.2

Source: Author

In addition to land and livestock ownership above described, transport ownership is another important criterion of wealth. In this regard, bicycles are particularly important in rural areas because they are the main mode through which small-scale framers transport agricultural products between the production areas and the markets (S007_S_2016). Furthermore, bicycles are viewed as important because small-scale farmers use them to fetch drinking water within the village, as shown in the figure 4.4, and they contribute as an alternative livelihood activity whereby bicycle owners provide transport services at the village level.

Figure 4.4 Woman fetching water by bicycle, Sofala Province

Source: Author, July 2016

Moreover, as indicated in Table 4.6, association membership, formal employment, and education are regarded in this study as factors which increase farmers' social capital. The value created through their interpersonal connections, as explained by Mehta et al. (2011), contribute to social differentiation because association members tend to have access to more opportunities as agricultural support is, for the most part, channelled through the farming groups. Furthermore, Manjengwa et al. (2012) highlighted that households with formal employment are usually better off in comparison to the majority of farmers in Zimbabwe. This is also the case in in central Mozambique where formal employment provides capital to invest in alternative technologies and commercialised inputs and such households use income earned elsewhere to invest in farming activities. Generally, for these households farming is not their main source of income, the male head of the household tends not to be directly involved in the farming activities as these activities are undertaken by other family members, or by hired workers. The World Bank (2007) states that having formal employment is invariably a source of social differentiation. As a source of social capital, the level of education acquired influences the ability of small-scale farmers to engage in livelihood activities outside of farming.

Lastly, Table 4.6 also indicates new investment in housing as a further factor to illustrate the process of social differentiation underway in rural areas in Central Mozambique, where most houses are built using local materials. In terms of wealth ranking, the poor households build the walls of their houses with bricks made of clay soil mixed with water, with no additional treatment, grass for roofing, and guinea grass for doors, as shown in Section 4.4.2, Figure 4.2. The intermediate households combine the use of local and purchased materials, as illustrated in Figure 4.5.

Figure 4.5 One house with zinc coated corrugated iron roofing

Source: Author, July 2016

The better-off farmers, who are for the most part association members, use their profits from farming to invest in improved housing. For example, the abovementioned member of Association Macequessa, Vicente (S010_S_2016), mentioned that he used the dividends from his sugarcane production to build a new house. Figure 4.6 below illustrates an improved house under construction. In this case, it represents an improvement in terms of the strength of the materials.

Figure 4.6 Improved house in rural area

Source: Author, September 2016

The walls are built using reinforced brick hardened by fire to increase their strength and, thereby, the durability of the house (Mitchell and Bevan, 1992). Instead of clay, cement is used to build the walls. For roofing, different options of commercialised materials are used. Figure 4.6 shows metal roofing which, according to Mitchell and Bevan (1992), requires less maintenance, is not vulnerable to infestation, is fire proof, and facilitates the harvest of rain water.

Improving their housing is a crucial investment which also influences the use of labour within the household. This is illustrated in the seasonal calendar of a non-member based in Macequessa (figure 4.7). Mr Fernando's (S025_S_2016) farm depends entirely on rainfall and he spends the time between harvesting of subsistence crops and the onset of the rainy season dealing with housing related activities, including building new mud huts, fixing roofs, and mending fences.

Figure 4.7 Seasonal calendar, crop production and offseason activities in Macequessa

Seasons	Rainy season				Dry season					Rainy season		
Months	J	F	M	A	M	J	J	A	S	O	N	D
Subsistence crops												
Maize (grain)												
Maize (cobs), sweet potato, sesame												
Millet, cowpea, pumpkin, sorghum												
Sorghum												
Housing activities												
Building their own houses, mending fences, and fixing roofs												
Part-time activities (Biscato)												
Land preparation												
Clearing the land												
Clearing and ploughing												
Waiting for the rains												

Source: Author's construct based on interviews

Seasonal calendar key:

Activities	Weeding	Harvesting	Planting	Transplanting	Off-season	Land preparation
Key						

An advantage of investing in housing with new materials is that farmers do not need to refurbish and mend their houses every year. By minimising these activities, labour can be allocated to other social and economic activities.

This section sought to explore how social networks, such as association membership and links with external organisations, affect rural social differentiation. However, because unidimensional measures of social differentiation can be misleading (Nyantakyi-Frimpong and Kerr, 2017), various aspects of asset ownership were considered to examine rural social differentiation. Rural households were grouped into three wealth categories based on their ability to access land and water resources, their ownership of livestock and transport, and other factors which increase their social capital, such as a higher level of education, association membership, and access to formal employment. Furthermore, because small-scale farmers use cash income from their farming activities to build improved houses, and that they regard this as an indication of well-being, this section also discussed how such investments influence their farming activities.

The findings suggest that poor households have difficulties in engaging in non-farming activities, whereas wealthier households have multiple plots and combined incomes from various livelihood activities. These findings concur with those of Chimhowu (2002), whose

study on spontaneous resettlement and changing livelihoods in Zimbabwe found that poor households are more dependent on farming as their main livelihood activity, and wealthier households are involved in diversified livelihood strategies that incorporate both farming and non-farming sources of income.

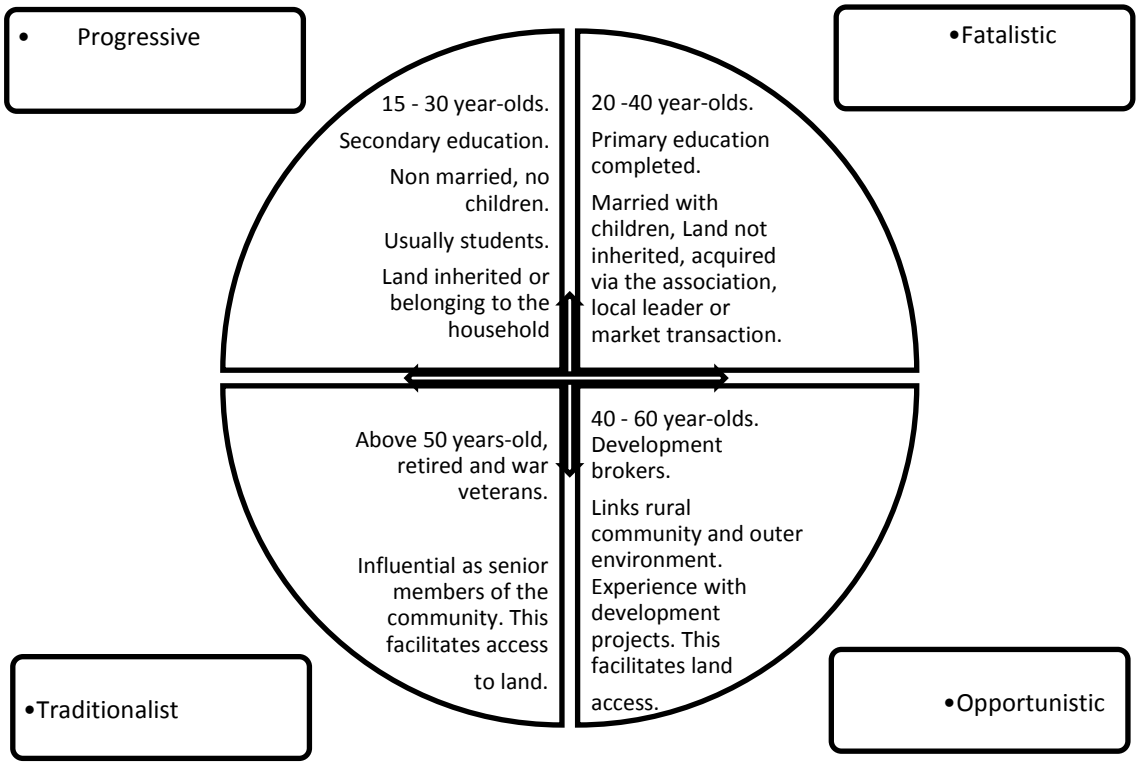
Having examined social differentiation amongst small-scale farmers in the vicinity of LSLIs, the following section discusses attitudes of small-scale farmers. In line with the sampling strategy and the chosen units of analysis for this research, there are two levels of case studies, namely, the innovation platform at the broader level, discussed in Section 3.2.3, and the individual small-scale farmer at the narrower level. In this regard, considering the individual as the unit of analysis, attitude, as a feature that intrinsically belongs to the individual, is explored. Acknowledging that small-scale farmers are not homogeneous and that they not only follow different innovation pathways but also engage in farming with different mind-sets (Douthwaite et al., 2002), a tentative system for grouping small-scale farmers based on their perceived attitude towards farming is considered in this next section.

4.3.4 Attitudes towards farming

As discussed in Chapter 2, diffusion of innovation theory has established a positive relationship between the years of education as an indicator of knowledge, and the likelihood of adoption of new agricultural technologies. In a similar way, the theory also established a positive relationship between the wealth and adoption of innovation. While wealth is a characteristic of the household, attitude is an intrinsic feature of the individual. Understanding the farmer's attitudes is crucial and fills a gap in the literature on agricultural innovation which focuses on extrinsic features, such as wealth (Meijer et al., 2015).

This section discusses how farmers in different categories take advantage of the opportunities created with the introduction of LSLIs. There is no direct relationship between the attitudinal features presented here and the wealth categories of the small-scale farmers. With regard to their attitude, in this study small-scale farmers are classified as: traditionalist; progressive; fatalistic; and, opportunistic. These attitudinal features are not mutually exclusive, yet characteristics of the farmers who exhibit them are summarised in Figure 4.8.

Figure 4.8 Characteristics of small-scale farmers with different attitudinal features



Source: Author's construct based on interviews

This diagram and the four categories of small-scale farmers based on their attitudes toward farming were derived inductively through observation and interaction with small-scale farmers. As explained in Section 3.6.3, the codes and categories that emerged from the qualitative data analysis were derived from the review of the literature and the conceptual framework, and new codes emerged from the data. In line with the data analysis procedure, using data from the third stage of the research cycle, i.e., in-depth interview with small-scale farmers, the categories of small-scale farmers considering their attitudes toward farming emerged from an inductive reasoning process whereby the demographic information about the respondents was juxtaposed with observation about their practices, their views concerning agriculture and the extent to which the small-scale farmers believe in alternative livelihood activities and are willing to engage in those livelihoods activities. By doing so, four main themes emerged from the data, as shown in Table 4.9.

Within the same household, one may find individuals with divergent attitudes towards farming. For example, in contrast to the farming lifestyle of the older members of the household, the relatively young, i.e., those aged between 15 and 30, are likely to be goal

driven and to view farming as a means to an end. Table 4.9 below summarizes four main categories of small-scale farmers in relation to their attitude towards farming.

Table 4.9 Attitudes toward farming

Category	Attitudes toward farming
Traditionalist	• Farming is a way of life • Unwilling to change current lifestyle
Opportunistic	• Engaged in farming to diversify income • Willing to adapt to changing situations (new livelihood options, etc.)
Progressive	• Farming as a business opportunity • Searching for alternative livelihood options (e.g., profit from farming to be invested in education)
Fatalistic	• Engaged in farming due to lack of opportunities elsewhere • Lack of belief in alternative livelihood options

Source: Author's construct based on interviews

Traditionalist farmers view farming as a way of life that allows them to maintain some stability and insulates against external shocks, in particular, economic shocks. However, in normal years with the absence of external shocks or extreme climate events, small-scale farmers are able to conduct production activities, both commercial and subsistence farming, without external support. Traditionalists tend to be older farmers, normally over 50 years old. Many of them are retired individuals or war veterans. The traditionalists tend to be opportunistic in their behaviour. They use their social capital to accrue benefits from the projects introduced by the government. In this case, their seniority within the community and accumulated experience in past occupations contribute to the opportunistic use of the day-to-day politics and the status quo to their advantage. Furthermore, flexibility in terms of working hours also contributes to the choice of farming as way of life: "*I am my own boss"*, mentioned a manager of the Association Nhamanembe (S012_V_2016). The same farmer may display more than one attitudinal and behavioural feature. For instance, some farmers may present as opportunistically traditionalist when they take advantage of maintaining the status quo.

Opportunistic behaviour, however, is expressed to a higher degree by another group of farmers. They usually operate as development brokers, defined as such by Bierschenk et al. (2002), and establish links between the farming community and the society as a whole. The opportunistic behaviour is found in both study locations and the individuals possessing this characteristic tend to be more highly educated when compared to the rest of the

community. This behaviour is illustrated, for instance, when a farmer from Manica Province claimed that he brought Companhia do Vanduzi to his village (I26_V_2016). Furthermore, a very influential farmer in Nhamatanda District (S001_S_2016) was working as teacher before he decided to reorient his energies into the management of successive agricultural development projects in Macequessa. The opportunistic farmers' ages ranges between 40 and 60 years old. At this age, the individuals are well established within their communities, they have accumulated experience in dealing with the government and NGOs implementing diverse rural development projects. When they are members of the association, their position also benefits other family members. This includes mature sons or daughters who share the compound, the farm, or both, with other members of the household. There are differences between the opportunistic and traditionalist farmer, while the former tends to be more inclined to adapt to changing circumstances, the latter is well-established in their current way of life and unwilling to make dramatic changes in their practice, or in how they gain their livelihood.

While opportunistic farmers may adapt to changing situations, **progressive farmers** view their practices as a means to an end. For instance, small scale farming may be seen as a form of diversification of income within the household, allowing them to save money on food. Thus, farming may not be the main source of income in the households of progressive farmers. Oftentimes, income from formal employment elsewhere is invested in agriculture. This not only allows the farmers to produce cheap food for the household, it also allows them to profit from the activity. These farmers are more goal-driven and their plans transcend those who view farming as a way of life, or those fatalistic farmers who believe that nothing can be done to change their situation. Progressive farmers tend to be young farmers with ages ranging between 16 to 30 year olds. Some are currently enrolled as students, those who are not plan to return to school in the future. For instance, Dante (S237_V_2016), a member of Association Nhaumbwe, plans to employ the profits from his farming enterprise, which is financed by his father, to invest in his university education. Lack of marital links and associated responsibilities, as highlighted by Wenger et al. (2007), allow these progressive farmers to take more risks in comparison to other equally young farmers who, nonetheless, have family responsibilities and are categorised as fatalistic farmers.

The progressives are usually young entrepreneurs who see farming as a business opportunity. In addition to further their education, profits from the farming activities are invested in housing. This was revealed as an important investment for many farmers. The location of a new house also revealed the extent to which the small-scale farmers view farming as way of life, or as an economic activity. Those who view farming as a way of life (the traditionalists) or as their only livelihood option (the fatalistic) tend to build their improved houses near the farm. While individuals who consider farming as a means to an end, i.e., as an economic activity (the progressive and opportunistic farmers) tend to build new houses near the main village, away from their farms.

Lastly, in terms of attitude, **fatalistic farmers** involve a group of seemingly hard-working young farmers who view farming as their only livelihood option and believe that nothing can be done to change their situation. These farmers are aged between 20 and 40 years old. They tend to have children who are entirely dependent on them for their survival. The fatalistic attitude may be related to the fact that they have parenting responsibilities that somehow limits their risk-taking behaviour. Moreover, there is a sense of fatality in the small-scale farmers' attitudes towards top down decisions which affect their lives. For instance, on multiple occasions small-scale farmers describe themselves as: *'Just a farmer'*. The expression was recurrent when the researcher asked about their negotiations concerning price in the vegetable sector and the lack of transparency concerning LSLI about the harvested sugarcane. This Implies an inability to act when confronted with perceived unfairness regarding their production agreement with the LSLI. By and large, fatalistic farmers maintain interactions with LSLIs under what they perceive to be unfavourable conditions because they believe that nothing can be done to change the situation, and the alternative livelihood options, considering their situation, are less beneficial.

Despite some dissimilarities, the different attitudes towards farming are interrelated. Fatalistic farmers tend also to be traditionalist due to their appreciation of stability, while at the same time they take advantage of opportunities introduced by different agricultural stakeholders, and in doing so they also innovate. As opposed to the progressive, the fatalistic farmers' innovation pathways involve a greater reliance on agriculture as their main livelihood activity, they do not to turn away from agriculture but fully embrace it. Similar attitudes are observed with other groups of farmers. They may adopt apparently

contrasting attitudes, but their intentions are to reinforce the dominant attitudinal or behavioural feature.

To explore the extent to which LSLIs influence innovation in small-scale farming, this study firstly sought to identify the innovations considering different classes of farmers. In this regard, in addition to exploring how wealth status influence interactions with LSLIs, this chapter classified small-scale farmers considering their attitudes toward farming. This typology allow to understand how factors such as age, previous experience with development projects and marital status influence whether farmers regard agriculture as a way of life, as a means through an end, or as an activity with which they are involved due to lack of alternative sources of income. In addition to the above-mentioned features, gender affects the distribution of tasks and, thereby, access to opportunities in small-scale farming.

4.3.5 Gender and farming

This section explores the relationship between gender and farming in Central Mozambique. The main focus of this research was not to emphasise gender roles; however, prolonged interactions with research participants reinforced the understanding that the distribution of tasks and responsibilities based on gender influences access to opportunities (Kabeer, 1999; Carr, 2008). In both study sites, men, women, and children are all involved in farming. However, it appears that the involvement of the women depends on the relative importance of farming as a source of income for the household, as shown in Table 4.10.

Table 4.10 Women's involvement in agriculture

	Main livelihood activity	Cases
Vegetables	Husband is representative of the ruling party in the village	During the interview with the husband and wife, the wife corrected her husband regularly and provided details about their farming activities and negotiations with the LSLI.
	Husband has formal employment (S085_V_2016)	During the interview on the association farm, the wife stated that husband never goes to their farm.
Sugarcane	Mat producer (S017_S_2016)	"*My wife does the farm work, as a man, I produce mats.*"
	Contract farmer, links small-scale farmers with public extension services	Husband performs more administrative tasks, such as providing animal disease control services at district level. Wife is responsible for the farm.

Source: Author, based on interviews and participant observation

Table 4.10 presents observations and quotations from the fieldwork that illustrate the role of women in agriculture in Central Mozambique. The family system in the region is patriarchal (Gotschi et al., 2009), and this affects the way in which women are involved in different groups, as well their access to agricultural support. The four cases illustrated in Table 4.10 exemplify situations in which farming is not the main source of cash income for the household. In such cases, the women tend to be responsible for managing the farming activities. These cases reinforce the notion that women play a predominant role in subsistence agriculture (World Bank, 2007). In both Manica and Sofala Provinces, the female members of households where farming is considered a secondary activity appeared to know more details about such activities than their spouses.

Alternatively, in cases where farming was the main source of income, male members of the household appear to dominate. For instance, during an interview with a woman in the vegetable sector, in Vanduzi District, the researcher asked about activities which facilitate the exchange of information about agriculture. She hinted that women perform a secondary role by helping their husbands with the association activities. She explained that sometimes association members have field days with extension agents on the association farm and her husband says: *'go home'.* Likewise, in a group discussion, female members of the association Macequessa (G3_S_2016) mentioned that they have limited information about sugarcane production because only male members of the household participate in the association activities. Indeed, as confirmation, in a list of 38 workers of the Association Muda Macequessa only one female worker appeared. In the Association Muda Macequesa, the men are responsible for the management activities, the females are responsible for activities such as weeding and a number of one-off tasks required during the sugarcane production season (G3_S_2016).

These findings reinforce several studies on gender and development. More specifically, the predominance of men in the production of market based crops concurs with Carr (2008), whose study in Ghana revealed that men exclusively produce market based crops, such as onion, sugarcane, cashew, okra, cocoa, and coconut, whereas women, for the most part, are engaged in the production of subsistence crops, such as papaya, yams, and tomatoes. Furthermore, according to Cornwall (2003), women's limited participation in networking activities, as occurs in both the sugarcane and vegetable sectors, not only restricts their

access to agricultural information, but also limits their ability to influence development projects. Lastly, the fact that female members of the household are responsible for food production and perform the labour-intensive activities, such as weeding, reinforces Kabeer (1999) findings about the gender roles in societies where women have a subordinate status to men.

4.4 Summary of the chapter

This chapter examined historical and contemporary factors that provide the context in which LSLIs operate in Mozambique. It revealed that the joint impacts of war, peace, continuing military conflicts, adoption of socialist policies, subsequent changes to a market-based economy, and decreasing agricultural support over time, influence the attitudes of the main decision-makers towards agricultural and rural development policies and their choices in terms of development strategy. However, the implication of this policy environment is a continuation of both colonial and socialist strategies towards agriculture. For example, both the attempt to operationalise former colonial plantations during the socialist era and their transformation into farming associations involved in the production of LSLI crops at present, suggest path dependence. Hence, the introduction of LSLIs results in continuing neglect of small-scale farmers.

This chapter also examined livelihood activities of small-scale farmers operating in the vicinity of LSLI in the two study sites. Accordingly, the findings suggest that their practices are influenced by numerous factors, including the environments available for crop production. Furthermore, in contrast to the idea that LSLIs are implemented on marginal land, the findings suggest that prime land is targeted. In both study locations the land has benefited from investments in irrigation and is located next to main sources of water and road infrastructure. It also emerged that social differences between farmers influence their interactions with LSLIs. Taking that into consideration, smallholders were grouped into different wealth categories and the findings suggest that poor households are more dependent on farming as a livelihood activity. Meanwhile, wealthier households have accumulated their capital by the combination of multiple livelihood activities which include farming, association membership which allowed them to benefit from multiple development projects, and employment outside agriculture. Furthermore, the findings also

suggest that the role of women in agriculture depends on the relative importance of farming as a source of income for the household.

5 Chapter five - LSLIs as a development strategy

5.1 Introduction to the chapter

As discussed in Chapter 2, research into LSLI tends to focus on its external drivers. For the most part, the literature attributes the increase in LSLIs to the actions of foreign investors and international organisations (Zoomers, 2010; Urioste, 2012; Wilkinson et al., 2012; Häberli and Smith, 2014; Gugushvili, 2016). Nevertheless, governments in host countries, including Mozambique, perceive LSLIs as a development opportunity (Hanlon, 2004; Hall, 2011). Hence, to take advantage of this opportunity, they encourage and legitimise LSLI. However, focusing on the foreign actors obscures the role of national and subnational actors in facilitating LSLIs. Therefore, this chapter explores the national and subnational drivers of LSLI in Mozambique where the agricultural stakeholders encourage its implementation. To achieve this, the chapter examines the arguments put forward by those stakeholders for the support of LSLI.

More specifically, using key informant interviews and analysis of policy documents, this chapter accounts for objective one, presented in Section 1.2, and aims to answer the following research questions:

- Why are the agricultural stakeholders promoting LSLIs?
- How are they implementing such promotion?
- How are LSLIs framed?

These questions are pertinent considering the challenges faced by small-scale farmers in Africa. Mozambique, analogous to other African countries, is confronted with stagnant productivity of food crops, underperformance of agricultural markets, long-term declining land-labour ratios, and increasing inequalities in land distribution (Jayne et al., 2010). Within this context, there are polar arguments as to what development should be undertaken (Chimhowu and Woodhouse, 2006; Li, 2011; Collier and Dercon, 2014). While host country governments defend the trickle-down approach to development, thereby justifying LSLIs; a growing body of the literature on innovation, outlined in Chapter 2, emphasise bottom-up development approaches which encourage co-innovation, participation, and shared production of knowledge.

The remainder of the chapter is presented as follows. Section 5.2 explores how the need for modernization and implementation of the agricultural development strategy through public –private partnerships encourages LSLIs. Section 5.3 discusses how small-scale farming constraints are framed to justify LSLIs. This section explores, in particular, the extent to which LSLIs mitigates market constraints and contributes as a source of income for farmers. This is followed, in section 5.4, by an analysis of the national and subnational agricultural stakeholders as drivers of LSLIs. It explores the elite interest these stakeholders have in LSLIs as a result of their involvement in development projects and the possibility this gives them to earn land rents given their ability to secure land use rights.

5.2 Modernisation of agriculture

Governments and agricultural stakeholders uphold the idea that these investments will contribute to the modernisation of the agricultural sector, and regard LSLI as a mechanism to support the activities of small-scale farmers. This section firstly explores how LSLIs are justified as a way to modernise the agricultural sector and then it considers public private partnerships because they constitute a means through which agricultural support is provided to small-scale farmers and their activities facilitate implementation of LSLIs in central Mozambique. As discussed in Chapter 4, in Mozambique agriculture is, for the most part, a subsistence activity organised into family farms. It is an important income source for approximately 80 per cent of the Mozambican population; small-scale farmers constitute 99 per cent of the production units in the country (Cunguara and Hanlon, 2012; Sabaratnam, 2017). Transforming subsistence farmers into commercial farmers is one of the important features of the country's agricultural development strategy. Both agricultural stakeholders and policy documents support this. As explained by a government officer responsible for promoting investments and by a BAGC manager, respectively:

> *"A country like ours can only develop by focusing on the agricultural sector, but it is important that we engage seriously in agriculture. Not as a playful activity as happens many times."* (I16_V_2016)
>
> *"Basically, we want the farmers to be involved not only in subsistence agriculture but also in agriculture as a commercial activity, as a business. In Manica province we organise discussions with other actors in the agri-business sector. We discuss what the best is for the farmers, how we can help them to transform into emergent, then commercial, producers." (I10_V_2016)*

Such discourse, whereby subsistence farming is construed as underdeveloped and commercial farming is regarded as a better alternative (Escobar, 1984), suggests a positive attitude towards modernisation. The above view is common amongst politicians and is also included in Mozambican policy documents. Borras Jr et al. (2011) emphasised that the government of Mozambique had vigorously supported production of biofuels in the country since 2004. Furthermore, following statement from former Mozambican Minister of Agriculture and Rural Development, Helder Muteia, also expresses this view:

> *"Our grand objective is to facilitate investment. We have to be able to respond to an investor who arrives and says: 'I want 10,000 ha to grow soya and my plane leaves in two days'. We want to be able to meet in an office and have him able to leave 90% sure that he will have the land he needs."* Helder Muteia in Hanlon (2004, p.620)

In terms of policy documents, the Action Plan for Poverty Reduction in Mozambique (PARP) 2011-2014 states that pro-poor growth can be achieved through investments in agriculture (Government of Mozambique, 2011). Moreover, the strategic plan for the development of Manica province highlights that by transforming agriculture from a subsistence activity into a competitive one rapid economic development can be promoted in the short-, medium-, and long-term (Governo da província de Manica, 2011). For this reason, agriculture is the main focus of the government in Manica.

There is a predisposition by the government to consider agriculture as an important sector and, as highlighted above, the government regards it as the sector with the highest potential to contribute to the country's development. Within this frame of reference, and as the majority of the agricultural population in Mozambique, small-scale farmers tend to be the focus of the rural development narrative. The following remarks by a member of the Manica province business council (I11_V_2016) exemplify this view:

> "*Small-scale farmers do not have any support. We cannot neglect them; they are the backbone of our agriculture. They produce night and day in small quantities because they do not have the necessary experience. Now, if we provide the necessary support, we can start the so-called green revolution that the government mentions regularly."*

Notwithstanding the view of these agricultural stakeholders, who argue that small-scale farmers should be the main target of intervention, the introduction of LSLIs create a shift in

the focus of the development narrative. Instead of small-scale farmers, LSLIs become the target of agricultural support and are presented as a means to tackle challenges faced by those very farmers. Accordingly, agricultural stakeholders assume that LSLIs perform different innovation systems functions. Considering innovation systems functions suggested by Hekkert et al. (2007), agricultural stakeholders have argued that LSLIs contribute to: knowledge creation through technology transfer; market formation by facilitation of farmers' access to international markets; resource mobilisation by facilitation of access to production factors; and mediation of access to, and management of, financial resources (I16_V_2016; I10_V_2016).

These assumptions have implications for how agricultural development programmes are implemented. By regarding LSLIs as a means to solve the problems facing small-scale farmers, the programmes not only encourage its implementation but also justify the support provided for these investments. One consequence of this practice is that, instead of focusing on small-scale farmers, governments tend to subsidise LSLIs. Agricultural support tends to be directed to the areas where LSLIs are operational and limited to their crops, with the expectation that the farmers will promote agricultural development. Some of the measures put in place to encourage agricultural investments are mentioned by innovation actors in table 5.1 below.

Table 5.1 Agricultural Support directed to LSLIs

Actor	Agricultural support directed to LSLIs
Investment promotion officer (I16_V_2016), responsible for fostering investments in Manica province	"*In order to promote agriculture and other activities, the government provides some incentives that include tax exemption for importing equipment at the beginning of the project, free from import duties and value added tax. In the agricultural sector, for instance, the investor can import tractors free from import duties."* He further explains: "*This is a way to provide incentives for investments, however, these investments can be made until the project is sustainable, within 5 years or so. After this period, the investor will start paying the import duties normally".*
Government officer *(I12_V_2016)*, extension services	"*The establishment of the irrigation systems as part of the PROIRRI project had in consideration the existence of Companhia do Vanduzi as a land investment operating in the area. This is not unique to PROIRRI, other agricultural projects tend to target farmers and communities in the areas surrounding the LSLI."*
BAGC manager (I17_S_2016), provide services to the irrigation project PROIRRI	*"PROIRRI is not open to any crop. From the beginning, it was decided that it is for rice or vegetables, all business plans are designed for the previously defined crops. The small-scale farmer can produce other crops for their subsistence, but the irrigation systems are implemented for specific crops because they depend on the availability of a company to work with the associations."*

Source: Author, based on interviews

These measures, as explained by the Investment promotion officer (I16_V_2016), may indeed facilitate LSLIs, but they may not be as effective in supporting small-scale farmers for several reasons. One reason is that the investment required to access such technologies is invariably beyond the financial capabilities of small-scale farmers. Secondly, the technology may not be appropriate for their environment considering that more than 70 per cent of the irrigated plots are smaller than one hectare. A third reason is that implementation of the irrigation projects are tailored to the needs of the LSLIs.

Furthermore, the above explanation about the criteria for the support of the small-scale farmers in a World Bank sponsored project may be an indication of the limits of reliance on LSLIs to create markets for small-scale farmers in terms of specific crops. Accordingly, Açucareira de Moçambique provides support only for sugarcane, and Companhia do Vanduzi concerns itself with the performance of baby corn, fine beans, and chili peppers. All their support is directed to the above-mentioned crops. As discussed in Chapter 2, the provision of agricultural support through commodity programs has been criticised because it is more suitable to well-endowed areas and is biased against resource-poor farmers (Sumberg, 2005). The out-grower schemes in central Mozambique, and elsewhere in Africa (West, 2015), are concentrated on the activities of LSLIs who invariably focus on the cash crops which are in their interest. This reveals an unequivocal bias against the main crops produced by small-scale farmers.

LSLIs occur within the context of substantial government support and is regarded as an agricultural development strategy. The government provides incentives that encourage LSLIs. As a means to attract foreign investment the Mozambican government has chosen to waive environmental regulations, change labour codes, and create tax holidays (Saul, 2011). These incentives are included in the legislation on investment that not only encourages investment in the agricultural sector and exploitation of natural resources but also subsidises LSLIs in numerous ways.

Government reliance on LSLIs is envisioned in both the national agricultural investment plan and the government strategy for the agricultural sector (Governo de Moçambique, 2011; Government of Mozambique, 2012). The agricultural investment plan assigns a greater role to the private sector for its implementation. In this regard, while acknowledging that the

country possesses a weak private sector, as a form of guidance the investment plan states that the private sector will take a dominant role in driving the agricultural development agenda (Government of Mozambique, 2012). Policy documents, such as the law on investment (Governo de Moçambique, 2018), foresee the creation of Special Economic Zones and put forward other economic incentives to encourage the establishment of LSLIs.

The rationale behind the business-led agricultural development is that the support to private sector initiatives will ultimately benefit smallholders. This reasoning is in line with the trickle-down notion in the diffusion of innovation theory used to justify interventions that support relatively advantaged farmers as opposed to resource poor farmers (Rogers, 2003). Nevertheless, relying on LSLIs, as private entities, to promote agricultural development and support small-scale farmers has numerous implications for Mozambique.

Firstly, considering the profit seeking behaviour of LSLIs, small-scale farmers do not have the resources to pay for the extension services such investment provides (I11_V_2016). Secondly, there are fundamental differences in terms of the objectives between small-scale farmers and LSLIs. While LSLIs resemble 'capitalist agriculture', wherein business owners are not involved in the management production units and their main goals tend to be profit maximization (Gasson and Errington, 1993), small-scale farmers commonly produce in family units. Family farms encompass multiple objectives. Furthermore, capital intensive agriculture provides few opportunities to subsistence farmers without formal training (Hall et al., 2008).

In Mozambique, the Corporate Social Responsibility (CSR) programme plays a crucial role in legitimising LSLIs. Increasingly, services such as providing technical assistance to poor farmers, facilitating access to markets, transferring technology, and facilitating access to financial services are now under the responsibility of public private partnerships, which in itself assigns greater responsibilities to the private sector in the form of CSR programmes. It appears that the government is gradually relieving itself of responsibilities previously considered to be for the public good. Selected quotes, shown in the table 5.2, disclose the expectations of the agricultural stakeholders concerning support to small-scale farmers.

Table 5.2 LSLIs as service providers

Stakeholders	Illustrative quotes
Public Extension officer (I12_V_2016)	*"LSLIs are required to provide minimum services to the small-scale farmer. "*
LSLI manager (I15_V_2016)	"*Instead of handouts that become obsolete with time, transferring knowledge is more important."*
Investment promotion officer (I16_V_2016)	"*The peasants think that the LSLI is doing them a favour, or that they are obliged to do so. They have to do it because they are in our area."*
BAGC manger (I17_S_2016), during a meeting with a LSLI	"*Some work has been done in terms of training; service providers are supporting the farmers in their activities, but we still have to ask the Açucareira de Moçambique for additional support for the activities of the small-scale farmer."*

Source: Author, based on interviews and participation in a coordination meeting during fieldwork in July 2016

The above table contains illustrative quotes from agricultural stakeholders indicating their reliance on LSLIs to support small-scale farmers. This also legitimises their role. Legitimization of LSLIs also occurs in developed countries, such as in Australia where the local farmers regard land investors as good corporate citizens due to the contributions they make to the local community (Sippel et al., 2017).

The view shared among scholars researching Mozambique is that there is no clear agricultural strategy for the country, see for example Hanlon (2004) and Mosca (2011). Indeed, a commercial farmer (G7_S_2016) who participated in the workshop for coordinating business activities in Sofala province also argued that there is no agricultural policy in Mozambique and that the problem for the sector is both structural and functional. To justify his view the farmer recalled that numerous development projects have been implemented in Sofala province and various seminars and workshops have been organised to discuss agriculture, but the problems remain unsolved. Sabaratnam (2017) also highlighted the limitations of the Mozambican State apparatus to support the agricultural sector due to shortage of staff, as well as fragmentation and the divergent agenda of the various interveners, such as donors and NGOs.

To tackle this fragmentation, public–private partnerships, in coalitions which incorporate different types of stakeholders, are considered as a solution to the market and institutional failures in developing countries (Spielman et al., 2010). As the government increasingly relies on public-private partnerships to provide agricultural support, this section discusses these coalitions as a way to provide support for small-scale farmers in central Mozambique.

The establishment of public-private partnerships is relatively new in Mozambique and appears to be a result of the continuity of policies towards privatization and diversification of agricultural service providers. For governments the tendency to encourage public-private partnerships put forward by main donors and private international investors is an alternative to their inability to provide funding for agricultural development (Clavel et al., 2015). In the case of Mozambique, the involvement of LSLIs through public–private partnerships is expected to fill an institutional gap, as explained by agricultural stakeholders in table 5.3.

Table 5.3 Expectation of agricultural stakeholders

Stakeholders	Illustrative quotes
Member of the provincial business council (I11_V_2016)	"*We have approximately 700 extension agents nationwide. Only in Manica province, we need 7000 extension agents. The available extension agents behave as bureaucrats sitting in their offices in the departments of agriculture. The technicians have to go to the field! They should not sit in their offices most of the time."*
BAGC manager (I10_V_2016),	"*In these out-growers schemes the farmers gain knowledge. In some situations, they can work as extension agents. They have more experience and knowledge about growing plants than other farmers who are not part of the out-grower scheme".* *"LSLI helps the small-scale farmers to export their produce. To this end, Companhia do Vanduzi has benefited from the innovator fund to mediate certification of small-scale farmers' agricultural products. There are no consultants or established certification schemes in Mozambique. All this process of certification is conducted via Companhia do Vanduzi. To buy the baby corn it is important to ensure that the irrigation water and the soil have been tested and that the water pH and other variables are known. Companhia do Vanduzi facilitates the certification process because it can be expensive and prohibitive for the small-scale farmers. That is why we provide funds for these activities."*

Source: Author, based on interviews

The above table shows that shortage of extension agents to support the activities of the small-scale farmers is an institutional gap that is expected to be filled by LSLIs. The problem of the extension agent's availability was raised in a group interview with members of the Association Mudzizi (G2_V_2016). It was revealed that an extension agent had been formally assigned to work in the village, but the association does not have regular interactions with public extension officers and the extension agent has never provided technical support to the participants in the group discussion.

These findings corroborate those of Sabaratnam (2017), who also reported decreasing numbers of extension agents in Nampula province, and in Mozambique in general. Given the inefficiencies of the public extension services, implementation of LSLIs is framed as a mechanism to support small-scale farmers. This is in line with a World Bank study by Ward

et al. (2016) in which it is argued that public private partnerships encompass numerous benefits to the smallholders, including long-term sustainability of large irrigation systems through improved market access, service provision, input supply, and technical assistance.

As discussed in Chapter 4, LSLIs are encouraged to create links with small-scale farmers. PROIRRI is managed by the Ministry of Agriculture in Mozambique and its implementation involves regular collaboration between the government, private companies (LSLI), and Beira Agricultural Growth Corridor (BAGC) as a service provider. Collaboration between private and public entities is now considered as a means to promote agricultural and rural development (Chimhowu, 2013). Within this frame, the Mozambican government is increasing its reliance on the private sector to provide agricultural support services, thereby supporting implementation of LSLIs.

As part of the PROIRRI, implementation of the innovator fund is an example of the agricultural support aimed at LSLIs. The Innovator fund, which tries to create links between LSLIs and small-scale farmers, is a grant available for LSLIs. As justified by the BAGC manager (I10_V_2016) in Table 5.3, the funds are provided because LSLI provides technical assistance and facilitates access to markets. This focus on the private sector is also a result of the withdrawal of the direct budget support provided by development partners (Sabaratnam, 2017). Accordingly, private companies are expected to fill an institutional gap and provide services to small-scale farmers. This contrasts with the dominant position in the LSLIs literature, which portrays such investments as land grabbing promoted by foreign interests.

Regarding LSLIs as a development strategy is not unique to Mozambique. It is also seen as such in other African countries, such as Ethiopia where these investments are considered as a means to earn foreign currency (Lavers, 2012), and Tanzania (West, 2015), where, as in Mozambique, LSLIs are regarded as a pathway towards modernisation and as a means to support small-scale farmers through job creation, transfer of technology, access to markets, and facilitation of access to production factors. These assumptions are further examined in the next section which explores how small-scale farmers' constraints are framed to justify implementation of LSLIs.

5.3 Framing of small-scale farmer's constraints as drivers of LSLIs

Framing refers to the situational assumptions, approaches, ways of interpretation, and beliefs stakeholders hold when they tackle a problem (Leach et al., 2007). Thus, framing affects the boundaries and comprehension of the issue. Out-grower schemes in the vegetable and sugarcane sectors have been promoted and supported by various agricultural stakeholders as a mechanism to support activities of the small-scale farmers. In other words, LSLIs are framed as the solution to the farmers' problems. Contrary to the dominant view in the LSLIs literature, which regards foreign investors as the main drivers of LSLIs, it appears that the government view is that such investments are a rapid pathway towards modernisation and they expect LSLIs to be a model for small-scale farmers who are confronted with multiple constraints.

5.3.1 Income constraints

This section examines how income constraints that small-scale farmers face are framed as a justification for the introduction of LSLIs and also considers the extent to which LSLIs can have an impacts on farmer's income. Trickle-down economic impacts of LSLIs will benefit small-scale farmers. This is the argument made by government and the agricultural stakeholders who promote the out-growers' schemes. They argue that LSLIs are better positioned to supply crucial services to support the small-scale farmers, thereby justifying the allocation of additional funds to LSLIs. This section examines the extent to which these claims are realistic. One example is the Catalytic Fund for Innovation and Demonstration currently under implementation by the Nacala Corridor and the Zambezi Valley Development Agency (Ministério da Economia e Finanças, 2016). This is a funding opportunity provided by the government of Mozambique to support the agricultural sector.

The objective of the Catalytic Fund, according to the handbook of policies and procedures that guide its implementation, is to improve access to markets for the small-scale farmers, as well as for small and medium enterprises, through private and public partnership with a focus on the market. However, funds need to be managed by LSLIs who are supposed to create links with small-scale farmers. The rationale for the fund, according to an innovation actor (I10_V_2016), is that LSLIs are experienced and through the Catalytic Fund they can support the activities of the small-scale farmers. As he explained:

> "*The small-scale farmer may not be able to manage* $US*500 thousand. The problem is the structure of the small-scale farmer; they do not have the capacity to manage that amount of money. They will need a large farmer to assist them. A company like Companhia do Vanduzi can be an umbrella to support the activities of the small-scale farmer. This company receives $US500 thousand to work with the small-scale farmer. This is beneficial."* (I10_V_2016)

The financial support to the LSLIs is justified as a mechanism to support the small-scale farmers. Another argument of the proponents of LSLIs is that it creates opportunities for employment for the rural inhabitants in the targeted countries. This may involve opportunities for employment within the LSLIs or employment generated as the result of their activities. However, in central Mozambique employment within the LSLIs is limited. In the vegetable sector a member of the Association 7 de Abril (S005_V_2016) mentioned that there were not employment opportunities because the LSLI bring their own people.

The situation is similar in the sugarcane sector; an inhabitant of the village of Macequessa (S012_S_2016) explained that employment opportunities are scarce and that the LSLI accept only short-term contracts that may last from three to five months. Mamonova (2015) also reported limitations among the LSLIs in terms of incorporating local inhabitants in Ukraine. Mamonova (2015) gave an example of 30 people on a waiting list to perform the duties of a combine-harvester driver for an American agricultural company.

In line with the above accounts, the survey results show that 64.3 percent and 46 percent of farmers in the sugarcane and vegetable sectors, respectively, believe that LSLI does not contribute to employment. However, the results also reveal that a sizeable number of farmers, 35.7 percent and 54 percent in the vegetable and sugarcane sectors, respectively, believe that LSLI contributes to employment. LSLIs in central Mozambique constitute a regular source of cash for the small-scale farmers through the out-grower schemes.

Small-scale farmers believe that participation in the out-grower scheme offsets the shortage of formal employment. "*It is like a salary"* (S006_V_2016), observed a member of the Association Campo 4. The regular income that they earn through their LSLI contracts not only insulates them against uncertainties associated with subsistence farming and

alternative activities, such as seasonal agricultural employment and commercialisation of agricultural surplus, but also provides lump sum payments for personal investments in aspects such as housing and education, which are difficult to make with irregular income sources. The lump sum payments perform a saving role (West, 2015). A member of the Association Nhaumbwe (S032_V_2016) explained:

> "*Baby corn is capital because payments are made on a monthly basis. Baby corn is better than green beans and chilies, which are harvested gradually during the cropping season, and the payment involves small quantities. With chilies, for instance, a farmer can harvest the crop for 6 months. Each month the farmer gets a small payment corresponding to the quantity of chilies harvested in that month. Baby corn is faster. You can harvest baby corn twice while chilies are still in the field".*

The above farmer produces different Vanduzi crops, each providing funds in very specific ways. The benefit of the baby corn for cash is highlighted by another member of the Association Nhaumbwe, Mr. Sabonete, who noted that baby corn is an important crop due to the short duration of the cropping season (S030_V_2016). As shown in Table 5.4, production of baby corn takes two to three months from planting to harvesting. In the summer, or the hot season in Mozambique, the crop can be harvested within two months. In the dry, cold season, between May and August, the crop can take up to three months from planting to harvesting time. Table 5.4 shows the characteristics of the main cash crops produced in the study sites.

Table 5.4 Major cash crops produced by the small-scale farmers in the study sites

Characteristics	Baby corn	Chili pepper	Green beans	Sugarcane	Cabbage
Upfront investments	L	L	L	H	M
Time to harvest	2-3 months	6 Months	3 Months	11 Months	3- 4 Months
Harvesting period	1 – 4 days	Up to 6 Months	Weeks	Varies	1 – 7 days
Labour requirements	M	M	M	L/H	M
Alternative uses	Animal feed	Consumption	Consumption	Consumption	Consumption
Alternative Markets	L	M	M	L	H
Innovation	M	M	M	L	M

L- Low; M- Moderate; H – High. Source: Author's compilation using interview data.

The short duration of the cropping season allows the planting of baby corn multiple times each year. This, according to a BAGC manager (I10_V_2016), is an advantage that association members who are part of the out-grower scheme have in comparison to those

who are not. The BAGC manager further explained that out-growers are now producing three or four times a year because of the relatively short life cycle of baby corn. Before being part of the scheme, similar to most Mozambican farmers, they relied on the rains for food production, thereby limiting crop production to the rainfall season.

Hence, due to the possibility of ensuring regular cash income during the year, the out-grower schemes with the LSLIs are viewed as an alternative to formal employment. In these production agreements, LSLIs not only contribute as a source of income but also facilitates access to factors of production. In both vegetable and sugarcane sectors LSLIs provide production factors in credit to association members. Table 5.4 shows that upfront investments for chili pepper and baby corn are relatively low due to the support from LSLI, which facilitates access to inputs and provides technical assistance. A 16-year-old member of the Association Nhamanembe (S083_V_2016) argued that this facilitates agricultural investments:

> "*When people do not have resources to invest in agriculture Companhia do Vanduzi provides production factors in advance and farmers pay after the production, this is a big help.*"

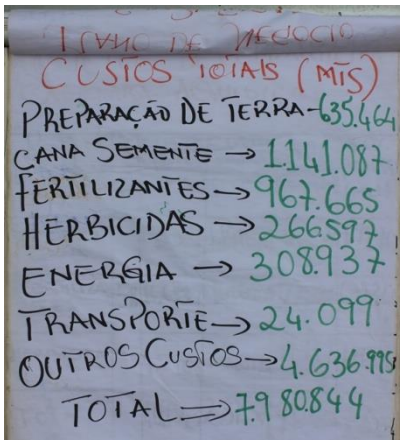
There are contrasting views about the contribution of LSLIs to the local communities. Some stakeholders in the vegetable sector believe that LSLI contributes to the livelihoods of the local community in multiple ways (S024_V_2016; I22_V_2016). For example, Mr Mario (S024_V_2016), explained that Companhia do Vanduzi was important not only to association members but also to the community as whole. Despite not taking part in the out-grower scheme due to perceived low prices offered by the company for their produce, Mario was concerned about the withdrawal of Companhia do Vanduzi from Chirodzo because according to him it contributes to the circulation of cash that bolsters economic activities within the community.

In the sugarcane sector, an extension officer based in Lamego (I5_S_2016) explained that because of LSLI interest in the irrigation system under construction in 2014, as part of the project PROIRRI, LSLI provided the necessary input and equipment, including pipes, one diesel water pump, and sprinklers, so that the association could start the production of sugarcane. This equipment was supplied in order to make production in the 2014/2015

season possible. An LSLI employee (I4_S_2016) further explained production factors are supplied in advance because the association does not have alternative means apart from the project.

The cost of the production factors are later deducted from the payments that small-scale farmers receive at harvest time after the sale of their sugarcane to the factory. An example of such costs in Mozambican metical (MZN) is presented below (Table 5.5). For British Pounds (GBP) the exchange rate used was 1 GBP=80 MZN. However, it is important to note that association members pay only 30 percent of the costs. The PROIRRI subsidises the enterprises by incurring 70 per cent of the costs during the 7 year duration of the project. The project PROIRRI started in 2011 and will finish in 2018.

Table 5.5 Projected cost for the production of 58 hectares of sugarcane



Items	Cost (MZN)	Costs (GBP)
Land preparation	635,464	7,943.30
Seeds	1,141,087	14,263.59
Fertilizers	967,665	12,095.81
Herbicides	266,597	3,332.46
Energy (electricity)	308,937	3,861.71
Transport	24,099	301.24
Other costs	4,636,995	57,962.44
Total	7,980,844	99,760.55

Source: Flipchart presentation by a BAGC technician (I13_S_2016)

One of the benefits associated with facilitating access to inputs through credit as an approach to promote agricultural development is that the possibilities for the state to subcontract agricultural support are increased. This advances diversification and the expansion of agricultural support available for the small-scale farmers. The government of Mozambique has been attempting to diversify the providers of agricultural extension services with the objective of benefiting a larger population of farmers (Gemo and Rivera, 2001). The LSLI, as a private provider of agricultural support, contributes to meet this purpose.

The viability of this approach increases if each farmer remains responsible for his own production costs. However, this is not the case with association members in the vegetable and sugarcane sectors in central Mozambique. They benefit from PROIRRI which provide subsidies for the production factors. In this case, financial support is given for the purchase of seeds, fertilizers, and pesticides for annual crops. Without these subsidies production costs are high. For example, an association member, Costa (S006_V_2016), explained that in each production season he spends between 25 and 30 thousand meticais to produce 0.5 hectares of cabbage, this excludes the cost of labour.

Admittedly, by decreasing production costs input subsidies are likely to allow relatively poor small-scale farmers to produce crops, such as cabbage, that require moderate upfront investments, as shown in Table 5.4. Nevertheless, not all agricultural stakeholders view input subsidies as a viable development strategy. For example, an extension officer (I12_V_2016) explained that the predominant form of agricultural support provided by government, non-governmental organizations (NGOs), and international organizations, such as the Food and Agricultural Organizations of the United Nations (FAO), involves the donation of production factors to small-scale farmers and this creates dependency. According to him, similar to many earlier initiatives, the irrigation project PROIRRI also focuses on the distribution of input and it is this which leads him to believe that interactions between small-scale farmers and LSLIs occurring in central Mozambique are not sustainable.

The potential for reliance on LSLIs as a development strategy may be understood by the extent to which their crops contribute to the income of the small-scale farmers. In the out-grower schemes LSLIs are expected to supply agricultural services to small-scale farmers. However, those services are oriented towards the crops which are of specific interest to investors. In contrast, limited support is available for the growing of subsistence crops, and it is these crops which constitute an important share of the income for small-scale farmers. Table 5.6 shows the relative importance of LSLIs' crops in comparison to cereals and fruit crops for the subsistence of the farmers.

The table contains the aggregate data about the number of households involved in the production of LSLIs' crops, cereals, and fruit crops from both study sites. The number in

brackets refer to percentages within each subgroup of households involved in the production of different crops, or groups of crops. As an example, the table indicates that 91.3 percent of the households mentioned that they baby corn only for the market.

Table 5.6 Objective of the production of LSLIs' crops, cereals, and fruit crops.

	Crops			
Objective	**Baby corn**	**Sugarcane**	**Maize and other cereals**	**Banana and other fruits**
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Only consumption	-	2 (8.33)	126 (58.6)	3 (20)
Mainly consumption	-	3 (12.5)	64 (29.77)	1 (6.67)
Both consumption and market	-	-	20 (9.3)	6 (40)
Mainly market	6 (8.7)	3 (12.5)	5 (2.33)	4 (26.67)
Only Market	63 (91.3)	16 (66.77)	-	1 (6.67)
Total	**69 (100)**	**24 (100)**	**215 (100)**	**15 (100)**

Source: survey results

In central Mozambique the main subsistence crops include maize and other cereals, such as sorghum and millet, as shown in Table 5.6. Spielman et al. (2010) argued that the impact of public private partnerships on poverty reduction may be realised in the choice of crops. The above survey results also show that maize and other cereals have a higher impact on poverty reduction as more than 90 percent of the households surveyed, 215 of 234 respondents, produce either maize or other cereals (sorghum and millet) for their subsistence. As a result, innovation actors are sceptical about the potential benefits of LSLIs' crops as a source of income for small-scale farmers.

This section has examined the contribution of LSLIs as a solution to the income constraints faced by small-scale farmers. It has discussed the extent to which facilitation of access to input can promote agricultural development in the context of LSLIs, and how the LSLIs' crops contribute as livelihood activities for small-scale farmers. Within this context, while some actors acknowledge the limitations of LSLIs as providers of agricultural services, other actors perceive LSLIs as a panacea that will solve numerous problems faced by small-scale farmers, in particular their access to market. Therefore, the next section explores how farmers' limited market access is put forward as justification for the implementation of LSLIs.

5.3.2 Market constraints

This section discusses how agricultural stakeholders regard market constraints as a justification for the implementation of LSLIs. It is important to explore the role of markets because agricultural stakeholders identify this as the main factor constraining agricultural and rural development. Accordingly, there are numerous initiatives aimed at engaging small-scale farmers in market-oriented agriculture (FAO, 2014). This section examines how the introduction of LSLIs has contributed to the facilitation of small-scale farmers' access to market. Some examples of market constraints raised by innovation actors in both the sugarcane and the vegetable sectors are illustrated in Table 5.7.

Table 5.7 Illustrative quotes highlighting problems with markets

Sites	Illustrative quotes
In Sofala Province, Association Muda Macequessa, currently producing sugarcane, has tried to produce tomatoes in the past, but this was not profitable, as explained by two association members	"*With the increase in productivity of tomatoes, prices decreased. It is not that we like to produce sugarcane, but the shortage of buyers for vegetable crops resulted in high losses for us. There were no markets for vegetable crops, and considering that vegetable crops are easily perishable we had to sell at very low prices* (S012_S_2016)."
	"We were throwing away tomatoes." (S001_S_2016).
In Manica Province, two innovation actors, a BAGC manager (I10_V_2016) and a member of the provincial business council (I11_V_2016), also highlighted the limitations of markets as a constraint to production.	*"We are having problems with the market for small-scale farmers. It is a serious problem. In the past Companhia de Vanduzi was buying other vegetable, in addition to chili peppers, fine beans, and baby corn, from small-scale farmers to sell within the country, but these activities have stopped. They are now concentrated on the export market."* (I10_V_2016)
	"*Zambezi development agency started distributing tractors and agricultural equipment to benefit small-scale farmers. This equipment is supposed to be rented, but how can small-scale farmers pay to use a tractor without guaranteed markets for their produce."* (I11_V_2016)

Source: Author, based on interviews

Access to markets may be linked to other issues, such as remoteness. During a group discussion with members of the Association Mudzidzi (G2_V_2016), members complained that poor road infrastructure limits their ability to sell products to buyers outside their village. As a result, association members focus on the production of baby corn, chili peppers, and fine beans to supply to the LSLIs. Inaccessibility also limited the researcher's attempt to visit the farms of the Mudzizi Association during the fieldwork. In the context of those challenges, access to market is put forward by agricultural stakeholders as a justification for LSLIs. In this case, LSLIs offsets the limitations created by poor roads.

Accordingly, the promoters of LSLIs encourage small-scale farmers to participate in the out-growers' schemes. For example, a government officer in charge of the investment promotion centre in Manica Province (I16_V_2016) suggested that small-scale farmers have to show that they are capable of achieving what the investor wants and much more; instead of planting one hectare they should plant two or three hectares, and then sell their produce to the investors because the market is guaranteed. Another actor, a BAGC manager I10_V_2016), claimed that farmers who are not part of the out-grower scheme are in a weaker position because they rely on intermediaries.

Admittedly, in the context of low market access, LSLIs have the potential to link small-scale farmers to markets. Farmers in the study areas welcome these initiatives as they provide them with opportunities to diversify their livelihoods. However, excessive market power is a drawback. As the only buyer, the LSLI dictates the rules and agricultural stakeholders regard this as a problem. A commercial farmer argued that due to lack of competition the LSLI walks at its own pace. "*If they want to walk slowly, they do; if they want to walk faster, they also do so"* (I13_V_2016). In other words, they dictate the market conditions which are not always favourable to the small-scale farmers. The above-mentioned BAGC manager (I10_V_2016) acknowledged that the lack of alternative markets frustrates small-scale farmers because they are always under the power of the LSLI and must follow their instructions. To avoid this, one small-scale farmer suggested that there should be other LSLIs in order to decrease the market power of Companhia de Vanduzi in the negotiation of prices (S239_V_2016).

This section has sought to explore the extent to which LSLIs contribute as a livelihood activity for the local communities in the host countries. Although providing greater contribution to small-scale farmers involved in the out-grower schemes, the findings show that LSLIs are also crucial as a source of cash for the other members of the host communities. It also emerged that small-scale farmers' limited access to markets is regarded as a major constraint to production, and that agricultural stakeholders consider LSLIs to be the solution to this problem. Nevertheless, introduction of LSLIs solves part of the problem because those involved concentrate on technical assistance and the marketing of crops, this then creates a new challenge related to the market power of LSLIs.

Although framed as the solution for the small-scale farmers' constraints this group are not the only beneficiaries of LSLIs. Rent seeking by the local elites encourages LSLIs in central Mozambique. Therefore, the next section examines how the elites take advantage of LSLIs occurring in central Mozambique. In particular, it explores how these elites capture development projects and demonstrates their ability to secure land use rights to encourage implementation of LSLIs.

5.4 Elite interest in LSLIs

The elite interest in LSLIs manifests in different ways. This section focusses on the sugarcane sector to discuss the different ways in which the elite interest influences implementation of LSLIs. The elite, as discussed in the review of the literature, are the more powerful and more influential individuals who usually represent other members of the community in different fora and their views are regarded as the views of the rest of the community (Bierschenk et al., 2002; Chambers, 2012). The section concentrates on the role of the subnational elites because the decision making about projects occupying areas equal to or less than 1000 hectares are made at provincial level. All the farming associations occupy areas within that limit. Firstly, the case of the Association Muda Macequessa is considered. It occupies 58 hectares and disputes an additional 42 hectares with other village inhabitants. This case involves an attempt by the government to foster links between small-scale farmers and LSLIs through a government project that appears to have been captured by subnational elites. Secondly, the case of the Associação de Canavieiros de Nhassato (ACNA), also known as Muda Growers, is taken into consideration. ACNA occupies 380 hectares in Nhamatanda District. This case discusses the possibility of deriving land rents as a driver of LSLIs.

5.4.1 Elite capture of development projects

This section examines how the apparent elite capture of a government-promoted development project aimed at supporting small-scale farmers seems to contribute as a driver of LSLIs. It takes as an example the Association Muda Macequessa, created in 2005. According to a member (S012_S_2016), Muda Macequessa started with the support of an NGO (GAPI), which facilitated the installation of an irrigation system and promoted the production of tomatoes. At that time, the association comprised 46 members, 28 male and 18 female. The experience with GAPI failed because tomatoes were not a profitable crop.

Currently composed of 36 members, Association Muda Macequessa has been benefiting from PROIRRI since 2011, during which time 58 hectares of irrigation investments have been made. The irrigation system is projected to occupy a contiguous area of 100 hectares in the village of Macequessa, but there are problems with the remaining 42 hectares. These are partly occupied by village inhabitants not benefiting from the irrigation project. Considering the situation in Mozambique, where the majority of farmers do not have access to agricultural support, this irrigation project concentrates on a relatively small number of farmers. More than one million dollars in investment in irrigation have benefited 36 association members (I19_S_2016; I17_S_2016), but these irrigation investments are not only benefiting small-scale farmers.

In this case association members include government officials at various levels, or their relatives. These members do not participate in the majority of the association activities, but they still benefit from the association dividends. In contrast, those small-scale farmers who temporarily do not take part in the association activities are stripped of their membership entitlements. For example, a couple (S064_S_2016) who participated in the foundation of the Association Muda Macequessa lost their memberships rights during a period of absence in which they were unable to take part in the association's activities. Upon their return to the village of Macequessa five years later, they attempted to resume activities with the association, but could not because their place had been taken by other individuals. The new members included the relatives of the existing association members and subnational elites.

The subnational elites encompass people at the local, district, and provincial level who possess a mechanism to exert influence over the members of the association. Despite not being inhabitants of the village of Macequessa, these members of the elite are entitled to the association's profits at the end of each cropping season. This is a form of elite capture (Arnall et al., 2013a) wherein individuals other than the local inhabitants of Macequessa benefit from irrigation investments and the services provided by the government and other agricultural stakeholders. An examination of the composition of the Association Muda Macequessa shows that some members are not merely small-scale farmers. These members include powerful individuals who perform different roles as government officers, or their relatives, local leaders, and agricultural technicians.

The abovementioned powerful actors use their role as intermediaries to benefit from development projects. Other actors have coerced membership into the association in order to benefit from irrigation investments. For example, a local leader threatened to ignore documentation concerning the association, and thereby limit opportunities to benefit from development projects in the future (S001_S_2016), unless he was given membership of the association. From the small-scale farmer's viewpoint, such threats are practicable because development projects, such as PROIRRI, are channelled via the government, so politicians attempt to portray the idea that they are the source of such opportunities.

The involvement of the local elite on the one hand, and the family links between the association members on the other, to some extent encourages the expansion of sugarcane production in the village of Macequessa. An example of family links between association members involves Mr Rungo (S001_S_2016), seen in Case study 5.1.

Case study 5.1 Elite capture of development project

Mr Rungo is a 57-year-old influential member of the Association Muda Macequessa. As a founding member and a former president, he earned his significant position within the association in the early stages of its formation. Before the creation of the association, he worked as a teacher in adult education within the village. His relatively high education attainment, he simply completed grade seven, allowed him to perform the role of a development broker, thereby controlling access to external resources by other village members. His prominent position within the association meant he could allow his relatives to perform different roles within the association, namely, three as association members and two as association workers. As a result, Mr Rungo and his family became part of small group of people benefiting from the irrigation project PROIRRI.

Mr Rungo is an example of an opportunistic farmer well positioned to take advantage of external opportunities. Moreover, education as a form of social capital influences the ability of rural inhabitants to draw on those external resources. This is in line with Dasgupta and Beard (2007) who maintained that a high level of education and links with external stakeholders constitute the power base for the creation of local elites. The survey results revealed low levels of education amongst the inhabitants of the village of Macequessa. The summary of the survey respondents' characteristics, seen in Table 3.6, shows that 46.2 percent of the research participants never went to school, and 23 percent did not finish elementary education. Hence, Mr Rungo's relatively high level of education gives him a prominent position within the village. Accordingly, the expansion of sugarcane plantation

in Nhamatanda District benefits the founding members of the association, their relatives, and subnational elites.

Elite capture of development projects is also occurring in the vegetable sector. For example, district governments have benefited from the Agricultural Development Fund for the purchase of agricultural equipment to provide services to small-scale farmers. However, the agricultural equipment is not accessible to the wider community which includes non-members. In Vanduzi the subsidized equipment is managed by an association member, Mr Sabonete (S030_V_2016), who has accumulated different roles at district level that allow him to control access to external opportunities. His roles include president of the innovation platform, which encompasses all the agribusiness associations in the Vanduzi district; president of the agro dealer association; and president of the assembly in one farming association.

The above-mentioned development broker, Mr Sabonete possesses multiple plots within the Association Nhaumbwe. This limits the opportunities for other farmers to engage in association activities and, subsequently, their access to agricultural support. As explained by a non-member (S206_V_2016),

> *"It is not easy to obtain land within the association, but there are those bosses who possess five or even six plots, like Mr Sabonete as if the association belonged to him... If they have several plots, where will other farmers grow their crops? That is not right! The leaders should have one plot and give the others the opportunity to farm within the association as well. They have plots everywhere, how about the others?"*

The literature on LSLIs largely disregards the role of the local actors as drivers of land investment, see Zoomers (2010) as an example. In contrast, the access literature views local actors as central to this wave of LSLIs. Pedersen (2016) suggests that the concept of polycentric governance, whereby access to land is determined by the interaction of actors at subnational, national, and international level, is key to explain the extent to which local actors enable LSLIs.

Apart from Association Muda Macequessa, which is composed mainly of small-scale farmers, there is another farmer organisation in Nhamatanda District that benefits from the

services of the Açucareira de Moçambique. While in the case of Muda Macequessa the production of sugarcane is mainly performed by small-scale farmers, in the case of the Associação de Canavieiros de Nhassato, which is discussed the next section, production activities are under the responsibility of the LSLIs.

5.4.2 Land rents as a driver of LSLIs

This section examines how land rents contribute as drivers of LSLIs in central Mozambique. National and subnational actors have the ability to secure land use rights (O'Laughlin, 1995), but do not have the capability to put their land into productive use (Hanlon, 2004). In spite of their inability to use land productively, these powerful subnational actors still find ways to profit from the land. Using examples from the sugarcane sector, this section examines the factors that allow powerful actors to secure use rights, thereby encouraging LSLIs. Among other matters, social capital and historical accumulation increase the ability of agricultural stakeholders to obtain land use rights. The section begins with the example of the Associação de Canavieiros de Nhassato (ACNA) which is comprised of individuals with privileged positions within the Mozambican society. ACNA exemplify how actors use their social capital to profit from land rents.

Two ACNA members interviewed during fieldwork in Mozambique, include a senior manager of the Açucareira de Moçambique and the director of a private company responsible for import and distribution of inputs in the Beira corridor. Within the association each member possesses individual land use rights for part of the area. Overall, the association occupies a contiguous area of 380 hectares. ACNA and Açucareira de Moçambique have a 10-year agreement that involves transfer of ownership of all investments made by the LSLIs to the land use rights' holders at the end of that period. Management of the sugarcane plantation in the area belonging to ACNA is performed by the LSLI. As explained by an employee of the Açucareira de Moçambique (I4_S_2016),

> "*We consider Muda growers as an extension of the Açucareira to the point that we have a section manager, a supervisor, and someone responsible for book-keeping. These people are paid monthly by the Açucareira. The landowners are not involved in the production process. They earn a fixed amount regardless of the production costs."*

The fixed amount is directly proportional to the size of the area occupied by each association member. ACNA's agreement with Açucareira de Moçambique suggests that some individuals make use of their privileged positions within the society to obtain land use rights that are then allocated to LSLIs in exchange for regular payments. The aim of the initiative is that ACNA members will become more independent and take responsibility for production in the future (I4_S_2016). However, this goal may be undermined by their perceived unpreparedness, as expressed by an ACNA member (I2_S_2016) who confessed he is not yet ready to become independent from the Açucareira and take charge of production on the 15 hectares he owns. It remains unclear what limits this farmer's ability to take responsibility for production, but the current agreement guarantees his profit from the land rents. This concurs with Hanlon (2004) who found that the Mozambican urban elite are mostly high-level officials from the government and the military who lack capital for significant investments, but have been acquiring land through political patronage. Thus, the existence of a Mozambican elite who maintain possession of land rights, but are incapable of investing in their own land, also explains why LSLIs occur in Mozambique. The findings also corroborate those of Fairbairn (2013) who identified five sources of power which shape land acquisition processes in Mozambique, namely: traditional authority; bureaucratic influence; social capital through involvement in local business networks; historical accumulation; and control over the development agenda through policy making.

Particularly relevant for this study are the first four mentioned sources of power because they also manifest at subnational level. Traditional authority and bureaucratic influence are the means through which development brokers manage to benefit from development projects targeted at the small-scale farmers. Social capital, as discussed in the case of ACNA, and historical accumulation facilitate access to land.

An example of how historical accumulation facilitates access to land is seen in Case study 5.2, Mr Nascimento (I11_S_2016), a 90-year-old veteran of the war for the independence of Mozambique.

Case study 5.2 Access to land but lack of investment resources.

Mr Nascimento has been a member of FRELIMO, the Mozambican ruling party, since its foundation in 1962. The interview with Mr Nascimento in his house lasted approximately three hours. Different themes were discussed, including the current political situation in the country, his experience during the war for independence, and agricultural and rural development. During the discussion, he made analogies with the Bible and popular folklore to discuss the current situation in the country. For example, he mentioned that Moses was able to liberate his people from slavery in Egypt but he was not capable of leading them into the Promised Land. According to Mr Nascimento, for many years Moses and his people were lost in the desert, but Moses' successor, Joshua, was able to finish the task and take the people into the Promised Land. Mr Nascimento's viewpoint is that FRELIMO freed Mozambique from colonial rule, but current crises and challenges mean that the country is yet to find its Joshua. Mr Nascimento moved to Nhamatanda after the peace agreement in 1992. He mentioned that he owns 1000 ha in Nhamatanda which he rents to a private sugarcane producer because he does not have the means to use it productively.

Hence, not only does the government actively seek investments but also a Mozambican elite is attempting to profit by way of a renewed interest in agriculture. The two associations, Muda Macequessa and ACNA, represent two ways in which the local elite benefit from LSLIs. The first case involves the elite capture of a project that was targeted at small-scale farmers. The second involves the elite use of their privileged positions in Mozambican society to obtain land use rights. This case illustrates that powerful individuals, who are neither small-scale farmers nor do they live in the target areas, manage to obtain land use rights in order to profit from land rents, thereby encouraging LSLIs. The case also reinforces arguments whereby formalizing land use rights benefits well-connected societal members (Chimhowu and Woodhouse, 2006). The evidence in this section suggests that the government and other agricultural stakeholders encourage LSLIs. Involvement of the national and subnational elite in LSLIs have also been occurring in other countries. For example, Baird (2014) revealed that elites play a significant role in Cambodia, Asia. Nevertheless, while involvement of the elite in that case is linked to money laundering, in Mozambique elite interest is manifest through the capture of development projects and the ability to profit from land rents.

5.5 Summary of the chapter

This chapter was guided by research objective two and addressed three research questions. In response to the first research question: Why are the agricultural stakeholders promoting LSLIs? The findings indicate that with the surge of LSLIs globally, the government of Mozambique embraced LSLIs and actively encouraged their implementation as a development strategy. In relation to the first research question and with the aim to explore the argument that implementation of LSLIs is a development strategy, the chapter sought to address the question: How are LSLIs framed? Thus, to justify this decision the government and agricultural stakeholders uphold the idea that LSLIs contribute to the modernisation of the agricultural sector. More specifically, they frame LSLIs are a means to support small-scale farmers.

Furthermore, in response to the following research question: How are they implementing such promotion? The findings suggest that LSLIs are explained by the implementation of the agricultural development strategy whereby the government relies on the private sector, through public private partnerships, to provide support for small-scale farmers. However, promoting LSLIs as a source of modernisation suggests a top-down, centralised, and unidirectional view of development. An implication of regarding LSLIs as a means to support small-scale farmers is that it shifts the focus of agricultural support. In this case, agricultural support tends to be oriented towards large farms and biased against small-scale farmers.

The findings also revealed two ways in which the local elite encourage implementation of LSLIs. Firstly, the inclusion, as association members, of powerful individuals whose societal responsibilities allow them to influence the implementation of development projects encourages LSLIs because they are seen as a way to increase their association dividends. Secondly, with the aim to profit from the land, subnational actors, as the holders of formal land use rights, allocate their use rights to LSLIs, thereby encouraging their implementation in central Mozambique. This finding challenges the idea that implementation of LSLIs is a mechanism for the support of small-scale farmers. Instead, the rent seeking behaviour of the subnational elites may limit the ability of the vulnerable groups to take advantage of these investments.

6 Chapter six – Incorporation of small-scale farmers into LSLIs

6.1 Introduction to the chapter

A growing body of the literature on LSLIs describes them as land grabbing. The assumption, as discussed in the Chapter 2, is that implementation of LSLIs involves the exclusion of local inhabitants and undermines their livelihoods (McMichael et al., 2010; Borras Jr and Franco, 2013; Wisborg, 2013). While acknowledging the potential drawbacks of LSLIs, this chapter explores the ways in which small-scale farmers are included or excluded during its implementation in central Mozambique. The chapter characterises interactions between these farmers and LSLIs by exploring the process by which such investments influence their livelihood. The chapter addresses research objective two, described in Section 1.2, and aims to answer the following research questions:

- What are the opportunities for networking and exchange of information in the targeted areas?
- What forms of collaboration are present in the local innovation systems and to what extent are LSLIs inclusive of the most vulnerable groups?
- What are the roles of different innovation actors and to what extent do they complement each other?

More specifically, this chapter explores the means through which social networks promote inclusion or exclusion of different groups. In relation to this, the chapter also examines how innovation actors negotiate access to opportunities and the extent to which unequal power relations influence interactions between different groups. The chapter draws on interviews with agricultural stakeholders and household surveys of small-scale farmers to explore the varying degrees of their incorporation into LSLIs. Social network analysis tools were used to explore interactions between innovation actors.

The chapter starts by examining the conditions that determine inclusion or exclusion of small-scale farmers. Invariably, these factors determine the likelihood that formal interactions will occur. The remainder of the chapter is outlined as follows. Section 6.2 explores association membership as a factor that determines access to opportunities in the agricultural sector. Following a discussion on networking and how it relates to the small-scale farmers and LSLIs interactions, Section 6.3 considers patterns of interaction and

inclusiveness of LSLIs. Finally, negotiations between LSLIs and small-scale farmers are discussed in Section 6.4. The focus is on land disputes in the sugarcane sector and market interactions in the vegetable sector.

6.2 Association membership and access to opportunities

This section examines the criteria used for the access to agricultural support and external funding opportunities. In particular, it discusses how association membership affects small-scale farmers' interactions with LSLIs. Producer associations are characterised by interactions between their own members, thus, following Aurenhammer (2016), such associations constitute networks. As discussed in Chapter 2, networking is an important concept that contributes to the exchange of information and interaction between network actors. It involves negotiations where the aim is to build new relationships (Engel, 1995; Leeuwis and van den Ban, 2004). The section firstly discusses networking as the attempt to become incorporated into existing associations, and then the creation of new associations is considered. Finally, the section considers the implications for excluded parties.

6.2.1 Association membership

Research on LSLIs largely focuses on the conflicts and resistance which occurs in opposition to these investments. However, not all such challenges aim to prevent implementation of LSLIs (Steinebach, 2017). Commonly, small-scale farmers struggle to gain incorporation into these schemes, which are regarded as a means to access opportunities (Mamonova, 2015), because the sources of cash income in rural areas are limited and, as discussed in Chapter 5, agricultural support to small-scale farmers is also underprovided. In the case of Mozambique, association membership is the means through which small-scale farmers are able to access such opportunities. One argument in support of group formation is that, through the associations, farmers are able to pool their resources and explore economies of scale (Biele et al., 2008; Bernard and Spielman, 2009; Reed and Hickey, 2016).

Understanding networking is vital because associations represent the entry point of substantial agricultural support targeted at small-scale farmers in both study locations. Accordingly, association members are the primary beneficiaries of agricultural support provided by the government. Such support is limited and large numbers of farmers compete

for the same opportunities (Sabaratnam, 2017). Hence, becoming an association member is a means by which small-scale farmers attempt to access agricultural support. However, association membership depends on several factors. In addition to the need for approval by other members, the prospective member pays an entrance fee and makes monthly membership payments (G2_V_2016). As an example of networking, where the aim is to be incorporated into an existing association, the case of Alberto (S032_V_2016), Case study 6.1, is considered.

Case study 6.1 Networking and association membership

Alberto is a 34-year-old married farmer and father of four children. The youngest of his children is a 2-year-old girl and the eldest is a 12 year-old-boy. Alberto is originally from Moatize District in Tete Province. Before his involvement in the association, his main livelihood activity was commercialisation of agricultural products between Tete and Manica Provinces. In one of his trips to Manica, he became aware of the association activities and decided he wanted to be part of the scheme. Next, he recalls his journey and how he attained association membership:

"I had a friend here in Manica Province, we spent a great deal of time together in Vanduzi and Macate selling agricultural products. I asked him to organize a place to host me in Vanduzi. He said: 'you can come, I will find a place for you to stay.' First, I went by myself and then my family joined me. As I was living in [the village of] Belas, I met the president of the Association Nhaumbwe and I started helping him on his farm as a way to gain experience in agriculture. I was doing biscato [seasonal work] *on his farm. I learnt everything, transplanting cabbage, applying fertiliser, weeding, and other things. After two years, he lent one of his plots to me. He said: 'I can see that you have willingness to work but you do not have your own land, you can work here but you need to seek association membership, it is very good'. I worked in the first year, in the second year… and then I started to look for opportunities to be a member of the association. At the beginning the members did not agree to accept me. But with time, they accepted me. They gave me a land plot, I searched for 500 Meticais and I paid the registration fee. This was in 2010."*

Economic reasons explain Alberto's involvement with the association. Considering the wealth ranking criteria put forward in Chapter 4, Alberto's wealth status, as an intermediate class rural householder, has been accomplished over several years, since 2010, through the cultivation of diverse marketable crops in the three land plots he has within the association. As a result of his participation in the out-grower scheme, Alberto is building an improved house in the village of Belas, and his household owns one cow, eight pigs, and 12 chickens.

The case of Alberto exemplifies the process of networking as a mechanism to establish new relationships that allowed him to access new opportunities. With the help of a friend, who he met on his business endeavours, he created conditions for his relocation from Tete to Manica Province. Then, by means of the links that he created with the president of the Association Nhaumbwe, as an apprentice he managed to secure a place within the association. This also underscores the importance of networks inasmuch as the more experienced small-scale farmers preform the role of mentors of the new association members (Stock, 2007). However, his case also suggests that the process to gain acceptance as an association member is not straightforward.

Seemingly simple rules, such as the need to be approved by other association members and the payment of entrance fees, may indeed prevent the incorporation of some individuals as association members. An example of a different outcome of networking is the case of 41-year-old Jose (S091_V_2016). His main activity is carpentry; however, analogous to the majority of rural inhabitants, he is also involved in farming, mainly producing maize for subsistence. Jose has lived in the village of Belas since 2007, and has been trying to gain association membership since. As he explained: "*I did not succeed because land is scarce in the association* (S091_V_2016)*."*

Confronted with the difficulties of becoming integrated into existing associations, farmers opt to create new farming associations as a means to access to new opportunities. However, association membership in itself does not ensure access to external resources. For example, as a pre-condition to participation in the out-grower scheme through LSLI, the associations are required to have access to water and irrigation infrastructures in order to ensure their ability to supply LSLI products throughout the year without disruption. As a result of these pre-conditions, there are 30 associations in the vegetable sector in Vanduzi District, but only seven associations with access to water and functioning irrigation systems have formal links with Companhia de Vanduzi (I5_V_2016). In the sugarcane sector, only Association Muda Macequessa is involved in a production agreement with Açucareira de Moçambique. Associations without an irrigation system are automatically excluded. This is significant because the majority of small-scale farmers in Mozambique do not have access to irrigation. Therefore, those conditions result in their exclusion.

Even with such limitations and pre-conditions that small-scale farmers are not able to meet, farmers organise themselves into groups in order to take advantage of the external opportunities introduced by the government and other agricultural stakeholders. These findings support Leeuwis and van den Ban (2004) arguments whereby networking may not involve commitment but may create the foundation for future commitment.

Group formation, as an institutional innovation, is part of the farmers' response to the exclusion, a way to renegotiate access to the benefits. However, the administrative procedures that allow access to those opportunities may be beyond the reach of the small-scale farmers considering their educational attainments. For instance, to benefit from the incentives provided by the government the organisation must be legally registered. As explained by a government officer (I16_V_2016),

> *"There is a simple form. The person fills in the form and they import the equipment from anywhere in the world. The only expenses they will have are related to the transport and the customhouse services."*

However, as shown in Table 3.6, which summarises the survey respondents' characteristics, 5.2% of the respondents in the vegetable sector never went to school, and 24.9% did not finish their elementary education. In the sugarcane sector these percentages are 42.6% and 23%, respectively. This limits the ability of the farmers to access those opportunities. Acknowledging their limitations, small-scale farmers make tactical alliances by including people at different levels of government as association members. This is in line with Reed and Hickey (2016) who suggested that the performance of cooperatives in Senegal depends on the social capital of its members. Hence, the invitations to individuals in different societal positions aim to increase the association's social capital. The expectation of the small-scale farmers is that the inclusion of more powerful stakeholders will facilitate links between rural households and external sources of funding.

For example, an attempt to create a tactical alliance occurred during the fieldwork undertaken in Nhamatanda District where members of the association AGRIPEL in Sofala Province invited the researcher to be part of their association with the hope that this would increase their ability to access external resources. These activities are also in accordance with Platteau (2004) who suggested that social capital is increased through the creation of

tactical alliances between the local elite and individuals operating outside the villages. While the case of AGRIPEL suggests that small-scale farmers have the leeway to control who becomes an association member, the case of the Association Muda Macequessa, discussed in the following section, reveals that association membership is not always conceded by mutual agreement between the existing members and the prospective entrants.

As discussed in Chapter 5, being an association member is also a mechanism through which powerful individuals are able to capture the benefit of development projects. This includes local politicians, government officers, and other intermediaries, who are neither small-scale farmers nor inhabitants of the location of the project implementation, and who impose themselves on the farmers. They have threatened to remove benefits currently in place, or to curtail potential future opportunities, by suggesting that without their participation investments on irrigation made in farms of the Association Muda Macequessa would be implemented elsewhere (I6_S_2016). Through this and similar manipulative practices, these powerful actors have secured their place in the Association Muda Macequessa. Instead of facilitating access to new opportunities, subnational actors use their role as development brokers to take advantage of the projects directed at the association members.

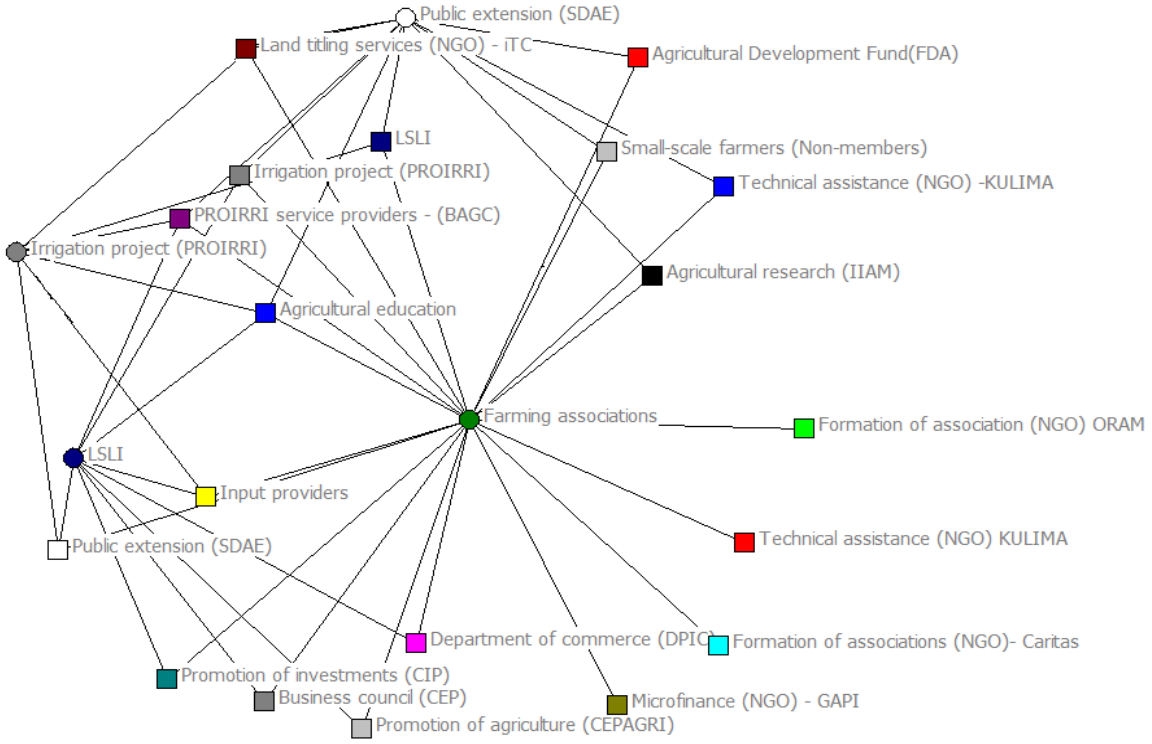
The findings in this section suggest that local initiatives also play a role in creating farming associations, albeit where the aim is to gain access to external opportunities. This finding challenges the view of Sourisseau (2015), who argued that the creation of associations is usually the result of external interventions. In the case of Mozambique, group formation is at the centre of the government strategy to provide agricultural support (Government of Mozambique, 2010). The farming associations perform different roles for the rural communities. Accordingly, the next section explores the different reasons for association membership put forward by small-scale farmers.

6.2.2 Membership benefits

There is a differential access to external resources between association members and non-members. As discussed in Chapter 3, farming associations in both vegetable and sugarcane sectors are currently benefiting from PROIRRI, a World Bank funded irrigation project, which has created the conditions for their interactions with LSLI. In the past, they have benefited

from the support of the public extension services and other partners, as shown in Figure 6.1, and training to organise themselves into associations.

Figure 6.1 Network of organisations with linkages with the farming associations



Source: Author, based on Interviews

However, access to external opportunities is not the only reason to seek association membership. Small-scale farmers seek association membership for different reasons. Broadly put by one farmer (S024_S_2016) when asked why he decided to join the association, he responded: "*to see the world growing".* There were 42 valid responses to this question which were then coded to provide four main themes, as presented in Table 6.1.

Table 6.1 Reasons for association membership.

Reasons for association membership	Number of respondents
Replacing a family member	6
Founders	7
Networking and access to opportunities	16
Alternative for formal employment.	13
Total	**42**

Source: Author, based on interviews

As shown in Table 6.1, six respondents mentioned that they were replacing a family member. This is considered here as a social reason for seeking association membership. In this case, the association is regarded as a safety net for the village inhabitants and provides opportunities for networking. As a member of the Association 7 de Abril (S006_V_2016) remarked: "i*f you cry alone, no one listens".* In some instances, the associations represent a form of social protection for the relatives of the members. This is common in the vegetable sector where replacing a family member usually involves taking the place of a parent, or other relative, who is unable to participate in the association activities due to illness, or in the case of death (S025_V_2016). In these circumstances, a relative not previously engaged in the association activities is accepted as a member.

Seven respondents mentioned that they were founders. The founding members are usually farmers who possess customary land use rights in the areas where the association was established. Considering the typologies of the farmers, based on their attitudes toward farming, most of the founders are traditionalists and view farming as a way of life. In their attempt to secure contiguous areas for the farming association, the government granted automatic membership to the former land users in the vegetable sector. This measure provides social protection to the association members and their families. In contrast, in the sugarcane sector, former land users were not granted automatic membership. As a result, these farmers have not only been excluded from the LSLI interactions but also risk being displaced from their land.

Table 6.1 also shows that small-scale farmers predominantly seek association membership for economic reasons as the majority of respondents linked association membership with access to financial opportunities. Of the 42 respondents, 16 mentioned that association membership is important for networking and accessing new opportunities. As explained by a member of the Association AGRIPEL (S064_S_2016):

> "*To be part of the association facilitates access to opportunities. For instance, when a project comes to our area, the current organisation, as an association, is better than working alone because it can facilitate access to credit. If the group is known and structured, it can more easily obtain credit than a single farmer."*

By the same token, a relatively large group of farmers, 13 respondents, view the association as an important source of cash, offsetting the shortage of formal employment in the village, and allowing them to maintain a regular income through production agreements with LSLIs. This also results in indirect benefits for non-members. These benefits include spill-overs that occur as a result of the commercial activities fostered at the village level and which allow an increase in the circulation of cash, or they occur via the technological exchanges between association members and non-members.

Furthermore, interview results suggest that there is relationship between association membership and other wealth ranking criteria. These results are supported by the chi-square test for independence between variables. In the case in which the assumptions of the chi square tests hold as explained in Chapter 3, the test suggests that there is an association between membership of farming groups and transport ownership in both the vegetable and sugarcane sectors. This means that, in both sectors, association members are more likely to own their own transport than are non-members. Additionally, association members are more likely to own livestock than are non-members in the vegetable sector. The test results are presented in Appendix 6.

The findings suggest that poor households are not included in association activities. In the case of PROIRRI, to justify the bias against poor farmers, a project manager (I10_V_2016) stated that they simply follow the project requirements, which means the farmer must be member of a registered association which possesses formal land use rights and have access to water with the potential for irrigation during the cropping season. These requirements reinforce business as usual, in other words, they tend to favour the better-off farmers and, thereby, exclude the most vulnerable groups who have neither access to irrigation nor formal land use rights. These findings corroborate those of Bernard and Spielman (2009) who found that poorer households tend to be excluded from the producer organisations.

Furthermore, interview results suggest that it is the same group of farmers who have had agricultural support from multiple organisations such as GAPI, ORAM, ADIPSA and KULIMA over time (I15_S_2016). This suggests that the better-off farmers are more likely to benefit from development projects. These findings corroborate those of Sabaratnam (2017), who also found that associations are the means through which small-scale farmers access

opportunities in Northern Mozambique. Moreover, considering the age of the small-scale farmers, which is also related to their attitudes toward farming, as seen in Chapter 3, association membership is more important as a source of wealth to younger farmers. This is illustrated by the quotations seen in Table 6.2.

Table 6.2 Association membership and links with LSLI as a source of wealth

Examples	Wealth criteria	Illustrative quotations
Association member in the vegetable sector (S083_V_2016), 16 years old	Improved house	"You *can build your house with Vanduzi."*
Association member in the vegetable sector (S032_V_2016), 34 years old	Improved house	*"I am waiting for the baby corn payment to finish my house."*
Association member in the sugarcane sector (S010_S_2016), 38 years old	Transport and improved house	*"Those who did not have bike now have bikes, those who did not have house are building their houses because of sugarcane."*
Non-member and village leader in Sofala (S024_S_2016)	Access to land	*During the time of Samora Machel[5] all this land belonged to GAPPO[6]. When they left the area, they gave the land to us."*
Non-member (S206_V_2016) in Manica, 67 years old	Access to land	*"I have all this riverbank. All of this is mine, so why do I need to be a member of the association?"*

Source: Author, based on interviews

The table suggests that association membership and participation in the out-grower scheme is an important means through which the younger farmers, who are usually the fatalistic and progressive farmers, are able to improve their lives. Meanwhile, access to land explains the prominent societal positions of older farmers, classified as traditionalists based on their attitudes towards farming. In Mozambique, the majority of land users have customary rights over the land (German et al., 2013). However, these rights, based on occupation and usage, are not enough to ensure access to opportunities.

The findings in this section suggest that farmers regard access to land as a source of wealth. This is in line with Peters (2002)'s findings about Malawi where farmers regard differential access to land as a wealth-ranking criterion and a source of social differentiation. Nevertheless, in the case of Mozambique access to land does not translate into access to other opportunities if the farmer is not affiliated to an association selected for intervention.

[5] Samora Machel was Mozambican president following independence in 1975 and until his death in 1986. During that time, as discussed in Section 4.2, Mozambique adopted a one-party system of government and transformed the former colonial plantations into socialist farms. These farms were managed by the Office of Agricultural Production Support (GAPPO)

[6] GAPPO[2] is the Portuguese acronym for *Gabinete de Apoio à Produção Agrícola*.

To access opportunities, farmers are required to access land within those associations, which is invariably a scarce resource.

With particular focus on associations engaged in formal interactions with LSLIs, this section discussed how associations are created and the criteria for membership. Exploring the criteria for association membership is relevant because it ultimately determines access to opportunities in rural areas. Taking this into consideration, the next section explores the patterns of interaction between different innovation actors.

6.3 Patterns of interaction and inclusiveness of LSLIs

The section focuses on the interaction processes, taking into consideration attitudes and practices of innovation actors as well as how land access is negotiated. The dimensions of interactions include inclusiveness of the poor, networking, and coordination within the system (World Bank, 2006). These interactions also draw attention to the broader aspects related to the institutional systems that affect interpersonal relations (Scott, 1987). This section firstly discusses the degree of incorporation of small-scale farmers in the out-grower schemes and examines the implications for those who are excluded.

6.3.1 Degrees of incorporation of small-scale farmers into LSLIs

Interactions between small-scale farmers and LSLIs take different forms. Members of the local community can be incorporated into LSLI activities as labourers or as out-growers. However, given the shortage of employment within LSLIs, small-scale farmers are predominantly incorporated into their activities as out-growers. Hence, this section discusses the incorporation of small-scale farmers in the out grower' schemes. The out-grower scheme involves a system whereby the LSLI outsource part of their production and act as a nucleus organisation providing input and technical assistance to small-scale farmers. Their interactions are enforced by contractual arrangements. Degrees of incorporation refer to the type of linkages between LSLIs and small-scale farmers. As shown in Table 6.3, three levels of incorporation have been considered in this study.

Table 6.3 Degrees of incorporation in the out-grower schemes

Levels	Cases
Inclusion	• Association members who participate in the out-grower scheme
Partial inclusion	• Association members not involved in the out-grower scheme • Non-members with links with association members engaged in the out-grower scheme
Exclusion	• Non-members without links with association members.

Source: Author's construct based on interviews

Table 6.3 shows that incorporation ranges from complete inclusion to complete exclusion from the activities of LSLIs. Inclusion is the situation whereby small-scale farmers are involved in the production agreement with LSLIs. Exclusion occurs when farmers have no formal links with those companies. Between these two extremes there is a range of possibilities for, or perceptions of, participation, which are considered here as different forms of partial inclusion. The two forms of partial inclusion considered in Table 6.3 involve indirect linkages with LSLIs: through their association membership, for members not participating in the out-grower scheme; or through the linkages with association members taking part in the out-grower schemes for non-members.

In the vegetable sector, such agreements involve individual farmers and the LSLI. Hence, participation in the out-grower scheme is an individual decision for the association member. This also allows the LSLI to select who participates in the out-grower scheme. As a result, not all association members are included in the out-grower scheme. Table 6.4 shows additional information about the associations involved in production agreements with LSLIs.

Table 6.4 Associations involved in the out-grower schemes

Province	Association	Number of Members	
		Provided by LSLIs	**Provided by small-scale farmers**
Manica	Campo 4	30	54
Manica	Nhamanembe	19	44
Sofala	Muda	36	36

Source: Number of members provided by the LSLIs and through interviews with farmers

As an example, Table 6.4 shows that the numbers provided by the LSLIs concerning the Association Campo 4 amounts to 30 small-scale farmers, whereas the farmers claimed 54 members compose the association. The number of association members provided by the two sources differ in the vegetable sector. This occurs because not all association members are involved in the out-grower scheme. Despite being association members, 24 of these

farmers in Campo 4 are excluded from the out-grower scheme, clearly this is a form of exclusion. Table 6.5 provides different explanations for the exclusion of association members from the out-grower schemes.

Table 6.5 Reasons for the exclusion of association members

Reasons	Examples
Breach of contract	Association members sell LSLIs' products to other buyers without company consent. Companhia do Vanduzi withdrew from Sofala because of this.
Disregarding LSLIs' recommendations	In the vegetable sector, non-implementation of technical recommendations, such as weeding and pruning of LSLIs' crops, may be interpreted as negligence.
Self-exclusion	In the vegetables sector, farmers stopped producing LSLIs' crops because they disagreed with the price offered.

Source: Author, based on interviews

However, exclusion from the out-grower scheme does not have implications for participation in other association activities because the associations are multi-purpose. Given these multiple possibilities for association members, non-involvement in the out-grower schemes is considered here as partial inclusion. Partial inclusion involves association members who are able to interact with LSLIs daily, but are not engaged in the out-grower scheme. Partial inclusion also involves non-members who believe they benefit from the activities of the LSLIs in other ways. This includes non-members with different links to the out-growers, as shown in Table 6.6. These links include family ties, friendship ties, and employment relationships. The last involves employees of the association members.

Table 6.6 Links between members and non-members and information exchange

Type of link	Examples	Observations and illustrative quotes
In both sectors family ties are the most common type of link because farming is, for the most part, performed as a household activity.	In the vegetable sector, as discussed in Chapter 4, all family members tend to engage in farming activities regardless of their formal status concerning membership.	For example, the researcher met 22-year-old Paulo (S052_V_2016) with other members of his household performing different tasks on his farm in the Association Nhamanembe, as shown in Figure 6.2.
	In the Sugarcane plantation of the Association Muda Macequessa.	The plantation workers are, for the most part, relatives of association members.
Friendship, non-members mentioned that they obtain agricultural information from their friends within the association.	When asked if he had links with Companhia de Vanduzi, a 41-year-old carpenter form Manica province, Jose (S091_V_2016) responded…	"*I have links with Companhia do Vanduzi through my friend who works with them. Sometimes I help my friend in his farming activities*".
	Jairosse (S206_V_2016), a 67-year-old male, mentioned that he visits his friends in the associations regularly.	*"I even go there and ask: what is this? How do you produce this? What is this type of fertilizer for?*
Employment, includes non-members who provide services to association members.	Jamal (S176_V_2016), is a 34-year-old male who lacks enough funds to buy land within the association.	To earn cash income, he performs seasonal work on the association farms
	Peter (S027_V_2016), is a 19-year-old male and permanent worker on one association farm in Vanduzi.	He performs most of the farming activities, but does not participate in the association meetings.

Source: Author, based on interviews and fieldwork diary

Figure 6.2 Family members performing different tasks in Paulo's plot in the association

Source: Author, August 2016

Table 6.5 suggests that interpersonal links facilitate information exchange within the village. Accordingly, small-scale farmers mentioned that the LSLIs influence their livelihoods because they have friends and relatives within the associations. As a result, non-members believe that they have links with LSLIs. This is also shown by the cross tabulation between association membership and links with the LSLIs, as illustrated in Table 6.7.

Table 6.7 Cross tabulation between association membership and links with the LSLIs

		Association membership		
		Yes (%)	No (%)	Total (%)
Links with LSLI (Vegetables)	Yes	90 (52.33)	8 (4.65)	98 (56.98)
	No	10 (5.81)	64 (37.21)	74 (43.02)
	Total	100 (58.14)	72 (41.86)	172 (100)
Links with LSLI (Sugarcane)	Yes	16 (26.67)	3 (5.00)	19 (31.67)
	No	3 (5.00)	38 (63.33)	41 (68.33)
	Total	19 (31.67)	41 (68.33)	60 (100)

Source: survey results (n=234)

Table 6.7 shows responses to the question: do you have any links with LSLIs? Results show that 4.65% and 5% of non-members in the vegetable and sugarcane sectors, respectively, stated that they have links with LSLIs; while 5.81% and 5% of association members in the vegetable and sugarcane sectors, respectively, stated that they have no links with the companies. These results also reflect intra-community inclusion and exclusion of households from the out-grower schemes in both sectors.

The findings in this section indicate that there are different degrees of inclusion and exclusion of small-scale farmers into the activities of LSLIs. Considering the above-mentioned functions performed by these organisations at the local level, along with their role as a link to the local communities with other levels of governance (Bosc et al., 2015), exclusion also suggests a lack of opportunities for capacity building and inadequate coordination with other innovation system actors.

Accordingly, inability to participate in negotiations with external actors leads to exclusion and accelerates the process of social differentiation within communities. In both the vegetable and sugarcane sectors, association workers do not participate in the association meetings and are not involved in the negotiations with LSLIs. As discussed in Chapter 5, pre-existing power relations allow well-connected village inhabitants with links at different levels of governance to participate in the negotiations with potential investors or

development partners. In this way, new opportunities, such as LSLIs, are likely to exacerbate the imbalance of power. This is more noticeable in the sugarcane sector where members of the Association Muda Macequessa managed to acquire land use rights for 100 hectares, including areas currently cultivated and settled by non-members, for more than 10 years (S064_S_2016; S025_S_2016; S027_S_2016). As a result, the excluded small-scale farmers are likely to be further impoverished due to the loss of land caused by these investments. This corroborates findings by Purvis and Grainger (2004) who highlighted that participation is influenced by existing power relationships. This also is in line with Rigon (2014), who investigated participation in an internationally funded urban development project in Kenya and found that the project reinforced pre-existing imbalances of power. As in the case of the urban development project in Kenya (Rigon, 2014), in Macequessa the most vulnerable groups have been excluded from the development project.

After discussing the varying degrees of incorporation of small-scale farmers in LSLI activities, following section presents a discussion of the terms of inclusion and exclusion within LSLI activities.

6.3.2 Terms of inclusion and exclusion

This section discusses the forms of organisation of small-scale farmers and how this relates to their interactions with LSLIs. The form of organisation refers to the combination of structure, management processes, and strategy (Miles and Snow, 1986). Therefore, this section aims to distinguish the different ways in which production is organised within the associations. It is important to analyse this because the preferences of the government and agricultural stakeholders in how they channel their support through the producer organisations influences their outreach and the distribution of the costs and benefits of intervention in the host communities.

In Mozambique, organising farmers into groups has been employed at various stages of the country's history. Before 1975, small-scale farmers were organised into cooperatives, the objective being to facilitate territorial administration and to provide additional benefits to farmers that were more integrated with the colonial system of administration (Hermele, 1988). During the socialist era, from 1975 to the late 1980s, the government forced rural inhabitants to live in communal villages (O'Laughlin, 1995; Jone, 2005). At this stage,

production activities were centred around state farms and the cooperatives created by the government (Rogerson, 1981; Jone, 2005). Organisation of small-scale farmers in groups is an ongoing practice that has also been reinforced by the expectations created by international donors who channelled their support through the groups at the end of the civil war in 1992 (Gotschi et al., 2009; Sabaratnam, 2017). This context provides the foundation for current choices in terms of the organisation of production.

The discussion in this section is based on a comparison between two associations in Nhamatanda District where past experiences influence current organisational choices. The first, Muda Macequessa, is involved in the production of sugarcane, and the second, AGRIPEL, produces a diversity of vegetables. This comparison also contributes to an understanding of the extent to which the cropping system influences small-scale farmers and LSLI interactions. The cropping systems explain some aspects of the organisation of production. For instance, sugarcane plantation in the village of Macequessa occupies a contiguous area of 58 hectares. Due to the scale of production, the plantation is managed as one production unit and the farm is managed collectively. This arrangement differs from the organisation of production in the vegetable sector where the association farm is subdivided into smaller production units managed by individual farmers. Typically, as shown in Section 4.3.3, the vegetable plots occupy areas of less than one hectare. In the vegetable sector, individual plots are allocated to association members who make their own decisions about production. In addition to the scale of production, allusions to the cooperatives during the socialist era suggest historical factors contribute to the current form of organisation.

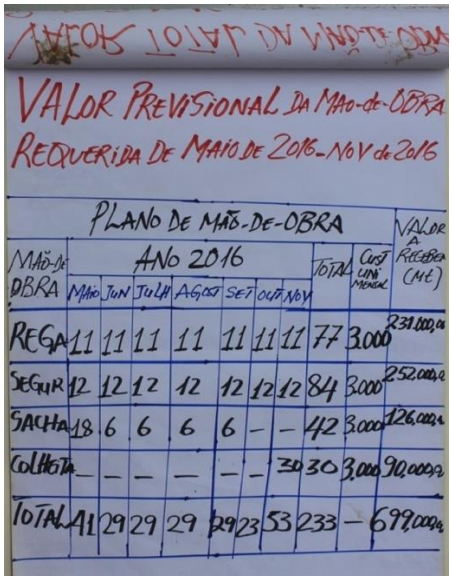
In the vegetable sector, the older farmers take into consideration their past experience of the socialist era as to how the production was organised at that time and its shortcomings. As explained by a member of the association AGRIPEL (I6_S_2016),

> "*If we perform our activity as if this was a cooperative, they used to work together and then sell the products. Sometimes they divided the money, in some cases it did not work very well. The association belongs to all of us, but when it comes to producing as such, each farmer produces in his own area to avoid conflict.*"

This is an unequivocal attempt to maximise the benefits of working in a group while safeguarding individual benefits and avoiding the same mistakes made in the socialist era. Furthermore, the term cooperative employed here has negative connotations linked to the farmers' experiences during the socialist period. After independence, the FRELIMO government promoted cooperatives and encouraged farmers to produce collectively (Rogerson, 1981; O'Laughlin, 1995), but ownership of the production was not allowed. Moreover, Walling et al. (2017) suggest that the term 'cooperative' may also have negative connotations due to colonial legacies.

While some farmers consciously avoid forms of organisation that resemble the cooperatives of the socialist era, others seem willing to reproduce the socialist cooperative in contemporary Mozambique. This is the case in the Association Muda Macequessa where the association farm is managed collectively, and the revenue is distributed equally amongst the association members. Similarly, the salary for all association workers is uniform, regardless of the individual responsibilities. This is seen in Figure 6.3, which shows the projected labour costs for 2016.

Figure 6.3 Costs of Labour


VALOR PREVISIONAL DA MÃO-de-OBRA
REQUERIDA DE MAIO DE 2016-NOV de 2016

PLANO DE MÃO-DE-OBRA

MÃO-de-OBRA	ANO 2016							TOTAL	CUST UNI MENSAL	VALOR A RECEBER (MT)
	MAIO	JUN	JULH	AGOST	SET	OUT	NOV			
REGA	11	11	11	11	11	11	11	77	3.000	231.000,00
SEGUR	12	12	12	12	12	12	12	84	3.000	252.000,00
SACHA	18	6	6	6	6	–	–	42	3.000	126.000,00
COLHEITA	–	–	–	–	–	30	30	3.000	90.000,00	
TOTAL	41	29	29	29	29	23	53	233	–	699.000,00

Source: Flip chart presentation by a BAGC technician (I13_S_2016)

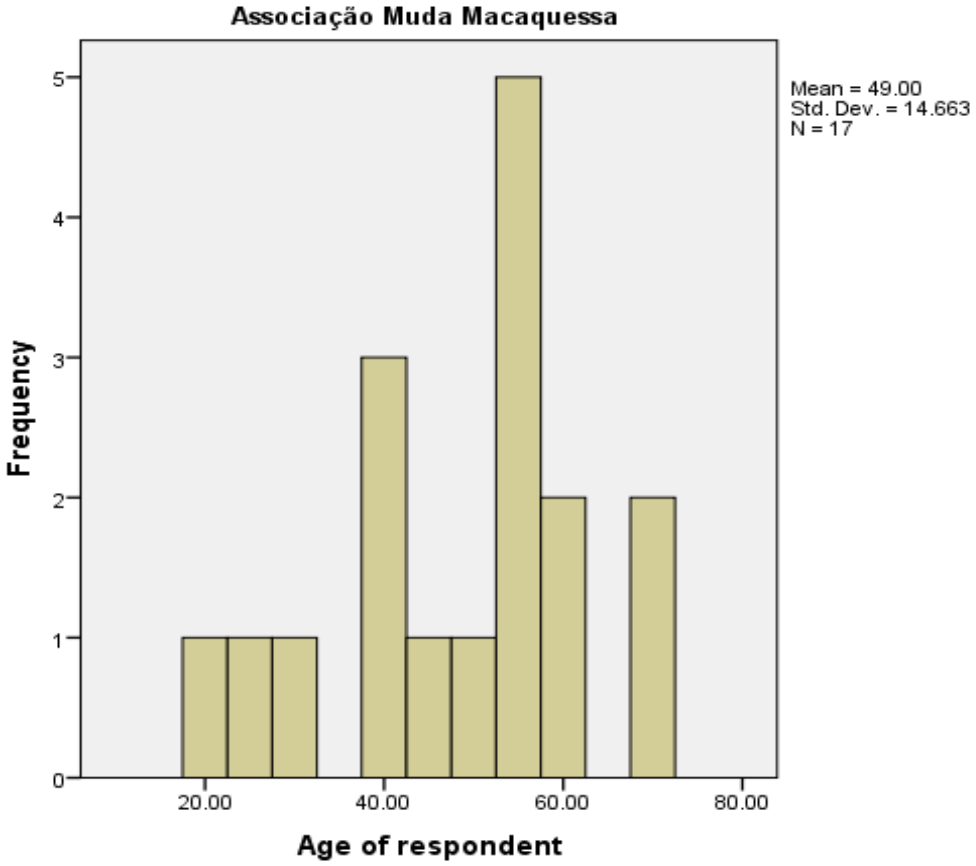
Based on this plan, the monthly salary of association workers responsible for irrigation, security, weeding, and harvesting the crop from May to November is the same in each category. As shown in the second column from the left, the monthly payment is 3000 MZN.

This resembles the organisation of production during the socialist era. There are implications for each form of organisation. Equal distribution of benefits which disregard individual performance and responsibilities may undermine the performance of the organisation. Entitlements to association dividends that are linked to membership, rather than to individual performances, create conditions for elite capture and appropriation of the benefits by powerful individuals.

As discussed in Chapter 5, through association membership development brokers at different levels are able to benefit from the association dividends. These powerful individuals also include local actors. Accordingly, equal distribution of benefits was the mechanism through which the eldest association members could retain benefits, regardless of their participation in the association activities. A 71-year-old founding member (S012_S_2016) explained that during the negotiations for implementation of the new irrigation system, Açucareira wanted to include the young and the physically strong members of the community as association members. This would exclude many of the founding members, however, the elderly association members managed to retain their membership, and also to include their relatives, not only as association members but also as association workers.

Considering the attitudinal features toward farming presented in Chapter 4, these founding members are either opportunist or traditionalist farmers. The association was created in 2005 (I5_S_2016) and, as shown in Figure 6.4 below, most of the founding members are elderly people who are limited in their ability to perform physical tasks.

Figure 6.4 Age of the research participants, Association Muda Macequessa



Source: survey results

The percentile Table 6.8 illustrates that only 25% percent of the respondents are aged under 39.

Table 6.8 Percentile age of the respondent, association Muda Macequessa

	Proportion of data below each percentile	Age of the association member
Percentiles	25	39
	50	55
	75	59

Source: survey results

To respond to the labour needs within the association, the elderly members decided to employ their younger relatives as association workers. This allowed the elderly to secure their membership and their entitlement to the association dividends at the end of the growing season, regardless of their participation in the daily activities. These activities include managing the water pump, changing the sprinklers, and guarding the farm, each one the responsibility of association workers. This arrangement limits the possibility for inclusion of other village inhabitants, thereby resulting in the exclusion of the majority of

the village inhabitants from the sugarcane production scheme. As explained by a non-member villager (S017_S_2016),

> "*They said that whoever possesses a farm in the area can be a member of the association, contrarily, the oldest members of the association accepted only their relatives.*"

This is an example of overly closed networks wherein strong ties between association members negatively impact the wider community (Fisher, 2013). In spite of these characteristics, the association hires workers from outside their closed networks to perform activities, such as plumbing, that require skills association members do not possess. These skilled workers have either worked for Açucareira de Moçambique, or been involved in the construction of the Muda Macequessa irrigation system. The ability of these individuals to secure a place as workers in the association shows that a diversified knowledge structure contributes to an equitable income distribution (Cimoli and Rovira, 2008).

This section has shown that powerful individuals manage to appropriate the benefits of interventions targeted at the small-scale farmers through their membership of the Association Muda Macequessa. Although not involved in daily activities, they are entitled to the association dividends. In addition to association membership, to interact with LSLI schemes, small-scale farmers are required to possess formal land use rights. The next section explores how land systems mediate interactions between LSLIs and small-scale farmers, and the ways in which access to formal land use rights determine access to opportunities.

6.3.3 Access to land and the inclusion of small-scale farmers

This section explores the Mozambican Land Law and the extent to which its implementation influences the practices of small-scale farmers. The government of Mozambique has facilitated formalisation of the land use rights of the producer organisations. This has introduced some nuances in rural land ownership. Conventionally, rural land is managed by the traditional leaders who allocate land to different households. Formerly, the households managed separate production units, however, with the formation of the associations, the communal land has been assigned to the farming associations.

The association land use rights usually encompass land customarily occupied by the association members. With the creation of the association, the former land users are integrated as members. This arrangement is working well in the vegetable sector in Manica Province where 80.8% of the survey respondents stated that there are no land conflicts. This contrasts markedly with the sugarcane sector where the Association Muda Macequessa possesses land use rights for 100 hectares and contains land occupied by non-members not integrated into the association. This has resulted in land conflicts between association members and the other occupants of the remaining 42 hectares assigned to the association. These farmers are not involved in the irrigation project and risk being evicted from the land they have been allocated by the village leader. As a result of these conflicts, the association is only farming 58 hectares out of the 100 hectares allocated to them, leaving 42 hectares of disputed land.

These land conflicts are in part caused by the way in which the acquisition of the 100 hectares occurred. Former land users and current inhabitants of Macequessa were not consulted before the allocation of the land to the association. According to the Mozambican Land Law, Law N^{o} 19/97, 1 October (Assembleia da República Moçambique, 1997), local inhabitants should be consulted prior to the allocation of land to a new investor. The same law states that the land can be acquired by occupation, and that the absence of registration shall not affect the land use rights. In the case of Muda Macequessa, some of the inhabitants not incorporated into the association have lived in the area for more than 15 years. For example, Fernando (S025_S_2016), Joaquina (S027_S_2016) and their families have been living in the village of Macequessa for more than ten years and were not consulted before the allocation of communal land to the Association Muda Macequessa. Land acquisition without free, prior, and informed community consent also occurs in Gaza Province in Mozambique, where the majority of the members of the community were not involved in the consultation process (Porsani and Lalander, 2018).

During the fieldwork, between March and September 2016, negotiations were undertaken for the expansion of the sugarcane plantation into the disputed 42 hectares. The rural inhabitants currently using the land in the expansion areas asked for compensation, but the association members were not willing to provide it (S004_S_2016; S001_S_2016). Customary claims to land in Mozambique are subject to implementation biases whereby

the government tends to support implementation of LSLI activities in the name of modernisation (Hanlon, 2004; Matavel et al., 2012).

The expansion of the sugarcane plantation, and the resulting land conflicts, reinforce the notion that the land tenure system provides unclear rights to different groups and increases the possibility of LSLI activity, as argued by Anseeuw et al. (2012). However, contrary to what is happening in Mozambique, in countries such as Indonesia the customary claims to land are more important than the formal claims (Steinebach, 2017). In the case of Indonesia, strategic employment of identity and the plurality of legal orders create an institutional setting that challenges LSLI.

The process of land acquisition in the case of Muda Macequessa is atypical. The characteristic in this case is that the land use rights have not been allocated to external investors. The rights were allocated to a farming association that comprises village inhabitants and the local elite. This may be seen as control grabbing (Borras Jr et al., 2012; Huggins, 2014). Control grabbing, according to Borras Jr et al. (2012), involves the power to control land and to derive benefits from land and other natural resources, regardless of ownership status. The similarity here with Borras Jr et al. (2012) is that the land acquisition process does not involve ownership. Contrary to the idea that control grabbing does not require expulsion of peasants, as argued by Huggins (2014), the case of Muda Macequessa suggests that land control is also associated with displacement of rural inhabitants from their farms.

The literature on LSLI largely fails to explain the mechanisms of land acquisition in Mozambique because it concentrates on direct land acquisitions involving the transfer of the land use rights from the local communities to external, powerful entities (Borras Jr and Franco, 2012; Cotula, 2012; Borras Jr and Franco, 2013; Cotula, 2013). In this study, the LSLIs found ways to fully use land owned by the small-scale farmers. Without legal rights to the land, and with the support of the government, LSLIs are able to convert lands occupied by farmers to produce their crops. Basically, they have access to land and labour. This corroborates Li (2011) argument that LSLIs want access to both land and cheap labour.

These conditions have been created in central Mozambique where expensive investments in irrigation have been made to promote the crops commercialised by the LSLIs. In the case of Muda Macequessa, although the land use rights were allocated to a subgroup of small-scale farmers within the community, LSLIs make use of the land through their production agreement with small-scale farmers. Thus, the LSLIs not only benefit from the land and cheap labour, they are also the ultimate beneficiaries of the investments made by the World Bank, via the government of Mozambique. Hence, as the survey results show, 51.9% of the small-scale farmers believe that LSLI contributes to land conflicts. This suggests that implementation of LSLI changes availability and access to land.

Those most impacted appear to be the village inhabitants who are not involved in the association, which clearly suggests that LSLI activities are not inclusive. The rights of the rural inhabitants are neglected in this process with total disregard of their occupation rights as envisaged by the Mozambican land system. Even when compensation is endorsed, because of the transaction costs they face to settle in a new location, farmers are likely to be left in a worse position when compared to their position should the status quo be maintained (Patil and Ghosh, 2017).

Furthermore, the findings in this section corroborate with De Schutter (2011) to the extent that using small-scale farmers' land to produce LSLIs' crops means the risks involved in producing and marketing such crops is transferred to the small-scale farmers, in both the vegetable and sugarcane sectors. Hence, having explored the mechanisms of exclusion and inclusion and examined the factors that influence interactions between innovation actors, the following section moves on to explore how unequal power relations affect such interactions in both the vegetable and sugarcane sectors.

6.4 Unequal power relations and interaction between innovation actors

Taking into consideration challenges introduced with implementation of LSLI, this section discusses how access is negotiated. Access, according to Ribot and Peluso (2003), is determined by a bundle of changeable powers exercised through different mechanisms, social relations, and processes. At the outset, or in the case of the expansion of LSLIs to new areas, these powers are employed to negotiate land access. During the implementation of LSLIs, such powers are exercised to negotiate market access. Accordingly, this section

firstly explores how different power resources are deployed to negotiate access to land as well as to demand compensation in the sugarcane sector. Following the discussion of land disputes in Section 6.4.1, market interactions are considered in Section 6.4.2.

6.4.1 Negotiations in the sugarcane sector

This section explores the land conflicts that arise with implementation of LSLI in central Mozambique. Land disputes are the main determinant of the negotiations that occur in the sugarcane sector. In these disputes, local actors draw on different resources and employ multiple tactics to exercise power. For example, Table 6.9 illustrates different tactics employed by innovation actors whose livelihoods are affected by the production of sugarcane. It focuses on three groups of actors, namely, association members, non-members, and the investors. Table 6.9 shows the legitimacy claims concerning the rights to land of the abovementioned actors and the mechanism through which they are able to access funding opportunities.

Table 6.9 Tactics, rights, and power resources of innovation actors.

	Tactics and rights to land of different groups		
Issues	Association members	Non-members	LSLIs
Rights to land, legitimacy claims	Formal land use rights (DUAT)	Occupation rights, valid according to Mozambican law	De facto land control through contractual agreements with association members
Access to funds and other opportunities	Exclusion, ability to decide who becomes an association member	Forcing awareness of their presence	Out-grower schemes allow LSLIs to access public funds
Power resources	Social capital, links with local elite, ability to manipulate processes to their advantage	Right to vote, ability to influence politicians, collective action	Value chain governance, use of their position within society to influence policy
Negotiation over land conflicts	Coercion, manipulation, lobbying, and persuasion	Weapons of the weak (non–compliance, demanding compensation)	Avoidance of direct involvement in negotiation

Source: Author, based on interviews

The above table also shows different power resources and the mechanisms through which such powers are exercised in negotiations over land conflicts. Through exclusion association members retain their position as gate keepers and control access to external opportunities. They exclude non-members by controlling who participates in meetings with project managers and potential development partners. In doing so, the views of the association members are conveyed as the views of the village inhabitants. The drawback is that

exclusion undermines the ability of the non-members to challenge the status quo. Nevertheless, they are not passive.

Non-members try to influence social events in their favour by negotiating their space using different power resources. For example, with the aim of expansion of sugarcane production into the additional, but disputed, 42 hectares, village inhabitants were advised not to prepare their land for planting in the cropping season of 2016/2017 because the area had been reserved for sugarcane plantation. In defiance, they did not proceed as advised. On the contrary, they carried on with their farming activities. Non-compliance, according to Scott (2008), is a standard form of resistance employed by relatively powerless groups. During the researcher's last visit to the village of Macequessa, towards the end of September 2016, the village inhabitants had cultivated their land as usual and were waiting for rains to come to plant cereals, such as maize and sorghum, for their subsistence. The fact that the association was not able to make use of the land allocated by the government in its entirety shows that non-members have de facto leverage. They have been successful in preventing the planting of sugarcane in the additional 42 hectares. The distinction between the rights to resources and the ability to make use of such resources is important in this case (Ribot and Peluso, 2003; Pedersen, 2016).

The negotiations for the expansion of the sugarcane production occur amidst an atmosphere of mistrust and apprehension. World Bank (2006) suggests that mistrust, along with a top-down culture and lack of confidence, are restrictive practices that inhibit innovation. Perhaps, as a counter-measure against their exclusion from the formal meetings, non-members did not wait for an invitation to approach external actors entering their village. As the negotiations for compensation were happening in July 2016, they invited themselves to engage with any actor with potential links to the LSLIs. For example, in some instances, the fieldwork activities conducted for this research in Mozambique were inaccurately regarded by some inhabitants of Macequessa as part of the household registration process for compensation purposes. In these situations, as described in the research procedure outlined in Section 3.5, the researcher stressed his position as a doctoral student and provided the necessary information to dismiss any misunderstanding. Nevertheless, farmers wanted to ensure that their voices were heard and their houses and

resources were accounted for, accordingly, village members volunteered their participation in the study.

With a tone of negotiation, non-members use different tactics to invoke their occupation rights. For instance, Joaquina (S027_S_2016) emphasised the number of years her family have lived in the village by pointing out that she has five children, the eldest is 15 years old and all were born in the village of Macequessa. Another female non-member (S059_S_2016) insisted that her niece, who lives in the same compound but in a different mud hut about four metres away, should also be interviewed and considered as a different household for compensation purposes. Furthermore, an 80-year-old male inhabitant, who settled in the village after his retirement in 2000, approached the researcher and the research assistant as they conducted an interview near his house and demanded that his house also be counted.

The association members, on the other hand, were negotiating alternative solutions to the land dispute. While persuading the LSLI and other agricultural stakeholders to engage in the compensation process, they also attempted to settle the issue with the non-members. In these negotiations, the members claim not to have the resources to compensate non-members. Hence, they suggest the implementation of a compensation scheme that does not account for tree ownership, for instance. This contradicts Mozambican Land Law. In Mozambique, as a legacy of the socialist era, the land belongs to the State and was nationalized after independence. Since then, changes have been made in the law to allow for different types of land transactions (Mosca, 2011). National Land Policy, written in 1995, in principle safeguards the rights of the poor and permits three types of land transfer (Ianni, 2012). These are: sale of improvements; sale of firms who possess land titles; and rentals (Hanlon, 2004). The law considers trees as an improvement, and investors are required to compensate land users for their trees (I1_S_2016; I14_S_2016). As discussed in Chapter 4, fruit trees serve different purposes and the village inhabitants regard them as a long-term investment.

In the vegetable sector, as abovementioned in Section 6.3.2, survey results revealed that the perception of 80.8% of the respondents is that Companhia do Vanduzi is not involved in land conflicts. This suggests that land conflicts involving small-scale farmers and LSLIs are

less important in this sector. However, in both the vegetable and sugarcane sectors, association members are confronted with a choice between a production agreement with LSLIs and uncertain market conditions at harvest time. The next section examines the negotiations between LSLIs and small-scale farmers, with an emphasis on market interactions in the vegetable sector.

6.4.2 Negotiations in the vegetable sector

This section examines market interactions between LSLIs and small-scale farmers. As discussed in Chapter 5, agricultural stakeholders regard LSLIs as a solution to the small-scale farmers' market constraints. According to Wiggins (2005), earlier research has shown that farmers are not likely to produce in situations where there is not access to markets. Nevertheless, this is an understudied topic concerning African agriculture. The market mediates the exchange of goods and services between buyers and sellers. Availability and access to information are crucial for these exchanges to occur. Sellers need to identify buyers, and vice-versa. In the New Institutional Economics literature, the costs associated with obtaining information about buyers and sellers are classified as transaction costs (Williamson, 1979).

In the out-grower schemes, the information about the buyer and the price are readily available in the form of production agreements when small-scale farmers produce LSLIs' crops. The terms of the agreement include the price of the products and the responsibility of different parties. In the absence of production contracts, small-scale farmers are constrained by limited market information, in particular, where to find buyers. As an innovation actor (I16_V_2016) claimed:

> *"It is easier for the small-scale farmers under contract with the LSLIs. They do not need to worry about the market. They sell the product to the company. The market is guaranteed. They have peace of mind. Whereas those who don't have access to market have to perform various roles in the value chain. At the end of the season, they have to find a buyer, rent a car, go to the market and try to sell their produce. They have much more work and much higher losses."*

Within this line of thought, the government and other innovation actors believe that by linking LSLIs and small-scale farmers the market will be guaranteed. This section firstly

examines the relationship between price and quality of the product in the interactions between LSLIs and small-scale farmers, and the extent to which LSLI operating as a monopsony (i.e., only one buyer), affect their interactions. Secondly, it explores the price negotiations between LSLI and the out-growers.

At the beginning of the out-grower scheme, in 2004, there were numerous problems and misunderstandings concerning the selection of vegetables. For instance, baby corn was sold at 35 MZN per kilogram. According to the association members this was a good price, but the main challenge was to reach an agreement as to the quality of the produce. The difference between the weight of harvested product and product considered for payment after the selection process was substantial. After negotiations, the price of baby corn was set at 5 MZN/kg at the farm gate, before any processing. In Box 6.1 below, an association manager (S005_V_2016) explained how these interactions occurred.

Box 6.1 Problems with the selection process

"Interactions with Companhia de Vanduzi started in 2004. At that time, they used to buy baby corn at the price of 35 MZN/KG. But there were problems! The problem was that a farmer would cultivate the baby corn, harvest it and take it to the collection point. With the scale, the person weighs the product, thus the company employee registered gross weight. Thus, if you harvested 200 kg they would take it to the pack house and once there they would remove the outer layer, after removing the debris they would take the baby corn that is in good shape, according to them! In addition, there was some produce infested by pests, also other products that have grown too much, they were over mature. There was also other baby corn that was very small, and the farmer should not have harvested it. It should be left in the field for an additional one or two days. They would not pay for these types of baby corn I have described. They would say: 'this one contains holes, it is rejected'; 'this one possesses seeds inside, it is rejected'. Lastly, if they decided to buy the produce harvested before its time they would pay very low prices. Thus, the product accepted according to their standards would be just 3 kg.

One day I harvested 170 kg of baby corn, gross weight, and they only paid me for 4 kg. Can you see that? ... 170kg transforms into 4kg, there was a lot of noise, it was always noisy, and it was noisy indeed. We suggested: 'ok, why don't you buy it at 5MZN/kg or 10 MZN/kg?" We submitted this proposal to them; we suggested at least 10, or 7, or 5 MZN. If you buy at the price of 5 MZN/kg, the selection process to separate the over mature or the infested product is your responsibility, but I have to be sure that I have delivered 5 Kg of baby corn and that not even 1 kg of the delivered product is going to be rejected.' It is precise. It took time, but we reached an agreement with the company to buy baby corn at the price of 5 MZN/kg."

The expressions 'noise' and 'noisy' are direct translations from the Portuguese words 'barulho' and 'barulhento', respectively, and which the farmer used to express his struggles and the complaints made during regular meetings with the LSLI employees until a new agreement was reached over the selection process and the corresponding price.

These disagreements have also contributed to the inclusion and exclusion of farmers from the out-grower scheme. As discussed in Section 6.2.3, due to price disagreements some association members removed themselves from the out-grower scheme. One example involved a well-known commercial farmer based in Belas, Case study 6.2, Mr Ntsongo (I13_V_2016). Mr Ntsongo is a retired agricultural worker, he occupies five hectares in the village of Belas. He self-excluded from the scheme due to the problems he perceived with the selection process.

Case study 6.2 Self-exclusion from the out-growers' scheme

After having formal employment in the public and private sector in Mozambique for more than ten years, Mr Ntsongo adopted farming as his main livelihood activity. In an interview at his farm he recalled his short-lived production agreement with the LSLI: "*I have produced baby corn on my farm, I planted 0.5 ha but they only harvested half of this. I told them: 'Stop! We cannot harvest anymore' because there are discrepancies between the initial and the final weight of the produce due to the selection conducted in the packaging house".* As he pointed out (I13_V_2016): "*The product went there… you know, they told me that in 3722 kg of the product harvested from my farm, they obtained only 450 kg after processing. Something must be wrong in all of this."*

He then asked, and answered, a number of rhetorical questions concerning the post-harvest to justify his decision to stop producing for Companhia do Vanduzi after one season: "*Who assisted the harvesting process? It wasn't me, their men did. Who transported the produce to the pack house? It wasn't me; their cars did, with all the conditions they create. Who weighs the produce in the factory? It wasn't me; it was collected from the farm without being weighed. It got there, they had some kilos. Who performs the classification and quality control? It wasn't me, I was not present. It was one of their employees. So, something must be wrong, maybe the people who harvested, or the transporters, maybe the weighing, or even the classification. Something is wrong"* (I13_V_2016).

Mr Ntsongo's questions also illustrate how much control the LSLIs exert at different stages of the crop value chain. This is also shown in Table 6.10 below, which illustrates the distribution of tasks between the LSLIs and the small-scale farmers in the out-grower schemes. The table shows that, in both sectors, small-scale farmers are mainly responsible

for crop management during the growing season, whereas the LSLIs control most of the post-harvest activities.

Table 6.10 Distribution of tasks between association members and LSLIs

Activity	Vegetables (Vanduzi, Manica)	Sugarcane (Nhamatanda, Sofala)
Land preparation	Farmers, mainly draught animals	LSLI, mechanised
Planting	Farmers, family labour	Association workers/members
Factors of production	LSLI supplies	LSLI supplies
Financial support	Inputs provided in advance	Inputs provided in advance
Technical assistance	Yes (LSLI)	Yes (LSLI, BAGC)
Crop management	Farmers	Farmers
Crop protection	LSLI	Association members/workers
Harvesting	Farmers	Hired labour (LSLI controlled)
Processing	LSLI	LSLI
Transport	LSLI	LSLI
Marketing	LSLI	LSLI
Product certification	LSLI	-

Source: Author's compilation using in-depth interview information

The agreement between the LSLI and the small-scale farmers established a number of quality features for each product. This gives the LSLI the right to reject part of the product on the grounds that it did not meet required quality standards. Farmers interpret this as a market strategy of the LSLI to increase its own profits. According to them, the LSLI only collects enough produce to cover their production costs. Employment of this apparently discriminatory purchasing, which is justified by the quality control process, has intensified since the price increase in September 2016. In these situations, small-scale farmers are left exposed to the market uncertainties that LSLI was supposed to remove.

As discussed in Chapter 5, small-scale farmers' limited access to markets is perceived as a major constraint for agricultural and rural development, and LSLIs are seen as a solution to this problem. In their relationship with the farmers, LSLI provide technical assistance and demand a specific quality of produce. The production agreement with Companhia do Vanduzi is legally bound. To guarantee preferential treatment as the main buyer and to avoid competition with other traders, LSLI invests large amounts of resources to ensure that small-scale farmers comply with the agreement and to guarantee supply of produce (I12_V_2016).

The farmers are aware of the quality requirements and admit that they have to comply with them. For example, a member of the Association 7 de Abril (S241_V_2016) mentioned that the quality requirements for fine beans include: absence of spots; absence of curves; the pod should not be too big, nor too small; and the product should be free from any sign of disease or pest infestation. All these features limited the amount of fine beans accepted by the LSLI. While the compliance to these requirements demands high standards in terms of the quality of the produce, farmers believe that the quality standards are also used as leverage against them by the LSLI in their production agreement.

After the initial price agreement was made, as described in Box 6.1, for many years the price paid by the LSLI remained constant, and this was a main factor of contention in the interactions between the LSLI and the small-scale farmers in the vegetable sector. At the beginning of the fieldwork, association members claimed that the price paid by the Companhia de Vanduzi for their crops was very low. For example, during a group discussion, an association member, Costa (S006_V_2016), made a comparison between the revenue made from baby corn planted in 0.1 hectares and the minimum monthly agricultural salary in Mozambique, which is approximately 3500 MZN. According to him, in the three-month duration of the cropping season, association members can earn approximately 2000 MZN. The minimum agricultural salary easily supplants that amount.

According to farmers, the price under implementation until September 2016, was agreed in 2004. During that time, the price of the produce did not change while the cost of production factors increased every year (G1_V_2016). As a result, a number of farmers stopped producing baby corn. They preferred to take chances with other crops, such as cabbage, to sell in the local market outside of the out-grower scheme. Eventually, as shown in Table 6.11, the LSLI increased the price paid for the produce.

Table 6.11 Changes in the prices for Vanduzi produce

Product	Initial prices (MZN/kg)	Final price (MZN/Kg)
	2004 – September 2016	September 2016 -
Baby corn	5	10
Fine beans	14	28
Green chilies	23	30
Red chilies	25	35

Source: Author

For example, the price paid for baby corn, the main crop produced both within the company and as part of the out-grower scheme, was set at 5 MZN/kg in 2004; in September 2016, while fieldwork activities were being undertaken in Mozambique, the price increased to 10 MZN/Kg. The LSLIs did not provide any explanation for their decision to review the price of the vegetable products, but an increasing number of association members who self-excluded from the out-growers' scheme may have influenced this decision.

At first, there appears to be a significant change as the price doubled for baby corn and fine beans, and increased by 40% for chili peppers. Accordingly, the changes seemed to be significant for small-scale farmers, but considering that the price increase occurred in a period of national economic crisis and extreme devaluation of the Mozambican currency in relation to the main currencies used in international trade, such changes may not have been as significant for the LSLI as is first apparent.

Contextually, on the 1st January 2015 the exchange rate between the British Pound (GBP) and the Mozambican Metical was £1 to 51.4 MZN. At the interview date following the price increase, 26th September 2016, the exchange rate between GBP and the Mozambican Metical was £1 to 99.22 MZN. Given the devaluation of the Mozambican currency in relation to GBP and other international currencies, it may be argued that the price had not increased in GBP terms. Despite this, a number of farmers were enthusiastic about the increase in the price paid for their vegetable crops. After the decision to increase the price was made, the researcher discussed this development with small-scale farmers. The farmers were eager to make the most of the price increase. For example, a member of the Association Nhamanembe (S084_V_2016) shared his plans:

> "*At this price, next year I want to start a campaign of baby corn production. I will take enough seed for three plots.*"

The enthusiasm over the new price was extended to farmers who were reconsidering their involvement with the company after withdrawing for some time because of the low price. The price increase could have been translated into substantial gains for the small-scale farmers. However, during a group discussion (G3_V_2016) after the price increase, members of the Association Anexa expressed their concerns with the quality requirements

and the rejection of their produce. This is exemplified below with quotations from three of the participants,

> *"After they increased the price, they are rejecting large quantities of the baby corn and fine beans. Now they are rejecting everything. I would prefer that they had continued buying at the previous prices. That was more advantageous.*"
>
> "*Back then, no product was rejected. Now that they have increased the price, they are rejecting more and more."*
>
> *"When our friends from the city arrive, and find product that was rejected by Companhia de Vanduzi they negotiate with the objective of lowering the price. If you want to charge 20 MZN/kg, they will pay 8 or 9 MZN/kg because they were not the ones to give instructions to harvest the produce.*"

In the out-grower schemes, LSLI has priority and exclusivity. Only after the company has selected the products according to the quality features they require, are the farmers allowed to sell the rejected product to other buyers. Accordingly, when the product is rejected, small-scale farmers seek alternative buyers, usually retailers from the provincial capital, Chimoio (G3_V_2016). However, these alternative buyers are under no obligation to buy any product. Knowing the perishability features of the vegetables once harvested, they attempt to pay the lowest price possible.

In the sugarcane sector, given the scale of production and the relatively large areas involved, problems occur due to the inability of the association to manage the sugarcane harvest itself. As shown in Table 6.10, LSLI provide the equipment for land preparation, hire labour to harvest the sugarcane at the end of the season, and transport the produce to the factory. As such activities are performed, association members are not well positioned to register the quantities of the harvested product. An association manager (S001_S_2016) believed that the quantities declared by the company do not coincide with the amount actually harvested in the field.

The difficulties in reaching an understanding with Açucareira de Mozambique is also explained by the form in which the negotiation occurs. As a service provider for the PROIRRI irrigation project, the BAGC negotiates on behalf of the small-scale farmers. Thus, the sugarcane production agreement has been negotiated by BAGC and the small-scale farmers

seldom have direct contact with the company employees. As a result of this lack of information, mistrust amongst the association members is incited because they are not directly involved in the negotiation process.

In summary, the negotiations manifest differently in the two study locations. In the sugarcane sector, despite the perception of unfairness in their production interactions with LSLI, association members avoid making additional demands because they do not want to be seen as ungrateful after benefiting from the irrigation system. In this case, association members behave as passive beneficiaries of an expensive irrigation project. According to the Theory of Planned Behaviour (Ajzen, 2012), the actions of the association members may be explained by their normative beliefs, or the attempt to comply with the expectations of people of great significance who, in their view, are the people who brought the project to the village. In the vegetable sector, on the other hand, the market interactions are more relevant and the LSLI and small-scale farmers have been able to agree on a number of issues that have allowed the continuation of their production agreement since 2004.

The case of vegetable production underscores negotiation as a continuing process in which small-scale farmers and the LSLI are required to renegotiate their agreement in order to carry on with their interactions. As illustrated in Box 6.1, and in Case study 6.2, to deal with the misunderstandings in the selection process in the initial years of their interactions, the LSLI agreed to pay a lower price of 5 MZN per kilogram of baby corn for all the harvested product at the farm gate. The price increase which occurred in September 2016 is the result of more than ten years of negotiations. An association manager, Mr Carlos (S004_V_2016), alluded to this by stating that they complain about the price whenever they meet LSLI managers and, according to him, the managers say*: "we will see, it is a process that takes time".* He then remarked that they are always complaining. Thus, LSLI's rejection of harvested products after the price increase marks the most recent phase of their interactions and ongoing negotiations.

6.5 Summary of the chapter

This chapter sought to address the research objective two, which characterises the patterns of interaction between innovation actors. In response to the following research question: What are the opportunities for networking and exchange of information in the targeted areas? The key findings are that small-scale farmers and LSLIs' interactions are mediated by a number of factors that render the inclusion of the farmers far from perfect. In both the vegetable and sugarcane sectors, small-scale farmers are required to be association members and possess formal land use rights in order to benefit from agricultural development projects. However, given that most rural households do not possess formal land use rights, nor are they registered in producer organisations, those rules ultimately prevent their inclusion in development projects. The findings in this chapter are in line with previous research that emphasise that formal or vertical social networks, which according to Hoang et al. (2006), involve asymmetric relationships that are associated with rights, is an important means through which rural households are able to access economic resources and information.

Moreover, the chapter sought to explore reasons for inclusion or exclusion of small-scale farmers in their interactions with LSLIs. This responds to the second research question: What forms of collaboration are present in the local innovation systems and to what extent are LSLIs inclusive of the most vulnerable groups? In both sectors, findings indicate that vulnerable groups are excluded from the farming associations. In the sugarcane sector, the finding revealed the existence of family ties between association members and the inclusion of powerful actors as association members. In this case, inclusion of influential people as association members may result from tactical alliances whereby the association members invite people perceived as influential where the aim is to increase the social capital of the association; or through the elite capture of development projects, in which case the powerful individuals impose themselves to be accepted as association members using different forms of manipulation.

Furthermore, this chapter set out to explore on-going negotiations between LSLI and small-scale farmers in the sugarcane and vegetable sectors with the aim to answer the following research question: What are the roles of different innovation actors and to what extent do they complement each other? In the sugarcane sector, BAGC negotiates with the LSLI on

behalf of the small-scale farmers. The implication of this arrangement is that the ability of association members to make decisions that affect their lives is limited. Moreover, indirect links between association members and the LSLI causes mistrust and thwarts opportunities for collaboration. Whereas in the vegetable sector small-scale farmers negotiate directly with the LSLI. Association members have individual and independent production agreements with the LSLI. The challenges in this sector is the market power of the LSLI who operates as the only buyer. The perception of the farmers is that the quality requirements and the selection process are used as leverage against them in their market interactions. These findings reinforce the notion that effectiveness of innovation networks depends on the context and thereby the configuration of actors (Hermans et al., 2017).

7 Chapter seven - Small-scale Farmers' Livelihoods and Innovation

7.1 Introduction to the chapter

This chapter focuses on small-scale farmers' innovations which occur as a result of their interactions with LSLIs. Such interactions were identified as important in Chapter 6. This chapter explores innovation in small-scale farming in order to understand how such innovations are influenced by the farmers' interactions with LSLIs, and the extent to which this occurs. Innovations, as defined in Chapter 2, are ideas or practices that are new to the user (Rogers, 2003). Considering this concept of innovation, which includes incremental changes which small-scale farmers perform during their activities, this chapter also challenges the assumption of the government and other agricultural stakeholders who regard LSLIs as the sole mechanism for the solution of problems which confront small-scale farmers. Firstly, by showing that small-scale farmers are innovating, and secondly, because it is important to consider different sources of agricultural innovation and learning. This chapter addresses objective three, presented in Section 1.2, and responds the following research questions:

- To what extent do agricultural stakeholders spur or suppress innovation?
- What are the innovations considering different classes of farmers?
- To what extent is the innovative capacity of small-scale farmers influenced by their interactions with LSLIs?

By taking into consideration the system of innovation perspective, not only multiple sources of agricultural learning are considered but also various incentives and opportunities for innovation. To capture these multiple possibilities, in addition to the household survey conducted with small-scale farmers, the chapter draws on ethnographic inspired methods which encompass participant observation and long hours spent in the field with the farmers. This allowed the researcher to engage in unstructured interviews with small-scale farmers and ask about their personal stories, including: their childhoods; their previous engagement with farming activities; past employment; and other aspects of their lives that may have influenced their innovation pathways.

The chapter firstly discusses the innovative capacity of small-scale farmers in section 7.2. Section 7.3 explores learning and innovation in small-scale farming considering the farmers interactions with LSLIs. Finally, Innovation pathways are then considered in section 7.4.

7.2 Innovative capacity

The innovation system framework regards innovation as an outcome of the interactions between multiple societal actors (Hall and Clark, 2010). As discussed in Section 2.5, among other factors, interactions between agricultural stakeholders are affected by formal and informal institutions, and by the attitudes of the agricultural stakeholders. In Chapter 4, farmers have been classified in terms of their attitude towards farming. In this section, those attitudinal features are taken into consideration in order to understand their innovation pathways and innovative capacity. Along with patterns of interaction discussed in Chapter 6, attitudes influence the outcomes of the innovation system. To account for this the next section explores the attitudes of agricultural stakeholders in relation to the small-scale farmers' innovative capacity in order to understand how it affects implementation of LSLIs.

7.2.1 Attitude of the innovation actors toward small-scale farmers

There has been an evolution in terms of how small-scale farmers are perceived by different agricultural stakeholders in the innovation literature. Initially, they have been regarded as mere users of innovations generated elsewhere. As pointed out in Chapter 2, there have been limitations concerning the transfer of technology approach, which led to the implementation of different participatory approaches to innovation, in which farmers are viewed as partners in the technological development process. Currently, system thinking approaches regard innovation as an outcome of the interaction between stakeholders that compose the innovation system (Hall, 2007; Hekkert et al., 2007; Hall and Clark, 2010).

In terms of attitudes, important features of successful systems of innovation are collaboration, trust, and complementarity (World Bank, 2006), which are each influenced by the behaviour of the innovation actors. Along with perceptions about social pressure and behaviour control, attitudes are regarded as a predictor of behaviour (Ajzen, 2012). This section draws on interviews with innovation actors in the vegetable and sugarcane sectors to explore their views in terms of what agricultural development is, and how it influences

their decision making regarding LSLIs. This is crucial because their expectations with regard to agricultural investments is likely to affect the way in which such investments are implemented. As discussed in Section 2.5, the conceptual framework, innovation actors include small-scale farmers and all agricultural stakeholders which contribute to bring agricultural knowledge, information and technology into use.

As discussed in Chapter 5, there appears to be a belief that an increase in the use of external or commercialised inputs is the most appropriate approach for the support of small-scale farmers' activities. Major efforts have been made accordingly. The theory of planned behaviour suggests that reasons for compliance with expectations and perceptions about social pressure are a predictor of behaviour (Ajzen, 1991; Ajzen, 2012). Given the expectations of the government agents, as entities of great significance, the small-scale farmers are likely to adopt their recommendations. In terms of government intervention, the latest effort is the previously discussed irrigation project PROIRRI. As explained by a government officer (I2_S_2016):

> "*There is a scheme in which the farmers design a project and submit it to PROIRRI. The farmers pay 30 per cent of the costs. This is to educate the farmers in using improved seeds because there is too much resistance to buying seed... so the project has a mission to prepare the small-scale farmers for the use of improved seeds, fertilisers, and even agricultural equipment, such as tractors, while the irrigation systems are built."*

Input providers regard initiatives such as PROIRRI, which encourage LSLIs, to be a positive development because their businesses prosper with the increased demand for inputs. For example, an input provider (I22_V_2016) mentioned that he lived in Vanduzi District for 30 years, during that time he witnessed changes in small-scale farmers' habits as they increased their use of commercialised inputs due to the influence of Companhia do Vanduzi. Consequently, he supports implementation of LSLIs. Another input provider (I25_V_2016) stated that LSLI serves as a model that small-scale farmers should follow. However, farmers who do not adopt the recommendations of agricultural stakeholders, or who are unwilling to use commercialised inputs, are seen as backwards. Illustrative quotes from innovation actors are presented in Table 7.1

Table 7.1 Attitude of innovation actors towards farmers' innovative capacity

Innovation actor	Illustrative quotes
Input provider (I25_V_2016)	*"Farmers have difficulties changing their habits. They use the same product, if that product is not available it is difficult for them to use a substitute."*
LSLI employee (I27_V_2016)	*"Small-scale farmers are very stubborn. You give them everything, seed, chemicals, fertilisers, and the only thing they have to do is to weed the plot... yet again a person needs to come after him constantly to remind him to weed, although in the end he is the main beneficiary."*
BAGC Manager (I10_V_2016)	*"The problem of the small-scale farmers is they do not follow the agro-technical recommendations."*
Investment promotion manager (I16_V_2016)	*"Farmers should think about profits. They should perform their tasks as professionals, thinking about monetary returns, about the costs of inputs."*
Commercial farmer (I13_V_2016)	*"The [missing] factor is the technique. It might be that they do not have the technique, or that they do not want to implement it."*
***Extension agent* (I15_S_2016)**	*"The majority of small-scale farmers do not have the knowledge about how to produce and are not prepared to adopt new technologies."*

Source: Author, based on the interviews and participation in the coordination meeting in Sofala Province

These arguments illustrate a Transfer of Technology mind-set, which adopts a top down decision-making criterion and regards innovation as a one-way communication process (Chambers et al., 1989; Leeuwis and van den Ban, 2004). In this process, small-scale farmers are passive recipients of external technology which they are expected to adopt without further changes. This innovation bias, as described by Leeuwis and van den Ban (2004), is prevalent amongst the agricultural stakeholders. The persistently low rates of adoption of commercialised inputs, according to this view, are explained by the stubbornness and backwardness of the small-scale farmers. Thus, according to these individuals, it is important to change this mind-set in order to take advantage of LSLIs. For example, an investment promotion officer (I16_V_2016) observed that the association members need to understand the rationale of the LSLIs as private companies because their aim is to maximise profits, therefore they focus on increasing productivity and improving the quality of the products.

Innovation actors expressed some disbelief at the continuation of the out-grower scheme without the support of PROIRRI. In the sugarcane sector, a member of the Association Muda Macequessa (S004_S_2016) stated that they would not be able to produce sugarcane without the support of Açucareira de Moçambique. Thus, in view of the the project PROIRRI coming to an end in 2018, the members of Association Muda Macequessa are considering renting their land and the irrigation infrastructure to Açucareira de Moçambique. In the vegetable production sector an input provider (I17_V_2016) expressed concerns about the continuity of PROIRRI project activities because according to her there were similar

initiatives in the past, but activities did not continue after the end of the project. She then argued:

> *"Small-scale farmers do not help themselves, they just want to receive help, but they do nothing to help themselves. If you help someone who does not want to be helped, it harms those who want to be helped" (I17_V_2016).*

These comments, on the one hand, reveal the attitude of innovation actors toward small-scale farmers who are considered to be passive. On the other hand, it alludes to issues concerning aid for development, in particular the sustainability of the projects in the long-term. Numerous concerns have been raised in this regard. Firstly, the LSLI are regarded as performing business as usual concerning the provision of agricultural support. A government officer (I12_V_2016) argued that the out-grower schemes with LSLIs benefit the same group of people who already benefited from other development projects.

In both Manica and Sofala Provinces small-scale farmers mentioned that they have been supported by NGOs, such as ORAM, GAPI, ADIPSA, and KULIMA at different stages of their existence as an association. This was discussed in Chapter 6, i.e., the associations have been the entry point for support of the agricultural sector in both Manica and Sofala Provinces. Accordingly, association members currently benefiting from PROIRRI and involved in the out-grower schemes with the LSLI have benefited from other development projects in the past. Evidence of their past involvement with development projects includes irrigation infrastructure and equipment inherited from such projects, as shown in Figure 7.1.

Figure 7.1 Non-operational water pump in a farmer's backyard, Sofala Province

Source: Author, Nhamatanda, July 2016

For these small-scale farmers the irrigation systems financed by PROIRRI, and the efforts to incorporate them into the LSLI activities, represent a continuity of their engagement in agricultural and rural development activities with the government and stakeholders. Within this frame, agricultural stakeholders argue that small-scale farmers have to change. As explained by a government officer (I16_V_2016):

> "*Small-scale farmers think that the LSLIs should do them a favour and they are obliged to do so. It is not simply Corporate Social Responsibility as they say. This mind-set needs to change. The farmers need to change their mind-set, to produce quality products and avoid making demands that demotivate the investors.*"

There appears to prevail the notion that the small-scale farmers need help from other organisations, particularly LSLIs, to make important decisions (I27_V_2016; I16_V_2016). Within this thinking, LSLIs are expected to facilitate access to markets, assist in financial management, and provide the necessary technology for the small-scale farmers to carry out production and marketing activities.

"*Basically, we want the farmers to be involved, not only in subsistence agriculture but also in agriculture as a commercial activity, as a business",* explained the investment promotion officer (I16_V_2016).

This view is summarised in a seminar report on coordinating agribusiness initiatives in Sofala Province by Beira Agricultural Growth Corridor (2016). The report states:

"*The family sector is the basis, but it produces only for subsistence because of its rudimentary technology. The challenge is to elevate the family farmers to the level of the commercial farmers, thereby transforming them into a powerful middle class. To achieve this, it is necessary to invest in irrigation, road and energy infrastructure, agricultural education, production inputs, and agricultural equipment."*

The report highlights how the deficiency of each of these factors undermines the performance of the family sector in Sofala Province. This section has argued that a transfer of technology mind-set prevails amongst the agricultural stakeholders in Mozambique. As discussed in the Chapter 5, this transfer of technology attitude towards the innovative capacity of small-scale farmers influences the expectation of the innovation actors, thereby contributing to the implementation of LSLIs as a development strategy. The expectations of innovation actors influence both the agricultural development strategies and other regulations on investments. However, the next section challenges this view and contrasts the prevailing mind-set with evidence from the fieldwork undertaken by the researcher.

7.2.2 Small-scale farmers' innovative capacity

This section discusses the innovative capacity of small-scale farmers with practical examples from their interactions with LSLIs whereby the linear view of innovation of agricultural stakeholders and resulting innovation bias are both challenged. Association members in Vanduzi District have recalled situations in which recommendations from the LSLI technician have been rejected. They have adopted some of the technological packages, but they do not implement all the agronomic practices as recommended by the LSLI technicians. They argue that the recommendations from the field technicians require verification (S005_V_2016; S241_V_2016). Therefore, they are cautious about implementing them. This suggests that small-scale farmers are not passive recipients of the technological packages.

Dutrénit et al. (2012) argued that farmers' distrust of the service providers results from past negative experiences.

Accordingly, an association manager reported a case in which, following the recommendation of a LSLI technician, farmers applied fertilizers very close to their plants and this resulted in high crop losses (S241_V_2016). To avoid similar situations, small-scale farmers use their accumulated experience to make farming decisions. Following the theory of planned behaviour (Ajzen, 1991; Ajzen, 2012), as discussed in Section 2.4.4, the perceptions of social pressure or willingness to comply with the expectation of entities of great significance explains the initial adoption of innovations. This includes innovation which are not appropriate to small-scale farmers farming systems, as exemplified by the application of fertilisers in a way that resulted in crop losses. Following such situations changes are necessary in order to ensure that the new technology will be adopted. In participatory technology development, as discusses in Chapter 2, Douthwaite et al. (2002) classified this process as 'fitness of technology'.

Box 7.1 provides the example of an exchange between farmers and LSLI technicians in which a small-scale farmer challenges the solution suggested by a LSLI employee to solve the problem of maize streak virus which was affecting baby corn. The conversation occurred in the backyard of the Association 7 de Abril and the researcher participated in the discussion.

Box 7.1 Knowledge exchange between LSLI technicians and small-scale farmers

The LSLI technician (I31_V_2016) argued that crop rotation was the best response to the problem. He then explained that, due to scarcity of land with irrigation conditions within the association, small-scale farmers tend to use their plots continuously throughout the year. On the other hand, farmers who participated in the discussion had different views. One farmer argued that the only way to prevent and control maize streak virus was to burn all the debris resulting from the crop production (S241_V_2016). This view was challenged by another association member who agreed with the LSLI employee (S011_V_2016).

This brief exchange of ideas shows different viewpoints concerning the solution to a particular problem between small-scale farmers and LSLI employees. Another farmer (S005_V_2016), from Association 7 de Abril, provided an additional example of technological exchange wherein association members have adopted the crops introduced

by LSLI technicians, but rejected the planting technique recommended by the company. As explained by an association member (S005_V_2016):

> *"In the beginning, the practice was to open furrows and ridges and plant fine beans on both sides of the ridge. Can you see? But we reached a point of saying no! And the company asked: 'What are we going to do?' We replied, 'We prefer to create the lines and to plant on one side of the ridge. When we plant on both sides of the ridge, using channel irrigation, the water touches the plants and they suffer'. This used to happen with fine beans and chili pepper when planted on both sides of the ridge. When plants are placed alternately on each side of the channel they compete. When this one grows, it closes this side, when the other plant grows it occupies the space between two plants on the opposite ridge. This was done with chili pepper and fine beans. We changed that. Currently, we plant only one side of the ridge and the water passes on the other side."* (Figure 7.2).

Figure 7.2 Green beans planted one side of the ridge

Source: Author

These are examples of interactions and mutual learning because both the small-scale farmers and the LSLI employees are exposed to new ideas. Their collaboration leads to a convergence of ideas (Van Bommel et al., 2009). In the above example, farmers have adopted a new crop and have employed different techniques to cultivate it. The LSLI employees are challenged to reflect on their standard practices. In order to be able to make decisions about the different technologies, the farmers go through a learning process. Following Kolb (1984)'s experiential learning theory, this process entails an integration of

their experiences with observation, experimentation, and theory to decide and to act. The choice made to reject the planting technique recommended by the LSLI technicians is the result of a learning process. In this case, the technicians' recommendations did not fit well with the circumstances of the small-scale farmers, in particular the use of channel irrigation. In their own fields, Companhia do Vanduzi use either pivot or drip irrigation (I30_V_2016). Considering these differences, changes were made to improve the production of green beans and chili pepper in Association 7 de Abril.

The above examples contradict the viewpoints of the agricultural stakeholders who regard small-scale farmers as backwards and unresponsive to the initiatives aimed at supporting them. The findings show that farmers are learning and innovating. The next section examines how the decision to innovate is put into effect from the social learning perspective.

7.3 Learning and Innovation

This section explores the extent to which LSLI enables or suppresses innovations in small-scale farming. In this section, learning processes and sources of agricultural knowledge are considered where the aim is to understand the extent to which small-scale farmers' innovations result from interactions with LSLIs. The farmers' life stories are explored to examine the innovation process, the factors affecting their decision-making, and to understand the extent to which, indeed if, small-scale farming innovations result from their interactions with LSLIs. Individually and as a group small-scale farmers follow different learning pathways through their life experiences. Table 7.2 below illustrates how diverse these pathways can be.

Table 7.2 Agricultural learning (Case studies 7.1 to 7.10)

Sources	Case study	Illustrative quotes
Family activities	Case study 7.1, a male association member (S005_V_2016) whose family is the main source of agricultural knowledge.	*I have started practicing agriculture in the village where I was born. From the early ages in your childhood, your mother gives you some tasks and when you come here it is just additional practice.*
	Case study 7.2, a divorced female association member (S051_V_2016) whose father and two brothers are also association members.	*My brother passed away and left us a plot within the association. Me and my brothers divided it into three separate plots.*
Multiple	Case study 7.3, a female association member (S085_V_2016) who combines pathways to innovation and asks for advice from other association members.	*1) Farming was part of my childhood; 2) I have never planted cabbage before; I normally plant onion, other brassicas, and common beans. I am experimenting with it myself, knowledge is necessary for a person to succeed.*
Other farmers	Case study 7.4, a male association member and LSLI out-grower (S032_V_2016) who helps other farmers.	*I started helping the president of the Association Nhaumbwe with the objective to gain experience in agriculture. This allowed me not only to earn some money but also to acquire some experience about agriculture.*
	Case study 7.5, a male non-member (S234_V_2016) without access to land and who regard another farmer as more knowledgeable.	*I am starting to play (spend time) with Costa (association member), so that I can observe his activities. He knows the time to plant each crop; he does not suffer with pests or diseases. Everything goes well with him*
	Case study 7.6, a female (S087_V_2016) who is a new association member.	*I heard from my friends that agriculture is profitable. My main source of income is business. I buy and sell clothes. I am trying this activity, if everything goes well maybe I will spend more time farming.*
Experimentation	Case study 7.7, a male non-member (S206_V_2016) with access to land who is planting chili pepper for the first time.	*This is an experiment; we never planted this crop before. All members of my family are learning from this experiment. Will it succeed or not? Are we going to produce it like in the association? We don't know.*
Observation	Case study 7.8, a male association member (S090_V_2016) who observes the activities of other farmers planting in the off season.	*I saw him planting common beans at his farm last week. As far as I know, this is not the time to plant common beans. I am following his activities, and if he succeeds maybe I can also plant common beans at this time.*
Employment in Agriculture	Case study 7.9, a male who before becoming an association member (S012_V_2016) was a contact farmer linking extension agents with other small-scale farmers.	*I was chosen to become the production manager because I have experience in agriculture.*
Agricultural education	Case study 7.10, a male association member (S237_V_2016) who recently finished the technical agrarian school and plans to continue his studies in higher education.	*I've always wanted to learn about agriculture. My father is an agronomist and he is funding all my activities here in the association.*

Source: Interview results, historical analysis

The findings in Table 7.5 suggest that there are multiple sources of knowledge and agricultural information. The findings from the exploration of small-scale farmers' life stories suggest that in addition to activities within the household, association membership and past employment are important sources of knowledge and agricultural information. The table also suggests that Innovation occurs as a result of diverse processes of social learning. Admittedly, there is a set of technological packages that were introduced by the LSLI technicians and their introduction increases the opportunities for innovation, thereby multiplying livelihood options for the farmers. Nevertheless, small-scale farmers were not found devoid of any agricultural knowledge. Invariably, before their interactions with LSLIs, they had accumulated knowledge about agriculture through their interactions with different types of stakeholders. Accordingly, LSLI is one of many means through which small-scale farmers learn about agriculture. In most cases, experience of agriculture is obtained during childhood. Taking, for example, case studies 7.1 and 7.3, they illustrate that family activities provide the foundation regarding agricultural knowledge and skills. As explained by a 47-year-old male association member (S005_V_2016), Case study 7.1:

> *"I have started practicing agriculture in the village where I was born. There, from the early ages in your childhood, your mother gives you some tasks and when you come here [to the association] it is just additional practice."*

Likewise, a female member of another association, Teresa (S085_V_2016), Case study 7.3, also mentioned that farming was part of her upbringing:

> *"I learnt to farm in Machipanda, the life there is agriculture."*

In practice, a combination of different pathways occurs and small-scale farmers derive agricultural knowledge from different sources. For example, when the researcher visited Teresa's farm, she was planting cabbage for the first time. "*It is a way to endure life",* she remarked. Teresa then added that she consults the association manager when she has any doubts about cultivating any crop. The case of Teresa encompasses three mechanisms through which learning about agriculture occurs, namely, family activities, experimentation, and the advice of other farmers. This is in line with the definition of learning as construed by Kolb (1984), i.e, it is the result of various processes encompassing experimentation, observation, experience, and abstract conceptualisation.

Farmers aspiring to become association members, and to have their own irrigated plot, engage in an active searching process to acquire additional skills in the production of vegetables. For instance, a 30–year-old non-member (S234_V_2016), Case study 7.5, mentioned that he seeks the advice of a friend who is an association member. As he explained,

> *"Costa is very knowledgeable about agriculture. He started to work on a farm belonging to someone else, where he learnt everything. After that he decided to start his own farm. He said: 'I have enough knowledge to be independent'. Then he started like he was playing. Now, all his attempts are successful."*

This finding corroborates Vogl et al. (2012) findings to the extent that small-scale farmers seek advice from individuals they regard as knowledgeable. However, in the case of Vogl et al. (2012), the knowledgeable farmers were the elderly village members. The more experienced farmers in this study include farmers in different age groups, including younger farmers, such as Costa, who is 30 years old. With the objective of learning how to plant vegetables, small-scale farmers gain their experience mainly by working on someone else's farm. As further explained by the above-mentioned non-member (S234_V_2016) who helps his friend in his farming activities:

> "*For you to have experience you need to work. I like to spend time with Costa to learn. When you want to learn something, you should not focus on the money, or you will learn nothing. You have to help and the person will willingly share his experience. But when you focus on the money, after working a bit you say: 'pay me!' The person will say: 'ok, here is your money', but you will never acquire his knowledge. But if you help, he will say: 'well, yes you deserve it'."*

These comments reveal the complexities that mediate interactions between the farmers, as well as their relations with other organizations. It shows that their actions are not limited to the achievement of short-term goals or as an income to support their families. They are also guided by long-term goals, such as learning a new skill. During the period of the fieldwork in Mozambique, small-scale farmers were conducting experiments which usually involved testing new crops or new varieties of existing crops. As an example, a non-member, Mr Jairosse (S206_V_2016), Case study 7.7, showed the researcher an experiment that his family was conducting:

"This is the first time we are producing chili pepper. It is an experiment. I was explaining to the other family members what I know about the production of this crop. I was taught by the association members that you need to prune the lower branches of the plant in order to improve its growth and productivity. In our family, we know little about this crop."

Association members and non-members have the opportunity to follow activities occurring within each of the farmers' plots. Through observation small-scale farmers are able to explore any experiment conducted by their peers. The proximity of the farms within the association to each other facilitates social learning through observation (Bandura, 1977). These interactions with different people and organizations create opportunities to innovate. As a 56-year old association member (S090_V_2016), Case study 7.8, commented:

"My neighbour is planting common beans off season. This is not common in this area. I think he is taking a great deal of risk by doing so, however, I will not completely discard his experience. I am observing and paying attention. If he is successful, I can implement the same practice on my plot,"

The above testimonial illustrates that paying attention to other farmer's experiments is one of the ways in which innovation spillovers occur within communities. Moreover, this finding corroborates Bandura (1977) social learning theory. Bandura places great emphasis on observation as a process that contributes to social learning. Considering that farmers are members of a community, and as part of that community their learning process is influenced by individuals and groups within it, small-scale farmers have daily interactions with other community members to the extent that some of the crop varieties introduced by the Companhia do Vanduzi have been adopted not only by association members but also by non-members. For example, the case of Mr Jairosse (S206_V_2016), i.e., the non-member who is experimenting with chili pepper, shows that non-members are somehow engaged with the experiences of those within the associations. Mr Jairosse explained that he could see everything that happens in the associations:

"*I see everything, although we are not working in the associations we can see everything, I have been there several times to see properly."*

The above example corroborates the notion that social networks contribute to social learning. In addition to illustrate the role of the social networks based on geography in facilitating learning and innovation (Ward and Pede, 2015), these findings are also in line with Oreszczyn et al. (2010) who regard farmers as a specific type of community of practice whereby the farmers themselves are responsible for brokering in order to access knowledge and information. By being part of the association, small-scale farmers in central Mozambique have the opportunity to take part in different learning processes regularly. There is also a process of group learning and reflection that influences their future actions as a group. This is exemplified by the following comments from a member of the Association Muda Macequessa (S012_S_2016) as he recalled their experience with Companhia de Vanduzi:

> *"Association members were selling chili pepper clandestinely to other buyers, because of this, Companhia do Vanduzi abandoned us. After the agreement was broken, the other buyers wanted lower prices. We mishandled our agreement with Companhia de Vanduzi. We don't know what will happen with Açucareira."*

This example suggests that past experiences are also taken into consideration when small-scale farmers take part in new relationships. This reflexive learning, as explained by Boyd and Osbahr (2010), changes collective awareness and creates new norms. Accordingly, the belief that Companhia do Vanduzi withdrew from the area because of their mismanagement of the production agreement influences their current interactions with Açucareira de Moçambique. Life stories illustrate how experience shapes small-scale farmers' innovation pathways.

In this section, acknowledging that humans learn from their experiences (Van Bommel et al., 2009), small-scale farmers' life stories were explored in order to understand how the learning process occurs. The findings suggest that the learning process in which the small-scale farmers are involved cannot be linked solely to their interactions with LSLIs. Along with LSLIs, there are multiple sources of agricultural knowledge and information. In this case, small-scale farmers have accumulated agricultural knowledge via the different roles they have performed during their lives. Farmers' agricultural knowledge and skills are a result of a lifelong learning process which starts in childhood and is affected not only by their temporality and locality but also by the interactions that have defined their lives at different

times and places. Therefore, intervention which aims to support small-scale farmers should take into consideration these varied learning processes and sources of knowledge and information.

The findings in this section suggest that small-scale farmers are proactive and through learning they try to change their innovation pathways. The next section discusses innovation in small-scale farming. Taking into consideration institutional and technological innovations, it considers different livelihood options and innovation pathways that emerge with the introduction of LSLI in rural Mozambique.

7.4 Innovation pathways

This section reviews innovations adopted by small-scale farmers in central Mozambique in response to different stimuli and available opportunities. More specifically, it highlights how both the introduction of modern irrigation systems and the implementation of LSLIs influence their livelihood activities. The section emphasises that small-scale farmers follow innovation pathways that take into consideration their historical antecedents, their resource endowments, and potential future opportunities. The notion of a pathway conveys changes which occur over time (Leach et al., 2007).

As discussed in the literature, Section 2.1, agricultural innovations can be classified using different criteria (Sonnino et al., 2009). This section uses three different typologies to examine innovations in small-scale farming. The first, identification of innovations takes into consideration the quadripartite classification system presented Table 7.2. The second, identified innovations are grouped in such a way as to emphasise the innovation pathways in Table 7.3. Specifically, this takes into consideration whether the innovation pathway changes or maintains current livelihood activities, and the extent to which such pathways involve interactions with LSLI. The third typology, to identify innovators, is based on the small-scale farmers' attitudes towards farming which was presented in Chapter 4, Table 4.9.

The quadripartite classification system, shown in table 7.3, comprises two dimensions. In the first dimension, the number of people needed to adopt an innovation forms the basis of the classification, i.e., it may be a collective or an individual activity. In this case, collective innovation is considered as a feature of the group and considers changes that are taking

place within the group, whereas adoption of individual innovation does not require adoption by the group. The latter involves changes occurring within individual plots. The second dimension classified innovations taking into consideration the nature of changes occurring in a particular milieu as: institutional innovation, which involve changes in the form of organisation, and technological innovation.

Table 7.3 Typologies of innovation in small-scale farming

	Collective innovation	Individual innovation
Technological innovations (Products/processes)	• Association adoption of LSLI crops • Sugarcane production	• Production of compost • Chili pepper production by non-members • Mixed farming systems • New planting techniques
Institutional innovations (Forms of organization)	• Group formation • Management associations • Management of irrigation systems	• Crop diversification • Off season crop production

Source: Author's construct, based on interviews

Technological innovation involves adoption of new products, such as new varieties of chili pepper, fine beans, and sugarcane introduced by LSLI technicians, and new processes, such as new methods of producing compost or employing new techniques for producing existing crops. For example, maize is an important subsistence crop in Mozambique. However, the production of baby corn, as the immature cobs of maize, is a new product for small-scale farmers and involves using new agricultural techniques, such as spacing between the plants.

The second typology to concern innovations is a modification of the findings presented in the above table in which innovations were organised considering whether the innovation pathways involve LSLIs or not. This alternative way of presenting the results, as shown in Table 7.4, highlights the purpose of different innovations adopted.

Table 7.4 Innovation pathways

	Innovations pathway change current livelihood activities?	
	Yes	No
Involve interactions with LSLIs	• Chili production by non-members • New planting techniques • Association adoption of LSLI crops • Group formation • Management of farmer associations • Management of irrigation systems • Production of compost	• Mixed farming systems • Crop diversification
Without LSLIs	• Offseason crop production • Crop diversification	• Offseason crop production • Irrigation committee

Source: Author construct, using information from the interviews

The innovation pathways in this case take into consideration interactions between small-scale farmers and LSLIs, and the extent to which these pathways aim to reinforce existing livelihood activities, or to create alternative livelihood activities. As an example, Table 7.4 illustrate that group formation is an innovation pathway which aim to create a new livelihood activity and involve interactions with LSLIs, whereas the creation of irrigation committees is an innovation which reinforces existing livelihood activity. This may or may not involve LSLIs.

The third typology involves the attitudinal features presented in Table 4.9, Chapter 4. This aims to identify characteristics of the individual farmers involved in the adoption of different types of innovations because the small-scale farmers have different attitudes toward farming, and these influence their innovation pathways. Understanding such differences is crucial because in the case of intervention each group of farmers seeks different benefits from development projects (Bingen and Simpson, 2015). The typology put forward in Chapter 4 considers four different attitudinal features. These include traditionalist, fatalistic, opportunistic, and progressive attitudes. This typology and the two ways of classifying innovation above described were considered to understand the extent to which LSLI spur or suppress small-scale farmer's innovations.

The following section discusses technological innovations as the incremental changes that small-scale farmers implement on their farms. In each case the section firstly considers the innovation pathways and then identifies the characteristics of the innovators.

7.4.1 Technological innovations

Considering a broad definition of innovation that encompasses ideas, processes, methods, and products that are new to the user (Rogers, 2003; Leeuwis and van den Ban, 2004), innovative activities can be undertaken individually or as a group. As an individual, each farmer is exposed to new ideas and then attempts to find ways of implementing those ideas. In the process of this implementation, the individual innovates in various ways. For a group generation or adoption of new ideas is a complex process. Adoption of vegetables commercialised by the LSLI is classified in this study as collective innovation because the company requires farmers to be organised into associations. This was discussed in Chapter 6. Although each small-scale farmer cultivates their plot individually, for the scheme to be operational the farmers are required to be organised into groups.

Furthermore, this section considers farmer's innovations that go beyond their interactions with LSLIs because, as discussed in Section 7.2, small-scale farmers are proactive and their innovation results from their accumulated experience and interactions with multiple stakeholders. However, the section firstly concentrates on the association members. As a point of departure, it considers the changes generated as a result of the introduction of irrigation systems in the producer organisations.

Innovation to account for the seasonality of crop production

Expansion of the irrigation systems have represented an important change in terms of farming occupation at village level. As explained in Chapter 4, Sustainable Irrigation System projects benefit farmers in both case studies. Before the introduction of these projects small-scale farmers had limited access to water and used rudimentary methods to irrigate their fields. Irrigation systems not only prolong the growing season of numerous crops but also allow the small-scale farmers to diversify by complementing subsistence crops with those that are marketable. As shown in Figure 7.3 below, the subsistence crops are mainly produced during the rainy season.

Figure 7.3 Seasonal calendar, crop production in Belas, Manica

Seasons	Rainy season				Dry season					Rainy season		
Months	J	F	M	A	M	J	J	A	S	O	N	D
Water usage												
No restrictions												
Irrigation schedule												
Subsistence crops												
Maize (grain)												
Maize (Cobs)												
Cowpea												
Cassava												
Cash crops												
Chili pepper												
Green												
Baby corn												
Diverse vegetables												
Okra												

Source: Author's construct based on the interviews

Seasonal calendar key:

Activities	Weeding	Harvesting	Planting/Sowing	Land preparation	Year-round production
key					

The above seasonal calendar illustrates that the use of irrigation allows small-scale farmers to produce vegetable crops, which include chili pepper, green beans, and baby corn, throughout the year. In addition to these, irrigation has also allowed extension of the production period for subsistence crops, although, as revealed in Chapter 5, the irrigation systems have been introduced where the objective is to produce LSLIs' crops. However, with individual crop management, as occurs in the vegetable sector, small-scale farmers also use the irrigation systems to produce subsistence crops. The last row in the seasonal calendar indicates key activities performed in relation to subsistence crops. In this case, the patterns match with the time the activity is performed during the growing season.

With the introduction of irrigation in some areas small-scale farmers have taken advantage of this technology, not only to extend the cropping season but also to try new combinations of crops in their irrigated fields, and so maximise the use of available resources. Accordingly, the next section considers the ways in which association members maximise their use of irrigated land.

Intercropping as a way to maximise use of irrigated land

While staple crops are commonly cultivated under a rain fed production system in Mozambique, small-scale farmers in both Manica and Sofala Provinces were using the irrigated area normally reserved for vegetable production to cultivate food crops such as maize and sweet potato. This practice was prevalent in the vegetable production sector wherein the impacts of El Nino events resulted in droughts. Diverse combinations of crops were under implementation in Vanduzi where small-scale farmers have found new ways of mixing crops. The aim of a mixed farming system is not only to maintain or maximise soil fertility (Dommen, 1988) but also to maximise the use of water for irrigation (Walker and Ogindo, 2003). For example, 56-year-old Mr Felix (S014_V_2016) was intercropping maize with sweet potato to maximise the use of irrigated land within Association Nhaumbwe. As the main crop, sweet potato was placed in the soil ridges, and maize in the channel where the irrigation water passes to irrigate the main crop. According to the farmer, irrigation is maximised this way. As he explained:

> *"If I obtain maize cob here, it is a step... That is why I arranged in this way, instead of throwing away water carelessly. [With] this hunger, you need ideas! Both maize and sweet potato need 90 days to harvest. Normally, maize can take up to 120 days until maturation, but if you produce it as a vegetable to obtain the green cob you need only 90 days.*"

In addition to intercropping maize and sweet potato, Mr Felix implemented soil conservation practices, such as crop rotation and intercropping maize and pigeon pea (cajanus cajans), a leguminous plant, to maintain soil fertility. Although he is an association member, each of the above-mentioned incremental changes are performed autonomously and do not involve LSLIs' crops. Mr Felix is an association manager, but he is not involved in the production of LSLI crops.

Mr Felix is an example of a traditionalist farmer because he is well stablished in the rural setting and makes substantial investments in farming as a way of life. Although traditionalist farmers innovate to embrace farming as a way of life, they are more independent of LSLIs than less traditionalist farmers. Typically, as in the case of Mr Felix, traditionalist farmers have prominent positions within their villages and have access to relatively large tracts of land. Their seniority facilitates access to development projects. Hence, given their resource

endowments and prominent position within the village they are not willing to change their life style, the opportunity costs of their involvement in livelihood pathways out of farming are higher in comparison to the opportunistic and progressive farmers. However, the situation of traditionalist farmers is, to some extent, similar to that of the fatalistic farmers whose family responsibilities prevent them from making radical changes in the short term. The case of fatalistic farmers is considered next because their innovations also aim to maximise use of irrigated land.

The following exchange, Box 7.2, epitomises the fatalistic behaviour. This is an extract from a group discussion conducted in the village of Belas in Vanduzi District. The participants are members of two associations (Nhaumbwe and Campo 4) (G5_V_2016).

Box 7.2 Attitudes toward farming, fatalistic behaviour

The farmers were discussing use, availability, and cost of pesticides. At some point one observed:

Farmer 1 (S006_V_2016): The pesticides are sold in very small amounts, in packages of 20ml.

Farmer 2 (S032_V_2016): We are just throwing away money.

Researcher: So, why do you keep throwing away money?

Farmer 2: What can we do?

Farmer 1: We are used to it. We cannot stop. We have to do it forever.

Farmer 2: Just to sit down, it is not an option.

This conversation illustrates a fatalistic attitude towards their condition as farmers, revealing helplessness in view of limited livelihood options. Their determination in the face of the situation is clear: keep farming because farming is the only alternative and they are used to it.

The fatalistic farmers engage in intercropping as an innovation pathway as they aim to increase integration of the LSLI crops into their farming systems. Rather than changing current livelihood activities, this integration of LSLI crops aims to reinforce farming as a livelihood activity. Beto (S173_V_2016), is an example of a fatalistic farmer who intercrops maize as a subsistence crop for consumption and chili pepper as a cash crop. He is 29-years-old and his background is described in Box 7.3.

Box 7.3 Fatalistic farmer intercropping maize and LSLI crops

Beto (S173_V_2016) finished his education at Grade 5 when he had to leave school because he did not have the resources to continue his studies away from home. His household is comprised of six people, including two wives and three children aged between two and four years. According to Beto he did not plan to have two wives, but circumstances beyond his control led to his current situation. He had to accept a second wife to avoid disappointing his elders. His main source of income is farming and he produces for the LSLI on two separate land plots which he rents in exchange for ploughing services. He owns a pair of draught animals that gives him access to land. Even so, his access to land is limited, so he tries to maximise use of the land he rents from the association by intercropping maize for consumption and LSLI crops.

Three factors explain Beto's fatalistic attitude, or his over-reliance on farming as a livelihood activity. Firstly, his limited education level and family commitments inhibit his ability to adopt livelihood options outside of farming. Secondly, according to him, farming is more profitable than charcoal production, his main livelihood activity before he became an association member in 2015. Thirdly, his investment in draught animals and the ability to participate in the out-grower scheme, in spite of not owning land within the association, is likely to be the first step toward ownership of association land. In making such an investment he reinforces farming as his main livelihood activity.

Chili pepper is promoted by Companhia do Vanduzi and through their contractual agreement the farmers have access to production factors. However, LSLIs do not allocate land to farmers. The vegetable production of the out-grower's scheme takes place on farmers' land. By performing mixed cropping of chili pepper and maize the farmers maximise water usage on their plots, and possibly fertiliser usage as well, although it could be argued that increasing crop densities also increases competition between plants.

The intercropping of maize with different crops, as discussed in this section, shows that in addition to their production during the rainy months, staple crops are also produced during the cold, dry season. Temperature data collected over a 30 year period by the World Metereological Organization (2018) indicate that between May, the beginning of the cold, dry season, and September, just before the summer rainfall season, average minimum temperatures range between 11.6 ^{o}C and 14.8 ^{o}C, and average maximum temperatures range between 22.8 ^{o}C and 27.2 ^{o}C. In terms of temperature, these are suboptimal conditions for maize production. According to Sánchez et al. (2014), the optimum temperatures for relevant developmental processes of maize range between 26.4 ^{o}C and 31.1 ^{o}C. Historical data show that during the main growing season, between October and April, temperatures in Chimoio, capital of Manica Province, range between 16.6 ^{o}C and 28.6

^{o}C (World Metereological Organization, 2018). Hence, by producing irrigated maize within the associations, in spite of the suboptimal temperature conditions, small-scale farmers are able to extend the production period for subsistence crops.

However, maize is not the only crop that association members cultivate under suboptimal conditions, they also try to maximise profits by producing cash crops off season. To account for this, the next section explores off season production of different crops as an innovation pathway which maximises both use of water and profits.

Production in suboptimal conditions to maximise profits

In Mozambique, the production periods are to some extent affected by precipitation variability. In Manica and Sofala Provinces rainfall is expected to begin in the interval between 20th October and the 7th of November each year (Manhique and Zucule, 2012). This marks the sowing period for most of the subsistence crops, including maize. On the other hand, vegetable crops are produced mainly between March and August each year. This constitutes part of the dry, cold season in Mozambique, as shown in Figure 7.5. However, investments in irrigation allow small-scale farmers in the study areas to produce in both seasons. While the main staple crops are produced during the rainy period, the bulk of the vegetable production occurs during the dry season. Accordingly, small-scale farmers are able to maintain year-round production by alternating between vegetable crops to sell in the local markets, LSLI crops, and subsistence crops during the rainy season. For example, Simon (S084_V_2016) explained his decision-making concerning crops to produce in different seasons:

> *"From January to April, I plant products from Companhia do Vanduzi because the market is guaranteed. If you plant cabbage during this time it does not give you money because there is too much cabbage on the market. In August, I prepare a nursery for cabbage and other brassicas. The price of cabbage tends to increase during the period between August and January because this is not the best period to produce cabbage. In producing against time, we have more difficulties to cultivate the crop, but it pays well. In addition to pests and diseases, low availability of water is one of the challenges at this time. During this time, we irrigate the vegetable crops at night. With the beginning of the rainy season we plant maize and cowpea for our own consumption."*

This finding suggests that small-scale farmers cultivate different crops not only in response to the growing conditions of their locations but also to maximise profits. This is in line with Sourisseau (2015) who argued that diversification of activities is common practice among different groups of farmers.

Furthermore, as suggested by Simon in the above quotation, crop diversification as an innovation pathway also involves off season production of different crops. In this regard, there is a favourable planting or sowing period for the majority of the crops within which their performance throughout the year is maximised. Any departure from this technical optimum increases the risk of crop failure (Gill, 1991). Among other factors, climate, availability of water, pests, and diseases determine the growing periods of most crops and the risks are likely to be proportional to the financial rewards for planting in the off season. Since the risks are increased due to a high incidence of pests, and perhaps competition with fellow small-scale farmers who have adopted a similar strategy, the financial rewards tend to be higher. Additional information about Simon (S084_V_2016) as an innovator involved in the offseason production of different vegetable crops is presented in Box 7.4

Box 7.4 Progressive farmer, off season production of different crops

Simon (S084_V_2016), is a 23-year-old progressive farmer who stopped his studies in Grade 9 because his father fell ill and he had to help his mother and siblings on the farm. However, Simon mentioned that he does not have a wife or a girlfriend so as to avoid additional commitments that may hinder his plans to continue studying. He is progressive because he is a goal driven risk-taker. He plans to invest income from his farming activity in education that will allow him to explore innovation pathways out of farming. Moreover, he is willing to take risks by engaging in the production of vegetable crops under suboptimal conditions. Simon has been engaged in off season production of cabbage and okra to make use of the price differential between the dry season, when most farmers are engaged in the production of vegetables, and the beginning of the rainy season, when the price of vegetables increases due to the scarcity of produce.

Off season production of okra and cabbage suggests that association members are also innovating outside of their interactions with LSLI. As in the case of Simon, the younger, progressive farmers are goal driven and willing to take risks. They innovate with the aim of changing current livelihood activities. To that end, they also explore livelihood options that do not involve LSLI.

As mentioned above, the introduction of irrigation systems also allows year-round production of different crops on the same piece of land. This creates new challenges in terms of managing soil fertility. The following section discusses the production of compost as an innovation pathway, the aim of which is to deal with this problem.

New process, production of compost as a way to maintain soil fertility

Small-scale farmers use various strategies to maintain crop fertility. These include: crop rotation; mixing subsistence crops with soil enriching crops, such as leguminous crops; using manure and compost; and the application of inorganic fertilisers. All these strategies are employed in the village. However, crop rotation is rarely employed due to the scarcity of land within the associations. This illustrates processes of agricultural intensification underway in the vegetable sector. Intensification not only involves continuous production on the same plot but also involves an increase in the use of both organic and inorganic fertilisers.

Inorganic fertilisers are supplied by the LSLI technicians as part of their contractual agreement with Companhia do Vanduzi and, as discussed in Chapter 5, the farmers have to pay for all the inputs used during the production process. However, given that the price of the products is the same, even if the farmers apply their own inputs and observe the necessary quality standards, small-scale farmers have been involved in the production of compost as a means to decrease production costs. For example, in the case of Mr Soromone (S090_V_2016), see Box 7.5, he became involved in the production of compost as a result of his interactions with LSLI, which is considered next.

Box 7.5 New process, association member involved in the production of compost

Mr Soromone (S090_V_2016) is involved in the production of compost from pig manure. The 56-year-old member of the Association Campo 4 explained that Companhia do Vanduzi encourages the use of compost as a practice to maintain and improve soil fertility. They do so because the use of organic fertilisers, such as compost and manure, is associated with animal husbandry. Mr Soromone has a corral with pigs in his house and was using the pig manure on his land without any treatment. Then, Mr Soromone explained, he had the opportunity to learn how to produce compost with Companhia do Vanduzi, so now he produces compost from pig manure to take advantage of the market facilitated by Companhia do Vanduzi. An additional advantage of using compost to maintain soil fertility is that most of the materials needed to produce it are available within the association. These materials include dried vegetables, green waste from the farms, and animal dung. There are always farmers planting and harvesting crops within the association, as Mr Soromone explained while collecting vegetable debris left after the harvest of cabbage in Association Campo 4.

Year-round production of vegetables, which ensures availability of crop residues used to produce compost, is also shown in the seasonal calendar, see Figure 7.3. In addition to the production of compost that allows cultivation of the same piece of land to continue throughout the year, farmers also combine different crops, not only as good soil management practice but also to maximise the use of the irrigation system. This also involves combining commercial and subsistence crops on the same piece of land and constitutes a change in their production patterns given that staple crops are commonly cultivated under a rain fed production system.

Focusing on the activities of association members, this section has explored how different innovation pathways result from the members' interactions with LSLIs. The next section explores the ways in which LSLIs influences innovation pathways of non-members.

Innovations spillovers

This subsection explores innovation spillovers in the interactions between LSLIs and small-scale farmers. The notion of spillovers considered in this section stems from the knowledge spillover theory of entrepreneurship. This theory highlights that knowledge is highly susceptible to spillover due to non-excludability, i.e., it is not possible to exclude others from accessing it, and non-exhaustibility, whereby the use of knowledge by one person does not impede its use by others (Audretsch and Keilbach, 2007). Accordingly, innovation spillovers involve the exchange of agricultural knowledge and information about the

production of LSLIs' crops as a result of the interactions between association members and non-members. Understanding the possibility that technological packages introduced by the LSLI may be used beyond the associations is important because the potential of LSLI as a development strategy also depends on its ability to target a large number of beneficiaries.

Given that the majority of small-scale farmers are excluded from the out-grower schemes, as discussed in Chapter 6, the possibility for non-members to adopt LSLI innovations supports implementation of LSLI as a development strategy. In central Mozambique, innovation introduced by LSLI technicians invariably involves crop varieties and specific recommendations in terms of the agronomic practices required for successful cultivation of those varieties. This section examines the extent to which introduction of new crops creates opportunities for non-members to change their innovation pathways, i.e., it gives them opportunities to explore new livelihood activities. It illustrates the use of LSLI crops beyond the associations by drawing on two examples of the cultivation of chili pepper varieties introduced by Companhia do Vanduzi in both Manica (box 7.6) and Sofala (box 7.7) Provinces.

Box 7.6 Innovation spillover, a small-scale farmer's experiment with chili peppers

During the fieldwork in the village of Belas in Manica Province, the researcher visited the farm of Mr Jairosse (S206_V_2016), Case study 7.7, who disclosed an interest in producing chili peppers introduced by the LSLI. The farm is located near Association Nhaumbwe. Mr Jairosse mentioned that he makes regular visits to the association. As a result of one such visit he was impressed with the potential of chili pepper as a crop that could be explored for commercial purposes. For this reason, at the interview date, he had initiated a small experiment and planted chili pepper in an area of $7m^2$ to test the varieties. By the end of the fieldwork, in October 2016, the experiment was still in progress.

In another case, see Box 7.7, brothers Pedro and Nelson (S007_S_2016) show that farmers are able to maintain these varieties for several years after their initial introduction. This case illustrates the potential of specific crops as a means of support for small-scale farmers. Its relevance is reinforced, not only by the possibility of its dissemination among association members and non-members but also by their ability to maintain these varieties after LSLI withdrawal from a certain region. This suggests that some technologies, such as crop varieties, may have long term benefits and that project discontinuation may not affect its usage at the local level.

Box 7.7 Innovation spillover, sustainability beyond the intervention period

Nelson (S007_S_2016) and his brother Pedro, born in 1981 and 1987, respectively, are vegetable producers based in the village of Macequessa, Nhamatanda District. They inherited from their parents an irrigable farm of about three hectares where they produce several vegetable crops. Their farm is located near the sugarcane plantation of the Association Muda Macequessa, which was involved in the production of chili pepper for Companhia do Vanduzi in the past. Although they are not association members, a legacy of the relationship between the association Muda Macequessa and LSLI, more specifically the varieties of chili pepper introduced by the LSLI, is now found in the brothers' vegetable garden. They have managed to multiply the seeds of chili pepper varieties introduced by the LSLI and have since been producing it for commercial and subsistence purposes.

The findings in this subsection suggest that LSLI influences the innovation pathways of non-members. As a development strategy, the impact of LSLI emanates from its potential to benefit a large number of small-scale farmers. Using farming associations as the mechanism through which farmers interact with LSLI limits the number of farmers with formal interactions with LSLI. But this does not impede the flow of innovations between the association members and non-members. Innovation spillovers allow non-members to benefit from innovations introduced by LSLIs.

The above findings would be encouraging, and provide further support for implementation of LSLI as a development strategy, if a larger population of non-members were involved in the production of LSLI crops. However, the survey results presented in Table 7.4 suggest that the two non-members described in Boxes 7.5 and 7.6 appear to be outliers and the adoption of LSLI crops by non-members is limited.

Table 7.5 Production of chili pepper

	Association membership		
	Yes	No	Total
Manica Province (n=173)	38	1	39
Sofala Province (n=61)	1	1	2
Total	39	2	41

Source: survey results,

Of 39 respondents involved in the production of chili pepper in Manica Province, only one is a non-member. In Sofala Province, only two respondents reported their involvement in the production of chili pepper more than five years after the withdrawal of Companhia de Vanduzi from Sofala Province.

Most changes described above can be classified as individual innovations because they are employed by individual small-scale farmers regardless of their adoption by the group. However, there are cases in which implementation of the innovation, such as producing vegetable crops in partnership with Companhia do Vanduzi, requires adoption by the group. This is applicable to both technological innovations, in the form of products and processes, and institutional innovations, as the village inhabitants have been finding new ways of organising themselves into farmers' groups to manage the water resources at village level, but also to benefit from external opportunities. In terms of local resources, apparently the main factor of dispute among the small-scale farmers in Vanduzi is water.

The new investments in irrigation have an influence on access to water in Vanduzi District. As a result, the small-scale farmers are finding innovative ways to organise themselves to manage the irrigation systems. Spielman et al. (2011) distinguishes learning by doing that results from individual innovative capacity and learning from others, associated with social networks. The introduction of irrigation systems challenges established social structures (Clavel et al., 2015). The new situation requires new forms of organisation. To account for the learning associated with social networks, institutional innovations are discussed next.

7.4.2 Institutional innovations

Institutional innovations involve new forms of organisation (Nelson and Nelson, 2002; Snapp and Pound, 2011). Typically, these are collective innovations because the changes are observed in the interactions between the different groups of farmers, or between farmers in a certain group. In order to benefit from external resources and other opportunities, local communities have been finding new forms of organisation. It has been established that networking contributes to innovation (Pittaway et al., 2004). Group formation as an institutional innovation is discussed next.

Group formation as innovation that allows re-negotiation of access to opportunities

Formation of new associations, as discussed in Chapter 6, constitutes a mechanism whereby small-scale farmers have access to opportunities created by the government, or other organisations. Through group formation, small-scale farmers explore new innovation pathways that allow them to re-negotiate access to opportunities. For example, the case of

Pedro (S092_V_2016), see Box 7.8, illustrates how he and a group of farmers have been preparing themselves to create a new association as a means to access agricultural support.

Box 7.8 Opportunistic farmer, non-member preparing to create a new association

In order to access agricultural support, a group of small-scale farmers have been making regular visits to the Association Nhaumbwe in Vanduzi District as a learning experience. Pedro (S092_V_2016) mentioned that he is particularly interested in obtaining information about the type of activities that can be performed as a group, and the distribution of tasks within the group. As of September 2016, when the researcher met with some of the representatives of the new association, the prospective members had identified an area for the establishment of the collective farm with water available for irrigation so that they could produce vegetables for LSLI, and they were lobbying public agricultural extension services to facilitate installation of an irrigation system. Pedro, a non-member involved in the group formation and in skills acquisition with the aim to engage in production interactions with LSLI, is an example of an opportunistic farmer willing to change his livelihood activities. To achieve this, he focuses on re-negotiating his inclusion in the development projects. One way to accomplish his goals involves adopting innovations that increase his ability to benefit from development projects.

Furthermore, Box 7.8 illustrates that small-scale farmers are proactive because they seek new ways to become incorporated into the production schemes of the LSLIs. These findings also challenge the notion that the creation of associations is usually the result of external interventions (Sourisseau, 2015). In addition to creating new producer organizations, the prospect of engaging in production agreements with LSLI is motivation for learning new agricultural practices. Hence, in preparation for future engagements with LSLI, the prospective association members have been searching for knowledge about vegetable production with their peers. This is a mechanism by which LSLI influences the behaviour of the small-scale farmers. As discussed in Chapter 5, in the context of limited support for agricultural and rural development activities, LSLI is an important source of cash for the local communities. Accordingly, small-scale farmers organise themselves in different ways to attract such resources to their farms.

The findings in this section revealed that group formation is an institutional innovation that aims to re-negotiate the inclusion of the small-scale farmers in the out-growers' schemes promoted by LSLI. This is in line with World Bank (2007) claims which highlight that rural households follow livelihood strategies that take into consideration their resource endowments, potential risks, and the limitations that result from the prevailing formal and

informal institutions. Hence, to account for resource endowments, the next section discusses the creation of irrigation committees and the joint management of irrigation systems as institutional innovations that allow sustainable use of water resources.

Irrigation committees as an innovation to facilitate access to water for irrigation

As a group, the farmers organise themselves in new ways in order to deal with challenges in the management of the irrigation systems. Water availability constrains vegetable production within the association for nearly four months, from July to October, which precedes the beginning of Mozambique's rainy season (see Figure 7.4). As a recurrent event, association members are aware of this, thus, in order to mitigate the impact of water shortages, they have created irrigation committees within the farming associations. For example, the following exchange (see Box 7.9) between an association manager (S012_V_2016) and another member (S054_V_2016) of the Association Nhamanembe suggests that the creation of irrigation committees, and the scheduling of irrigation within the association, allows the water users to plan their activities according to the availability of water for irrigation.

Box 7.9 An exchange which highlights the importance of irrigation schedules

It was a Thursday, the 18th August 2016, when the researcher was conducting fieldwork in a farm within the Association Nhamanembe. An association member (S054_V_2016) was considering irrigating his plot to sow baby corn two days later, on Saturday. After listening to his plans, an association manager (S012_V_2016) asked him, "*What will you do first? Sow or irrigate?"* The association member replied, "*I'll irrigate first"*. This was the beginning of a prolonged debate, not only about the soil conditions at sowing time but also about the management of water for irrigation within their association.

The manager remarked, "*If you irrigate today, you will arrive on Saturday and the soil will be dry, consequently you will not be able to sow".*

The member explained, "*I know that on Monday I will have [access to] water. The issue is that there are some stones on the soil surface which were uncovered during ploughing, so if I irrigate today, on Monday after sowing it will be easier to irrigate again".*

The manager asked, "*What if you fail to have access to water on Monday?* ".

The member asserted, "*I will fight for it. On Monday, I need to have access to water".*

This exchange shows the importance of the irrigation committees to the prevention of conflict between the water users within the association. The creation of irrigation committees is an institutional innovation because small-scale farmers perform activities

that allow prolonged access to water resources during the dry months, and equal opportunities for the association members to access irrigation water as a group. This finding corroborates Clavel et al. (2015) findings concerning the importance of collective management to ensure distribution of irrigation water and cost sharing amongst beneficiaries. Accordingly, in each association a subgroup of members is designated to perform the role of irrigation managers, their responsibilities include: controlling the level of water in the channels that conducts water from the mountain to the association farms; scheduling the cleaning activities at each point in the irrigation system; managing the irrigation schedule within the associations; and providing information about the performance of the irrigation system to the local government. Irrigation committees have also been created outside the associations as an autonomous institutional innovation that does not involve interactions with LSLI.

Box 7.10 below shows an example of conflicts associated with the management of water for irrigation in Manica Province. The conflict arose because collaboration is required between different users to ensure accessibility and sustainability of the irrigation channel. In other words, an irrigation committee had to be created to manage the irrigation channel. This autonomous innovation involves another traditional farmer, Mr Songo (S242_V_2016).

Box 7.10 Traditional farmer, creation of an irrigation committee

Mr Songo (S242_V_2016) is a veteran of Mozambique's War of Independence which occurred between 1964 and 1974. Mr Songo and his wife moved to Ruaka in Manica District in 1994. At the time, the local leader allocated them land identified as unoccupied, but he advised them to be aware of absent landowners because they still had rights. Mr Songo then dug a channel to irrigate the approximately 25 hectares allocated to them. Now, Mr Songo claims that he owns the main irrigation channel diverted from Ruaka River. However, the channel crosses land that belongs to other farmers and they use it in their farming activities. This scenario has created some problems with the management of the irrigation channel. At some point, Mr Songo decided to charge for the use of water. Nevertheless, other users misinterpreted this action and claimed that Mr Songo had sold the irrigation channel to them. After much dispute, it was agreed that all farmers should have access to water from the channel to irrigate their crops and that access to water does not require any payment. As a result, an irrigation committee has been created to manage the irrigation channel.

Small-scale farmers have been making adjustments in response to the agro-ecological conditions in their environment, and they have also been making changes in the way they

are organised in order to better enable access to external resources and to manage existing resources. In other words, they have been implementing institutional innovations. The findings, summarised in Table 7.6, suggest that small-scale farmers follow multiple innovation pathways which take into consideration their attitudes toward farming.

Table 7.6 Innovations adopted considering attitudes toward farming

	Innovations pathway change current livelihood activities?	
	Yes	No
Involve interactions with LSLIs	**Opportunistic farmers** • Chili production by non-members • New planting techniques • Association adoption of LSLI crops • Group formation • Production of compost	**Fatalistic farmers** • Mixed farming systems • Crop diversification
Without LSLIs	**Progressive farmers** • Offseason crop production • Crop diversification	**Traditionalistic farmers** • Mixed farming systems • Irrigation committee

Source: Author's construct, based on interviews

As shown in table 7.6, these innovation pathways involve LSLI as an important source of innovation. These findings differ from Ojulu (2013) study which did not encounter technological interactions between LSLIs and small-scale farmers in Ethiopia. However, both association members and non-members have been changing their innovation pathways, not only to improve the management of existing farming systems but also to explore alternative livelihood activities, with or without LSLIs. As an example, while traditionalist association members, as exemplified by Case study 6.2 in Chapter 6, exclude themselves from the out-grower's schemes; this chapter as shown that opportunistic non-members attempt to create new links with LSLIs through group formation. Qualitative findings suggest that opportunistic and fatalistic farmers are engaged in learning processes which reinforce their ability to follow innovation pathways that involve LSLIs. This allows them to maximise opportunities introduced by LSLIs. In contrast, and for different reasons, the progressive and traditionalist farmers are predisposed to engage in innovation pathways that do not involve LSLIs. Access to land and their ability to derive income from different sources or production environments allows traditionalist farmers to terminate production agreements with LSLIs which they perceive as disadvantageous, whereas progressive farmers are goal driven and their engagement in farming is a means to an end, such as to further their studies. If progressive farmers perceive LSLIs' crops as less profitable they focus on the production of alternative crops.

7.5 Summary of the chapter

This chapter explored innovations in small-scale farming as the outcome of interactions between farmers and LSLIs. As a point of departure, the chapter attempted to understand attitude of the agricultural stakeholders with regards to the innovative capacity of the small-scale farmers in order to respond the following research question: To what extent do agricultural stakeholders spur or suppress innovation? The findings indicate that there is a lack of belief in the small-scale farmers' abilities. As discussed in Chapter 2, innovation bias explains the view of the agricultural stakeholders with regards to the innovative capacity of small-scale farmers. This reveals a contradiction between the principles of an innovation system that justifies the exploration of synergies between public and private organisations to support innovation in small-scale farming, and the practice in which agricultural stakeholders take a linear view of innovation. An innovation system framework presupposes interactions, collaboration, and synergy between stakeholders who are part of the system (Hall, 2007). Accordingly, farmers incorporate knowledge from different sources. In addition to LSLIs as innovation partners, it is important to consider their households and the wider community as vital sources of technology and innovation.

In contrast, activities of the small-scale farmers challenge the view of the agricultural stakeholders who do not believe in their innovative capacity. In response to the following research question: To what extent is the innovative capacity of small-scale farmers influenced by their interactions with LSLIs? The findings suggest that farmers are proactive because they question innovations introduced by LSLI technicians or other agricultural stakeholders. In this regard, farmers learn and adapt to the enabling environment that includes formal and informal institutions who influence their actions. In the vegetable sector, innovations include new crops and the technical recommendations for their production. However, small-scale farmers do not adopt all recommendations suggested by the LSLI technicians, they adapt the innovations to fit their situation and resource endowments (Douthwaite et al., 2002). Given the prevailing transfer of technology mind-set which exists among agricultural stakeholders, they interpret these changes as resistance to learning.

In response to the third research question: What are the innovations in small-scale farming considering different classes of farmers? The findings also suggest that small-scale farmers follow different innovation pathways which relate to their attitudes toward farming. Traditional and fatalistic farmers incorporate LSLI innovations in their farming systems as a means to strengthen their capacity as farmers. Whereas the opportunistic and progressive farmers take into consideration multiple livelihood activities with or without LSLIs. The implication of understanding these attitudes towards farming, and how they influence the behaviour of the farmer in the uptake or rejection of certain innovations, is that interventions which aim to foster change in rural areas can be targeted and can take into consideration different groups of farmers and their attitudes towards farming. For instance, considering the introduction of LSLIs in developing countries and the inability of these investments to absorb the labour surplus in rural areas, by understanding the willingness of some individuals to engage in livelihood activities other than farming, it is possible to support their engagement in innovation pathways out of farming, and thereby without LSLIs.

8 Chapter eight - Conclusion

8.1 Introduction to the Chapter

The aim of this study was to understand how large-scale land investments (LSLIs) affect small-scale farmers in host countries. Considering the case of Mozambique, the study sought to investigate why LSLIs are regarded as a development strategy and how agricultural stakeholders justify their support for such investments. Research questions were asked which aimed to examine how LSLIs influence the livelihoods of small-scale farmers, and the extent to which that influence occurs. Using an innovation system conceptual framework, the study sought to understand how small-scale farmers negotiate their inclusion in the activities of LSLIs, and whether LSLIs support or hinder innovation in small-scale farming. This conclusion outlines the findings, and the theoretical, empirical, and policy implications, as well as considerations for future research.

8.2 Summary of main findings

This research explored interactions between small-scale farmers and LSLIs. The main findings are presented and discussed in Chapters 5, 6, and 7. Moreover, Chapter 4 includes preliminary findings concerning the impacts of LSLIs on the livelihoods of small-scale farmers in addition to a description of the characteristics of the farmers in the vicinity of LSLIs. Accordingly, the next section summarises the main findings.

8.2.1 Historicising Mozambican LSLIs

A number of features of the political processes which occur in Mozambique are context specific. To account for these Chapter 4 reviewed the main features of the agricultural and rural development strategies during colonial, socialist, and post-socialist periods of the country's history; it also examined government policy and the political environment which mediates implementation of contemporary LSLIs within the country. As a point of departure, Chapter 4 sought to understand the extent to which path dependency accounts for Mozambican policy choices and agricultural and rural development strategies.

There is persistent support for LSLIs and marginalisation of small-scale farmers

The historical review suggests that the contemporary government system in Mozambique, a former socialist country, preserves some of the features of a centrally planned economy. An important legacy of its socialist past is that the Mozambican governance system still holds a high degree of centralisation (Carbone, 2005). At present, the winner of the presidential election is entitled to appoint government representatives to different positions at the national and provincial levels. These central and provincial government representatives, in their turn, appoint their representatives at the lower levels, and so on. This system invariably involves the exclusion of all other political forces, regardless of election results at local level. That is, the winner governs administrative areas, provinces, districts, and communities, even where other political parties gained a majority during the elections. In addition to being a source of post-election conflicts in contemporary Mozambique, this concentration and centralisation of authority affects development processes in general, and implementation of the agricultural sector strategies in particular (Mosca, 2011; Cunguara and Hanlon, 2012).

An implication of this concentration and centralisation of authority is that the decision-making process regarding the agricultural sector is predominantly top down (Mosca, 2011; Cunguara and Hanlon, 2012). Hence, as discussed in Section 4.2, the government support of LSLIs at present also suggests a path dependence and continuation of agricultural and rural development strategies which gives a secondary role to small-scale farmers. Within this frame, implementation of LSLIs suggests, on the one hand, a continuation of historical processes and reinforcement of development strategies adopted in the past or, on the other hand, adaptation of such strategies to new circumstances.

This review suggests that the Mozambican government has a particular interest in large-scale enterprises, thereby explaining its continual effort to modernise the agricultural sector through the development of large-scale land investment (Hermele, 1988). A number of sources, including Hermele (1988), Hanlon (2004), and Mosca (2011), have reported that government intervention in agriculture during the socialist era was concentrated on State farms. As explained in Section 4.2, this was a failed attempt to revive previously colonial-owned plantations. State farms were unsuccessful due to inherent inefficiencies and the ongoing war with the rebel movement, RENAMO. Furthermore, research findings revealed

that farming associations in both the vegetable and sugarcane sectors have also been established on former colonial and socialist farms where government and agricultural stakeholders have been fostering links between LSLIs and small-scale farmers.

Chapter 4, in addition to providing an historical review of the literature in order to explore path dependency, put to use primary data collected during fieldwork in Mozambique to examine the impacts of LSLIs on the livelihood of small-scale farmers. In this regard, Section 4.3.2 sought to explore the perceptions of small-scale farmers on how implementation of LSLIs supports or undermines existing livelihood activities in the targeted areas.

LSLIs impact livelihoods of rural inhabitants in multiple ways

Research findings substantiate the well-established notion that small-scale farmers are responsible for the lion's-share of agricultural production in developing countries. In central Mozambique, survey results revealed that more than 80 per cent of the respondents were involved in crop production as their main livelihood activity. Findings suggest that, for the most part, subsistence farmers sell part of what they produce to earn a cash income. However, there are differences in the two study sites. In the vegetable sector, predominantly in Manica Province, both members and non-members of the associations rely more on farming as a source of cash, whereas in the sugarcane sector alternative livelihood activities, such as production of bamboo products, are important as a source of cash, in particular for non-members.

Within this scenario, the findings suggest that implementation of LSLIs affects farmers' livelihood activities. As discussed in Section 4.3, such impacts may be negative where the introduction of plantation crops, such as sugarcane, compete with the same land used for the production of subsistence crops, thereby promoting land disputes. In these cases, LSLIs are likely to undermine alternative income sources for small-scale farmers and restrict their ability to follow diversified livelihood options because of limited access to the natural environment, crucial for the pursuit of such livelihood activities. This appears to be the case in the sugarcane sector, where the majority of the research participants perceive the LSLI as a cause of land conflicts.

Conversely, the perception is markedly different in the vegetable sector where the research findings revealed that small-scale farmers do not view LSLI operations as a source of land conflicts, in fact they view LSLIs as an alternative income source. As discussed in Section 5.3, such investments contribute as a source of cash and facilitate access to markets where alternatives are scarce, thereby creating new livelihood options for farmers in the areas where the investments are implemented. Nevertheless, even in such cases, findings also highlight the inability of LSLIs to absorb excess labour supply in the targeted areas. Confronted with this limitation it is important to maintain alternative livelihood options in those areas. This is crucial because, as explained by Carr (2013), farmers engage in multiple livelihood activities that allow them to face different climatic and economic risks.

Furthermore, the findings reinforce previous research by Borras Jr et al. (2011) whereby prime land, in terms of its accessibility to main roads, the availability of water and proximity to irrigation infrastructure, is targeted for implementation of LSLIs. In the two study sites, for the most part, irrigated land is allocated for the production of crops promoted by LSLIs. This occurs even in the situation where land acquisition does not occur because association members retain land use rights, but allocate their land to the production of LSLIs' crops. This phenomenon, whereby investors do not have ownership but are able to access land and natural resources, is described as 'control grabbing' in the LSLIs literature (Borras Jr et al., 2012; Huggins, 2014). These findings are also in line with Li (2011) to the extent that LSLIs have managed to make use of both the land and the labour of small-scale farmers through their production agreements.

Gender and age influence the social relations of production between small-scale farmers

Given the patriarchal family system in central Mozambique, the male and older village members are able to control the ability of vulnerable groups, such as the women and the young village members to access opportunities. The findings in Section 4.3.5 suggests that those vulnerable groups are not allowed to take part in networking activities or to engage directly with development partners. The preliminary findings concerning the social relations of production in both vegetable and sugarcane sectors suggests that there is a gendered distribution of tasks and responsibilities whereby the men have a prominent role in activities that constitute a major source of cash for the household. This includes agriculture in situations in which this activity is the main source of cash income. Whereas the women

are for the most part engaged in subsistence agriculture and perform a secondary role in commercial agriculture. As an example, in the sugarcane sector, the women perform the physical and manual tasks such as clearing the land and weeding the sugarcane plantation, whereas the male association members are for the most part engaged in managerial tasks.

This research argues that LSLIs hold promise as a development strategy in situations where its introduction does not undermine existing livelihood options. Conversely, LSLIs that compete for existing land and water resources with local communities are likely to result in unintended outcomes. The historical review in Chapter 4 suggests that path dependence contributes to an explanation for the implementation of contemporary LSLIs in Mozambique. However, the review, while considering formal institutions, such as agricultural development strategies at different stages of Mozambican history, does not explain why LSLIs are regarded as a development strategy. This notion was further developed in Chapter 5 which explored the role of national and subnational actors as drivers of LSLIs. Accordingly, the next section summarises the findings of Chapter 5.

8.2.2 Exploring the national and subnational drivers of LSLIs

Chapter 5 discussed the mechanism through which national and subnational actors encourage implementation of LSLIs. The chapter considered the way in which both official policy and the expectations of agricultural stakeholders are conducive to LSLIs. As presented in the conceptual framework, Section 2.5, formal and informal institutions comprise the enabling environment. In the case of Mozambique, the findings suggest that favourable agricultural policies, alongside the paternalistic attitudes of agricultural stakeholders, encourage the implementation of LSLIs. In exploring national and subnational drivers of LSLIs, this research engages with the wider debate regarding those drivers and their implications.

LSLIs regarded as a means to modernise the agricultural sector

Chapter 5 firstly explored why the government and agricultural stakeholders are promoting LSLIs. It emerged that LSLIs are situated within the context of decreasing funding for agricultural development coupled with the need for modernisation of the agricultural sector. Within this framework, the government of Mozambique and the subnational agricultural stakeholders believe that LSLIs will contribute to the transformation of

subsistence farmers into market-oriented commercial farmers. This accounts for informal institutions and it is relevant because, as highlighted by Scott (1987), social beliefs and beliefs systems are rationalised into laws, rules and regulations. The findings, as discussed in Section 5.2, suggest that implementation of LSLIs in Mozambique is a response to this policy environment in which the government attempts to find alternative mechanisms for supporting the agricultural sector. This is significant because it is generally assumed that LSLIs are imposed in developing countries, the expectations of national and subnational actors elucidates their role as drivers of LSLIs.

At local level the main supporters of LSLIs tend to be government officers from Investment Promotion Agencies, such as CEPAGRI and CPI, project managers involved in the irrigation PROIRRI, managers of BAGC, and input providers. These actors have positive attitudes towards LSLIs as a development strategy. They regard LSLIs as a win-win situation because, as they argue, small-scale farmers acquire agricultural knowledge and LSLIs ensure supply of their products. Furthermore, as discussed in Chapter 5, out-grower schemes attempt to encourage the exchange of information between small-scale farmers to offset the shortage of agricultural extension agents in the country. However, the notion that LSLIs will fill an institutional gap and provide agricultural support to small-scale farmers is disputed. Other agricultural stakeholders, which include non-members in the sugarcane sector as discussed in Chapter 4, public extension officers, and local businessmen, argue differently; they question the implications of LSLIs on the livelihoods of the local inhabitants. In particular, there are concerns that LSLIs will undermine existing livelihood options.

It has been shown that the agricultural stakeholders have a positive attitude towards LSLIs and subsequently encourage such investments informally. However, in order to explore how Mozambican stakeholders promote LSLIs, Section 5.3.1 also considered how formal institutions encourage their implementation. Findings in Chapter 5 indicate that there are various mechanisms in place to facilitate implementation of LSLIs. Some examples include the creation of Special Economic Zones and the LSLIs entitlement to fiscal benefits within those Zones. To attract LSLIs local agricultural stakeholders provide incentives to facilitate their introduction in Mozambique. An example of such support is import subsidies made for the purchase of agricultural equipment which require high upfront investment and are likely to benefit LSLIs.

There is an increasing involvement of the private sector in the provision of agricultural support

To operationalise their view on modernisation, agricultural stakeholders implement public-private partnerships. This arrangement, as discussed in Section 5.2, is the mechanism through which LSLIs are involved in the provision of agricultural support to small-scale farmers. The involvement of private entities in the provision of agricultural support is justified as an alternative mode for the implementation of Corporate Social Responsibility programmes in which interactions with small-scale farmers are framed as a means to facilitate market access and to promote social learning. An implication of viewing LSLIs as the mechanism through which agricultural support is delivered to small-scale farmers is that it shifts the focus of the main service providers. With the aim to promote modernisation, and the assumption that knowledge and wealth will trickle down from LSLIs to small-scale farmers, government resources are channelled into the support of the activities of LSLIs.

An example of such a shift in the focus of agricultural support, as discussed in Section 5.3.1, is the Catalytic Fund for Innovation and Demonstration which is available for LSLIs to support the activities of small-scale farmers. By channelling funds through LSLIs, such investments become the focus of the agricultural intervention. This is worrisome considering that small-scale farmers continue to make up the majority of the agricultural population in developing countries, including in Mozambique where they represent more than 90% of the rural population. There are justified concerns over the involvement of profit seeking organisations in agricultural and rural development programmes. Although private companies may be involved in philanthropic activities, profit is their main goal. Chimhowu (2013, p.16) highlight that market driven development and reliance on the private sector to solve environmental and social problems is a premise which "raise questions about ethics of profiting from poverty". Another implication of considering LSLIs as a development strategy is that it increases reliance on the private sector for the provision of agricultural services to small-scale farmers. This reinforces the notion that agribusiness companies are increasingly controlling African agricultural value chains (Amanor and Chichava, 2016).

Although small-scale farmers have been assigned a secondary role in agricultural and rural development during both the colonial and the socialist eras in Mozambique, provision of

agricultural support through private companies may exacerbate the marginalisation of poor households and their farming systems. This is because LSLIs provide support in order to enhance small-scale farmers' ability to supply LSLIs' crops. In other words, all the support focuses on crops promoted by LSLIs. The focus on the production of generic and standardised products limits the ability of rural actors to influence development programs (Murdoch, 2000). Furthermore, promoting LSLIs as a means of support for small-scale farmers, and as a source of modernisation, suggests a top down, centralised, and unidirectional view of the innovation process (Biggs and Clay, 1981; Biggs, 1990).

Moreover, the assumptions made with regard to technological interactions and employment creation as a result of the implementation of LSLIs lead to an increased bias against small-scale farmers. There are various ways in which the bias against small-scale manifests. The shared support scheme promoted by the irrigation project PROIRRI, whereby small-scale farmers have to contribute additional resources to benefit from the project, is another way in which such bias manifests.

National and subnational elites do benefit from LSLIs

A further shortcoming of the involvement of LSLIs in the provision of agricultural support to small-scale farmers is the risk of the elite capture of development projects. The findings suggest that the involvement of powerful individuals and the under-representation of poor households in the farming associations not only limits the potential of LSLIs as a development strategy, but also exacerbates the negative impacts of LSLIs because such powerful individuals use their societal positions to the maximum advantage of the association of which they are members. For example, in the case of disputes, subnational government officials are not impartial in their decision-making.

Moreover, the notion that LSLIs will benefit small-scale farmers is also questioned because of the land rents that powerful national and subnational actors accrue with their implementation. The findings suggest that such individuals have the ability to secure land use rights through various means, including: the exercise of their bureaucratic influence; use of traditional authority; use of historically accumulated power; knowledge of the local business networks; and the control they exert over the development agenda which they use to encourage LSLIs due the possibility of earning land rents. Nevertheless, the findings are

ambivalent to the extent that LSLIs perform some of the functions envisioned by the policy makers and other development practitioners, including market creation and the facilitation of access to production factors, technology transfer, and technical assistance (World Bank, 2006; De Schutter et al., 2013).

Chapter 5 contributes to the contemporary debate about the drivers of LSLIs worldwide. With a focus on the national and subnational drivers, the chapter reflected on the implications of regarding LSLIs as a development strategy. However, their potential as a development strategy is affected by the interpersonal interactions between innovation actors during their implementation. This was discussed in Chapter 6. Accordingly, the next section summarises the findings of Chapter 6, which explored how different groups are able to benefit during implementation of LSLIs in both the vegetable and sugarcane sectors.

8.2.3 Characterising interactions between LSLIs and small-scale farmers

There is little understanding of the interpersonal interactions which take place between stakeholders engaged in LSLIs. It is important to understand how these investments are implemented on the ground, how small-scale farmers organise themselves in relation to LSLIs, and who are the intermediaries involved. This is particularly important because it is vital to know how vulnerable groups are affected and what institutional arrangements are made which contribute to their marginalisation. With the aim to understand how small-scale farmers are incorporated into the LSLIs activities, Chapter 6 firstly considered the underlying interactions.

Association membership facilitates access to opportunities

The findings suggest that farming associations are the predominant means through which small-scale farmers interact with LSLIs. Such associations have been the focus of the interventions of both the government and the NGOs engaged in agricultural and rural development. With the involvement of the private sector in the provision of technical and financial assistance, as discussed in Chapter 5, the same group of people benefit from different development projects. In this regard, the latest opportunity is the out-grower scheme involving LSLIs which is promoted by the Government of Mozambique and financed by the World Bank. This funding has enabled the installation of irrigation systems for farming associations in both Manica and Sofala Provinces.

A shortcoming of the provision of agricultural support through the associations is that the government allocates disproportional support to association members, at the same time excluding the majority of the community. Moreover, the findings suggest that not taking part in the farming associations entails social, economic, and representational implications for non-members. Given this, and other opportunities such associations have had in the past, and the shortage of alternatives, non-members negotiate their incorporation into the existing associations with the aim of improving their access to agricultural support, in particular their incorporation into the activities of LSLIs. Such processes, as discussed in Section 6.2, are described in this study as networking. In the two study sites, networking occurs through the attempt to be members of existing associations and by the creation of new associations.

Chapter 6 considered how social capital, in the form of membership to farming groups, affects the livelihoods of the small-scale farmers. Findings reveal that association membership is particularly important as a factor that determines access to opportunities. Association members tend to be better off in comparison to the majority of non-members. Statistical results of the chi-square test of independence between variables supports the existence of an association between indicators of wealth, such as transport ownership and livestock ownership, and membership of farming groups. However, knowing that association membership facilitates access to opportunities allows small-scale farmers to renegotiate the benefits of development projects. Thus, through networking non-members negotiate their incorporation into the activities of LSLIs. The efforts of the small-scale farmers to be incorporated in this way supports the view of the agricultural stakeholders who consider LSLIs to be a development strategy. This is because it suggests that small-scale farmers also believe in the positive contribution of such investments to their livelihoods. In Chapter 4, these farmers who attempt to follow innovation pathways that involve LSLIs have been classified as opportunistic farmers.

As discussed in Chapter 5, the findings suggest that LSLIs contribute to the mobilisation of resources and facilitation of access to markets. These are important production constraints in small-scale farming systems. However, the contribution of LSLIs in facilitating access to production factors influences how LSLIs and association members negotiate crop

production and commercialisation in particular, and use of the irrigation system in general. In this regard, association members in the sugarcane sector avoid confrontation with PROIRRI managers and maintain a production agreement with LSLIs that they perceive as unfair. This research was informed by the Theory of Planned Behaviour, as discussed in Section 2.4.4. Following this theory, the behaviour of association members is explained by their normative beliefs, as described by Ajzen (1991) and Ajzen (2012). According to this theory, small-scale farmers regard both project managers and LSLIs' staff as persons of great significance, and as a result they attempt to comply with expectations of such people due to their perceived importance.

Furthermore, incorporation of small-scale farmers into the activities of LSLIs involve additional pre-conditions that most small-scale farmers do not possess. In this case, in addition to association membership, to engage in formal agreements with LSLIs small-scale farmers are required to possess formal land use rights and to have access to water for irrigation. However, most rural households operate informally, thus demanding registration limits the ability of the small-scale farmers to take advantage of these opportunities. Also, low levels of education and illiteracy limits the ability of small-scale farmers to engage in formal agreements and to make use of the opportunities that aim to promote agriculture. Given these limitations, section 6.3 examined how small-scale farmers are incorporated into the LSLIs activities.

Vulnerable groups are excluded

The findings described in Chapter 6 suggest that there are varying degrees of exclusion and inclusion of small-scale farmers into the activities of LSLIs. This allows LSLIs to also influence farmers not involved in formal production agreements. Inclusion involves association membership and formal production interactions in which small-scale farmers are organised in groups to supply products to LSLIs. Partial inclusion encompasses non-members who have benefited from technological interactions with association members, and members no longer involved in the production agreements because they have decided not to produce LSLIs' crops, or because they have been barred from the scheme by the LSLI technicians due to perceived misbehaviour. Meanwhile, exclusion occurs for small-scale farmers who are neither directly nor indirectly involved in the production schemes. Understanding these particularities helps to inform policy. For instance, the identification of the characteristics

of small-scale farmers who are willing to engage in production agreements with LSLIs may improve the decision making about LSLIs and potential target groups.

The extent to which the small-scale farmers are able to interact with LSLIs may be associated with their social status. Social differences within communities lead to opposing interests on some occasions. One consequence of this heterogeneity is that the out-grower schemes are not inclusive of the poor. This corroborates Chambers (2012) findings who emphasised that poor households are under-represented and as a consequence they have limited participation in development projects. In the sugarcane sector, in the village of Macequessa, association members' goals to expand the sugarcane plantation are incompatible with the interests of the wider community whose aim is to maintain existing livelihood options. Accordingly, prevailing top down attitudes, mistrust, and lack of information determines how interactions occur.

Section 6.4 explored how unequal power relations affect interactions between innovation actors. The findings suggest that instead of collaboration achieved by cooperation between individuals who believe in a common goal and perceive fairness in the interaction, association members use manipulation and other forms of coercion over non-members to increase their access to land. Non-members, on the other hand, employ different forms of passive resistance, or weapons of the weak as described by Scott (2008), to avoid being evicted.

Inclusion of powerful actors in farming groups limits the potential of LSLIs as a development strategy

In the sugarcane sector, the ability of the association members to manipulate processes to their advantage is increased by the inclusion of powerful subnational actors as association members. Such powerful actors manage to benefit from development projects either by forming tactical alliances with small-scale farmers, in which case their involvement is consensual, or through the capture of development projects where the aim is to benefit from the investments made by PROIRRI. Such powerful individuals have managed to use their prominent societal positions and to impose themselves on the association members in order to secure a place within the association. However, whether elite capture or tactical alliances between development brokers at different levels of government, their

involvement as association members not only undermines the effectiveness of development projects but also exacerbates the potential negative implications of LSLIs on the livelihoods of non–members. The elite tend to use their positions, as government officials, extension officers, or local leaders, to the benefit of the association with disregard for other members of the community.

In the sugarcane sector, elite capture, whereby the association benefits individuals who are not small-scale farmers and who are not directly involved in the association activities, is sanctioned by the form of organisation. Organisation of production in the Association Muda Macequessa resembles the cooperatives promoted by Frelimo during the socialist era. More specifically, equal distribution of revenue between association members, regardless of their contribution during the sugarcane growing season, facilitates this process. At the operational level, all the association employees earn equal salaries regardless of their tasks and responsibilities. This form of organisation, resembling a collective farm, has further implications for the distribution of the benefits of the irrigation system financed by the World Bank. It results in overly closed networks, as described by Fisher (2013), whereby the most influential association members have managed to include their relatives as both members and workers, thereby limiting the number of households benefiting from the interaction with the LSLIs. This reinforces Whiteside (1998)'s view that associations are often undemocratic and promote mechanisms through which different forms of exclusion can occur.

An implication of these divergent interests between association members and non-members and their lack of collaboration is that agricultural stakeholders fail to explore opportunities for learning and innovation. Accordingly, outcomes of the interactions between agricultural stakeholders in terms of innovation in small-scale farming were discussed in Chapter 7. Such findings are summarised next.

8.2.4 Examining the outcomes of interactions between agricultural stakeholders in terms of innovation in small-scale farming.

In line with the IS approach which envisages innovation as an outcome of the interactions between various stakeholders, Chapter 7 addressed three research questions. Thus,

considering prevailing top down attitudes pointed out in Chapters 5 and 6, Chapter 7 sought to understand how agricultural stakeholders affect innovation in small-scale farming.

Agricultural stakeholders have a linear view of the innovation process

Considering different perspectives on innovation and how small-scale farmers are regarded in the innovation process, as discussed in Chapter 2, findings suggest that attitudes of innovation actors towards the innovative capacity of small-scale farmers is in line with the transfer of technology approach to innovation. Such attitudes are expressed, for instance, through disbelief in the abilities of small-scale farmers held by public extension officers and LSLI technicians; or, through the belief that the increased use of commercialised production factors, such as inputs and fertilisers, is always desirable by investment promotion officers and input providers. The latter attitude is described by Leeuwis and van den Ban (2004) as innovation bias. Such innovation bias influences outcomes of the interactions. Furthermore, innovation bias is also a source of disagreement between small-scale farmers and LSLI technicians because non-implementation of the recommendations suggested by the LSLI technicians was interpreted as neglect and resulted in exclusion of association members from out-growers' schemes in the vegetable sector.

The innovation bias of the promoters of LSLIs fails to notice the incremental changes that small-scale farmer's make in their farming practices. For the most part, the interventions linking small-scale farmers with LSLIs rely on increased use of exogenous innovation in the form of commercialised inputs, agricultural equipment to promote mechanisation, and new export crops, with minimal attention paid to established farming systems, or to the use of the existing supply of labour and internal markets for agricultural products. These, as argued by Chambers et al. (1989), are important features of the transfer of technology approach and diffusion of innovation research which is biased against small-scale farmers. Over-reliance on exogenous innovations may, in its turn, increase farmers' dependence on international markets for the production factors. Along with the biological and climatic factors that make the agricultural sector risky and uncertain, increasing small-scale farmers' reliance on the markets exposes them to additional risks.

Small-scale farmers challenge the view of the agricultural stakeholders

Notwithstanding the linear view on innovation of the agricultural stakeholders, in line with participatory and system thinking approaches to innovation, the process by which the technical and social innovations occur follows a variety of mechanisms. Accordingly, the findings suggest that small-scale farmers are proactive, and that adoption or dis-adoption of innovations introduced by LSLIs is a result of varied learning processes in which small-scale farmers are involved. The findings in Section 7.3 reinforce the IS notion of multiple sources of information and interactive learning processes as important features of the innovation process. Accordingly, smallholders are engaged in a continuing quest for innovation and reflection about their agricultural practices. While taking into consideration their past employment as a source of agricultural knowledge, they also conduct experiments and observe the activities of other farmers. This is in line with Kolb (1984)'s experiential learning theory which conceptualises learning as a an interactive process that involves abstract conceptualisation, observation, and the use of experience and experimentation.

Social learning contributes to innovation

An important aspect of the agricultural learning in which small-scale farmers are engaged involves the conceptualisation of learning as a feature of the group. Hence, the group of farmers involved in the production of vegetables or sugarcane represent a social system, and agricultural innovation is a social learning process. In this regard, supporting the notion of learning as a social process (Oreszczyn et al., 2010), individual experiments were the basis for decision making for both the experimenters and for other farmers not directly engaged in the activities. The geographical contiguity of the farms in the associations allows other members of the community to observe each other's experiments. By doing so there is no need to reproduce the experiments on other farms. According to Wenger (2011), this is a feature of a community of practice in which the proximity of their farms allows small-scale farmers to share experiences with peers, and thus learning is accumulated over time within the group. This also reinforces Bandura (1977) thesis that regards observation as an important aspect of the learning process.

Innovations adopted in each case tend to reflect their attitudes toward farming

Farmers are engaged in diverse innovation pathways with and without the involvement of LSLIs. The traditionalists view farming as a way of life, among other matters their age and the amount of investments they have made throughout their lives in this livelihood activity helps explain their reluctance to engage in alternative livelihood options. The findings suggest that they innovate to ensure the long-term viability of farming as their main livelihood activity. As discussed in Section 7.4, their innovations include the establishment of irrigation committees to ensure availability of water for irrigation, and mixed farming systems to manage soil fertility. The fatalistic farmers are involved in farming due to a shortage of opportunities linked to alternative livelihood options. They innovate in order to embrace farming as their main livelihood activity. Their innovations also include mixed farming systems but, in this case, they incorporate LSLI crops.

Opportunistic farmers are relatively flexible, they combine farming with the management of rural development projects within the village. This group includes the development brokers located at the interface between the village and other levels of government. They innovate with the aim to maximise opportunities introduced by development projects. Non-member opportunistic farmers are engaged in group formation where the aim is to establish links with LSLIs; they conduct experiments and seek knowledge concerning the production of LSLIs' crops. Association members who are opportunistic farmers are engaged in the production of compost to maximise the market created by the introduction of LSLIs' crops. Furthermore, the progressive farmers view farming as a business opportunity. Hence, they are, for the most part, engaged in crop diversification with or without LSLIs, and the offseason production of different crops, such as cabbage and okra, in order to profit from higher prices when crops are produced under suboptimal conditions.

Assuming that these behaviours are enacted under the farmer's own volition, in the manner described by the Theory of Planned behaviour (Ajzen, 1991), and with the notion that behavioural change can be influenced (Bandura, 1977), understanding these particularities may contribute to the selection and implementation of development projects. More specifically, understanding which farmers are willing to change their livelihood activities has implications in terms of the provision of agricultural support. Such support can be tailored

not only to different groups but also to individuals with specific features based on their needs, their attitude towards farming, and their self-perception.

Findings in Chapter 7 suggest that a transfer of technology mind-set prevails amongst agricultural stakeholders, but their linear view of the innovation process, which places emphasis on exogenous innovations, is challenged by the actions of small-scale farmers who are engaged in multiple innovation pathways in which the integration of both exogenous and endogenous innovations is involved. Activities of small-scale farmers are in accordance with the IS principles that envisage interactive learning processes between multiple configurations of actors.

The findings summarised in Section 8.2 also highlighted implications of the impact of LSLIs on the livelihoods of small-scale farmers in host countries. More specifically, such findings suggest that in some situations LSLIs contribute to the creation of alternative livelihood options, and in other instances it undermines existing livelihood options. Further to this, theoretical, policy, and empirical implications of this research are considered next.

8.3 Implications of the research

8.3.1 Theoretical implications

This section discusses the applicability of using an IS approach to explore the implementation of LSLIs. The IS framework establishes the theoretical foundation for the investigation of interactions between LSLIs and small-scale farmers. Most research on LSLIs focuses on land conflicts and highlights the struggles over natural resources and the unequal power relations amongst the participants in the process. However, LSLIs are not likely to cease in the future. Within this scenario, the IS framework provides a balanced view of LSLIs and emphasises its potential as a development opportunity whilst also identifying challenges and drawbacks. Acknowledging this is important as it can encourage more informed decision making regarding these investments.

Incorporation of power into a IS conceptual framework

Investigating LSLIs from the perspective of innovation does not refute their negative outcomes, neither does it assume that small-scale farmer's innovations are unequivocally a

result of their interactions with LSLIs. In relation to this, one of the criticism of IS approach, as discussed in Section 2.4.5, is that it does not take into consideration power relations (Lundvall, 2007). This study has contributed by incorporating power into an IS conceptual framework, Figure 2.3. More specifically, it examined the micro-sociological aspects of power within social networks to understand interactions between small-scale farmers and LSLIs. Hence, the use of IS approach provides room for a holistic examination of the LSLIs, and thus considers both the potentially negative and positive outcomes.

Underscoring farmer's agency

Another criticism of IS approach and the way in which it has been implemented for developing countries' agriculture is that it gives major emphasis to the system and not to individual farmers. Magro and Wilson (2013) highlight that holistic coordination requires data and information from different administrative levels. This study has considered two levels of case studies, at broader level the cropping systems was discussed in Section 3.2.3, and at the narrower level the small-scale farmer individual features were outlined in section 4.3.4, thus giving emphasis to both the system and to individual farmers. By doing this, the IS approach also draws attention to farmer's agency, highlighting that they are not passive in the face of LSLIs.

Network approach explores synergies amongst actors

Furthermore, application of the social network analysis tools and consideration of LSLIs as part of a local network of actors allowed dissipation of the bias which exists in the literature and which tends to regard these investments as external to the locations where they are being implemented. This approach emphasise the interdependence between innovation actors (Spielman et al., 2009). As a result, and contrary to most research on LSLIs, this pragmatic view explores synergies, complementarities, collaboration, and involvement of other stakeholders in the interactions between small-scale farmers and LSLIs.

Another advantage of the network approach is the possibility of linking external opportunities with development challenges within rural areas (Murdoch, 2000). Hence, regarding LSLIs as part of the local agricultural network is relevant because the study does not focus on the problems which result from the introduction of LSLIs, instead it explores the ways in which their benefits can be maximised. This is discussed in the next section in

connection with policy and the practical implications of promoting LSLIs as a development strategy.

8.3.2 Policy implications

Understanding the ways in which small-scale farmers engage with land investments has policy implications. The findings suggest that an appropriate enabling environment encourages beneficial interactions between LSLIs and agricultural stakeholders and capitalises its implementation as a development opportunity. The findings in Chapter 5 indicate that due to a decrease in funding from main development partners and the need to diversify service providers, LSLIs have been providing agricultural support to small-scale farmers through their involvement in public-private partnerships. However, because agricultural support in developing countries has been conventionally provided by government agencies for public good, and by NGOs for philanthropic reasons, it is important to be cautious about the involvement of private entities in the provision of such services as their main goal is profit. If unrestrained, LSLIs are likely to undermine existing livelihood activities instead of promoting development through the creation of alternative livelihood options (Li, 2011). To that end, the government should promote LSLIs that do not undermine or compete with existing livelihood options. This should take into consideration alternative land uses and access to natural resources.

In terms of land policy, the view of supranational organizations, such as FAO of the United Nations and the World Bank, is that current trends in LSLIs will continue, and therefore they propose Voluntary Guidelines to improve governance of LSLIs in order to reap the benefits of these opportunities. These guidelines include Principles for Responsible Investment in Agriculture and Food Systems approved by the Committee on Food Security (CFS) on the 15th October 2014 (FAO-CFS, 2014). Similarly, the African Union has also proposed guiding principles on LSLIs to guarantee inclusiveness and to ensure that investments in farmland in their member states support sustainable development (African Union, 2014). Nevertheless, the effectiveness of voluntary guidelines to curb negative impacts of LSLIs is questioned, not only because voluntary guidelines are non-binding, but because voluntary guidelines disregard fundamental aspects of accountability, they do not consider human rights issues, they do not put forward an alternative to LSLIs, and they do not suggest ways to compensate the losers (De Schutter, 2011).

In countries like Mozambique, where the land system envisages the protection of the rights of the most vulnerable, but implementation of the system is deficient, voluntary guidelines are likely to be equally ineffective. The Mozambican Land Law, approved in 1997, recognizes customary land use rights and indicates that consultation with local communities is a prerequisite for the approval of LSLIs. In 1999, the DINAGECA (Direção Nacional de Geografia e Cadastro - National Department for Mapping and Land Registry Service) published guidelines for conducting consultations (Hanlon, 2004). Accordingly, the first consultation is more inclusive; in addition to the land applicant, the technician from the Provincial Mapping and Land Registry Service, and the district Administrator, it involves most members of the community. The aim of the first meeting is to explain the community rights, present the proposal, and select three to nine people who will join the district administrator and the technician from Land Registry Services to represent the community in the rest of the negotiation process (Hanlon, 2004). However, these instructions are limited and their effectiveness to safeguard community rights will depend to a great extent on the goodwill of government representatives, i.e., the district administrator and the technician from Land Registry Services.

The case of sugarcane demonstrated that government officers, who are also association members, safeguard their personal interests that are incompatible with the interests of non-members. Therefore, it is important to create awareness about such deficiencies in the manner in which the Land Law is implemented and to encourage collaborative work that aims to both promote new investments and protect the rights of local communities. By and large, taking into consideration the policy and practical implications of this research, the above recommendations also entail that support of LSLIs as a development opportunity should be preceded with changes in both policies and mind-sets; appropriate policies with inappropriate mind-sets leads to unintended outcomes.

Another implication of this study derives from the finding that social differentiation amongst small-scale farmers leads to diverse forms of engagement with LSLIs. More specifically, it is important to consider possibly divergent interests between small-scale farmers in the areas targeted for LSLIs. Government should be aware, when intervening, of the imbalances of power within the community. If rent seeking undermines the potential

benefits of LSLIs, it is important to find ways to circumvent the rent seeking elites who take advantage of interventions introduced to benefit the most vulnerable groups. This can be achieved by minimising the number of intermediaries during the delivery and implementation of these interventions, or by taking into consideration different groups of farmers and their specific needs.

In terms of agricultural policy, the evidence suggests that the cropping system influences the nature and the outcomes of the interactions between LSLIs and small-scale farmers. In this regard, there exists greater scope for interactions and technological exchanges between LSLIs and small-scale farmers in the vegetable sector. This is not only illustrated by the larger number of producer associations engaged in out-grower schemes in the vegetable sector, but also by the technological packages introduced by LSLIs that have been adopted by both association members and non-members. An additional advantage of the vegetable crops introduced by LSLIs is the availability of local markets for such crops. New vegetable crops, such as baby corn, and new varieties of existing vegetable crops, green beans and chillies, have been shown to have greater potential to benefit the local community. This creates new opportunities for small-scale farmers considering that the varieties introduced by LSLIs differ from the varieties available locally. By embracing these opportunities small-scale farmers attempt to follow innovation pathways that involve LSLIs.

The findings suggest that benefits of interactions in the vegetable sector go beyond the farming associations. Hence, LSLIs involved in vegetable crops may be appropriate as a pro-poor development strategy. In this sector, non-members benefit from LSLIs through their links with association members. Furthermore, targeting LSLIs engaged in the production of vegetable crops may translate into greater societal benefits because of the ability of each farmer to reap benefits from their interactions with LSLIs that are associated with individual efforts. Although LSLIs crops are produced in groups within the association, the technology packages, which contain seeds, fertilisers, and other basic services including pest control, are delivered to individual farmers who have autonomy in the management of their plots. In this case, the production in individual plots within the association allow small-scale farmers to take advantage of both individual and collective forms of organisation.

The situation is different with sugarcane where the association farm is managed collectively as one unit. This arrangement has numerous implications and affects the distribution of costs and benefits. In terms of tasks and responsibilities, such collective farm management obscures individual performance. The inability to reward individual performance appears to affect organization of the sugarcane production and the ways in which the association members attempt to increase their profits. In this regard, new positions for association members or workers are restricted to the relatives of existing members. In terms of benefits and profits, as outlined above, the equal distribution of profits and revenues legitimises the entitlements to benefits for the rent seeking elites. In terms of innovation, the scale of production and the specialisation of tasks in the sugarcane sector limits the opportunities for each farmer to explore different stages of the production cycle and to learn the various processes associated with sugarcane production.

Additionally, large-scale sugarcane production is performed exclusively in partnership with a land investment company that possesses a sugar mill in Dondo District, Sofala Province. In this case, there is no alternative market to which the small-scale farmers could sell sugarcane if necessary. Instead of promoting it, this lock-in situation is likely to undermine innovation. Understanding these differences is important and has a practical use. Vegetables have greater potential to benefit the local communities because, as explained by the World Bank (2007), such crops maximise the competitive advantage of small-scale farmers in relation to large-scale farmers in aspects related to labour supervision.

Furthermore, as suggested by Turner et al. (2017), it is important to consider path dependency to promote systemic innovative capacity. Innovation is achieved by breaking negative tendencies and encouraging positive ones. In this regard, the context within which such investments are implemented is important. In the next section, this conclusion underscores the importance of context specific empirical evidence from Mozambique to the deeper understanding of how LSLIs are implemented. This context specific information complements the online databases, such as Land Matrix (2014), which have been created within the last ten years to understand patterns of LSLIs worldwide.

8.3.3 Empirical implications

One purpose of this study was to address the shortage of empirical evidence in regard to the implementation of LSLIs. This is a response to the calls from Oya (2013), Edelman et al. (2013) and Cotula et al. (2014) to go beyond 'making sense of' what is going on with regards to LSLIs globally to an understanding of the processes on the ground. Through fieldwork conducted in Mozambique, which involved interaction with agricultural stakeholders engaged in the vegetable and sugarcane subsectors, the research generated empirical evidence on drivers, processes, and the potential outcomes of LSLIs in a host country.

Mozambique is a typical case in which LSLIs are regarded as a development strategy

There are not many studies about Mozambique, which may be an emblematic case. Active government support and LSLIs interaction with small-scale farmers organised in groups are, for instance, two possible comparable features of Mozambican LSLIs. This case is particularly relevant because the country was a major destination for contemporary LSLIs. Therefore, exploring interactions between LSLIs and small-scale farmers in Mozambique may contribute to an understanding of what is going on in other countries and what to expect from LSLIs in similar contexts. While representative of what is going on in comparable scenarios in terms of the patterns of interaction amongst agricultural stakeholders, the case of Mozambique also differs due to its enabling environment, cultural inheritance, and geographical location. Hence, the contextual conditions on the ground can have a major impact on the implementation of LSLIs and thereby preventing generalisation of particular types of LSLIs.

The case study approach emphasises the importance of context specific information

Understanding what is going on on the ground also involved bringing farmers voices into the debate. This is important because their voices are rarely heard (Chambers, 2012). Although they are frequently considered to be the main beneficiaries of development projects, the voices of the powerful, which include decision makers, development brokers, and people in prominent societal positions, are usually more salient. Reporting the views of small-scale farmers, in addition to giving them the opportunity to voice their expectations and concerns, helps other stakeholders to view them as a heterogeneous group. By adopting this stance, intra-group conflicts and divergent interests are considered as the norm, not only within the community but also within the farming associations and in

households. For example, the case of Mozambique challenges the idea that such investments are invariably rejected by local communities and that struggles associated with LSLIs aim to prevent their implementation. The research demonstrates that agricultural stakeholders, including non-members, also regard LSLIs as a development opportunity.

8.4 Considerations for future research

In the case of Mozambique, there is a conducive enabling environment whereby both formal and informal institutions encourage the implementation of LSLIs. Hence, the findings may be applicable to analogous scenarios. However, considering the premise that LSLIs are a development opportunity, it is important to understand how different enabling environments contribute to realise the potential of LSLIs as a development strategy. Cross country comparisons will contribute to an understanding of the extent to which different institutional arrangements enable the implementation of LSLIs as a development opportunity. In particular, how different land systems and agricultural and investment related policy environments encourage technological and market interactions between LSLIs and other innovation actors, and how they minimise land conflicts and competition between different interest groups are ripe for exploration.

By exploring LSLIs and small-scale farmers' interactions in the sugarcane and vegetable sectors, the findings suggest that cropping systems influence how the local communities derive benefits from LSLIs, and the extent to which this occurs. Future research should take into consideration other farming systems, involving for instance, cereals, fruits, and dairy products, to understand the extent to which farmers and LSLIs interactions foster or undermine innovation. Furthermore, it is important to capture the voices of different groups of farmers. In this view, future studies should focus on gender for instance. Preliminary findings in Chapter 4 highlight that intra-household distribution of tasks has implications on women participation in networking activities beyond the household, hence also limiting their access to opportunities. Taking this into consideration, it is crucial to understand the extent to which the women benefit from LSLIs.

In terms of methodology, more specifically in the implementation of the snowball sampling strategy, as discussed in Section 3.3.3, the overlap between key informants and the respondents of the stakeholder's questionnaire affected the snowball sampling due to

unavailability of the research participants for the second stage of the interview process. Thus, to maximise the use of social network analysis tools, future research should consider a different reference point and not include the research participants as key informants at the commencement of the snowball sampling procedure. Despite the overlap amongst different networks at subnational and national levels, Stock (2007) emphasises that this may reveal a different configuration of actors.

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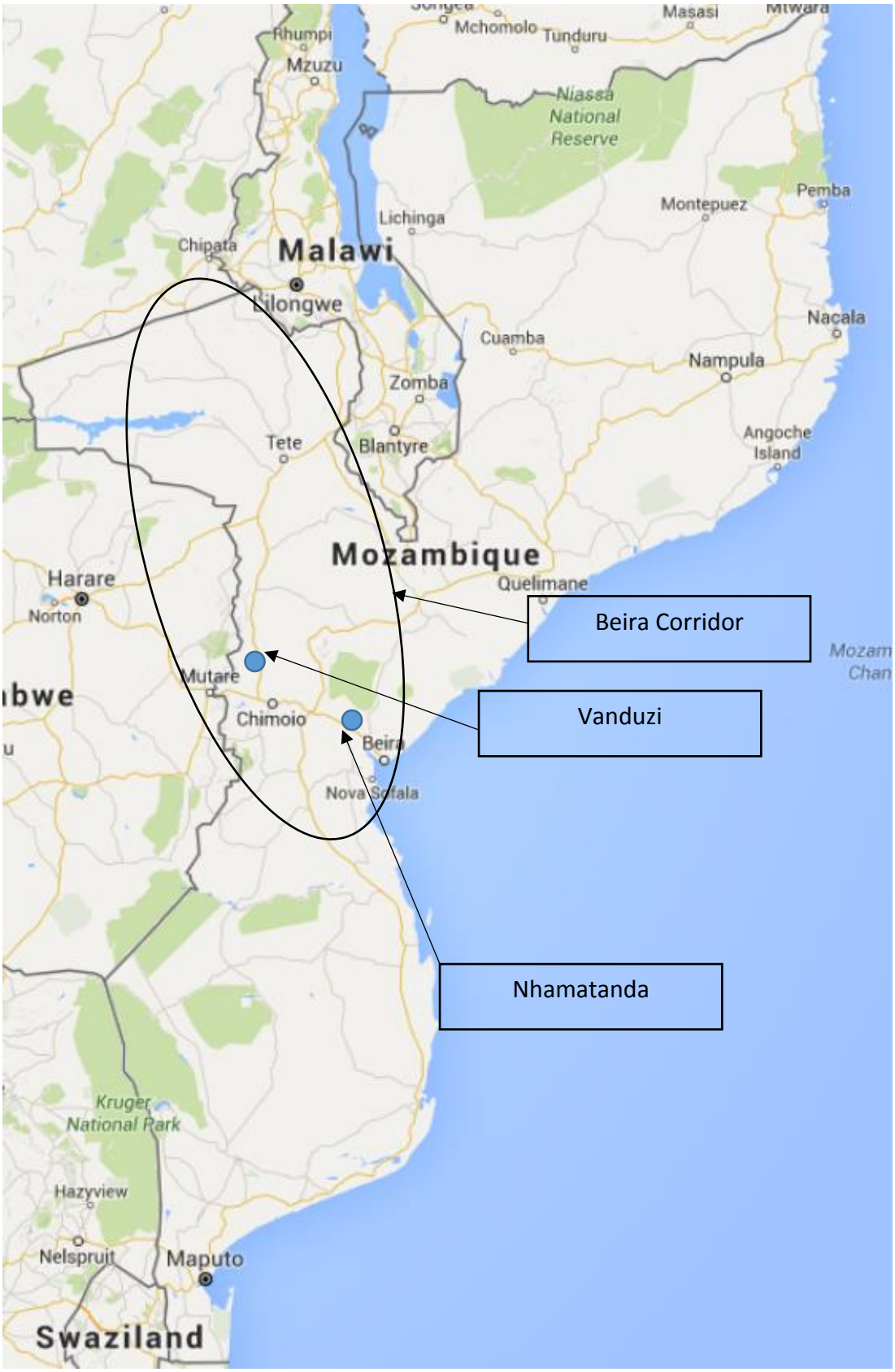
Appendices

Appendix 1. Map of Mozambique, study locations highlighted



Source: https://www.google.co.uk/maps/@-19.2224884,33.8346363,6z

Appendix 2. Household questionnaire

Section 1 - Information about the questionnaire

Questionnaire ID

Date of the interview

Name of the inquirer

Location of the interview - Province/District/Community

Participant Information Sheet and Consent Form

To the research participant, please read the following information:

Dear participant,

My name is Sarrok Talhada. I am a student at the University of Reading in the United Kingdom. This interview is part of an on-going research project. It will contribute to my studies for the attainment of the degree of Doctor of Philosophy at the University of Reading. The research is entitled 'Understanding Innovation: Exploring Interactions between Large-Scale Land Investments (LSLIs) and small-scale farmers in Mozambique'. The aim of the study is to understand the extent to which LSLIs contribute to innovation in small-scale farming. This interview will last approximately 30 minutes. As a participant, I would be grateful if you could share some information regarding your activities within the agricultural sector and your views about innovations therein.

This information will only be used for this research and it will be disposed of upon completion of the study. Your identity will not be revealed to anyone other than the interviewer collecting your form. You are free to withdraw from the interview at any time you feel uncomfortable or become unwilling to participate, and you do not have to specify a reason. Any contribution can be withdrawn at any stage and removed from the research if desired. If you wish to withdraw, please contact me using the details below, and quoting the reference at the top of this page. The reference will only be used to identify your questionnaire and will not reveal any other information about you. You are assured of confidentiality throughout the research process, and you will not be identifiable in the published research results. By answering the interview questions, you acknowledge that you understand the terms of participation and that you consent to these terms. For additional information regarding this research, including access to the research findings, please do not hesitate to contact me.

Telephone: University of Reading (United Kingdom): +44 (0) 118 378 6293

Email: s.d.a.c.i.talhada@pgr.reading.ac.uk

Semi-structured interview – topics and questions

Section 2 - Demographic information

Details of the respondent

Age of respondent?

Gender of the respondent?

What is the highest level of education you have completed?

What is your relationship to the head of your household?

Information about the household

How many members are in your household?

What is the occupation of the head of the household?

Does the head of the household have any other source of income?

What is your main source of income?

Do you have alternative sources of income?

Are other members of the household economically active?

Do other members of the household have an alternative source of income?

Does the head of the household own farmland?

Do you own farmland?

Do any other members of the household own farmland?

How many machambas do your household members own?

Are these plots located in the same area?

Section 3 -Characteristics of the production unit

What is the size of your farm?

What is the size of the land used for rain-fed agriculture?

Do you use irrigation on your farm?

What is the size of the irrigated land?

Which crops do you irrigate?

Main crops and the purpose of their production

Please list the crops produced on your farm during the past season (2015/2016)

What are the crops produced for the association?

What are the crops produced on the floodplain?

What are the crops produced outside the association?

What is the main purpose for producing each crop?

What factors contribute to your decision-making about crops?

Semi-structured interview – topics and questions

Transport ownership

Do you have any form of personal transport?

What type of transport do you own?

Type of animals in the farm (species and quantity)

Do you own cattle?

Do you own pigs?

Do you own goats?

Do you own chickens?

Do you own other species? Please specify

Section 4 - Social networks (Networks and Networking)

Networks

Are you, or any member of your household, an association member?

If so, what is the name of the association?

What role do you, or any other household member, play within the association?

Why did you decide to seek membership?

What is the objective of production within the association?

Opportunities for networking

Have you ever participated in a workshop or attended a training session on agriculture?

Have you ever participated in an agricultural field day with extension agents?

Has any member of the household visited other farmers or agricultural companies elsewhere?

Sources of agricultural information

What organisations provide agricultural support or information for you?

Do you have any links with public extension services?

How often do you interact with public extension services?

Do you have any links with other farmers?

How often do you share information with other farmers?

Do you have any links with LSLI?

How often do you share information with large-scale land investments (LSLI)?

Channels for exchanging agricultural information

Is radio a means by which you obtain information about agriculture?

Is TV a channel by which you acquire information about agriculture?

Semi-structured interview – topics and questions
Do mobile phones facilitate exchange of information about agriculture?
Are pamphlets a means by which you obtain information about agriculture?
Do village group discussions facilitate exchange of information about agriculture?
Do discussions within the household facilitate exchange of agricultural information?
Do activities within the household facilitate exchange of agricultural information?
Do informal conversations facilitate exchange of information about agriculture?
Does churchgoing facilitate exchange of information about agriculture?
Do community meetings facilitate exchange of information about agriculture?
Section 5 - Perception of the contribution of the LSLIs to the livelihoods of the local communities
Is LSLI an important source of income for your community?
Is LSLI involved in land conflicts?
Does LSLI increase job opportunities for the community members?
Does LSLI contribute to agricultural innovation?
Does LSLI increase market opportunities for the small-scale farmers?

Sources of income. Please rank your main sources of income from 1-7, where 1 is not at all important and 7 is very important. Only consider the sources that are important to you.	**Ranking**
Own farm - subsistence farming	
Own farm - commercial farming	
Labour in agriculture	
Labour outside agriculture	
Commercialisation of agricultural products	
Commercialisation of other products	
Other, please specify	

Appendix 3. Questionnaire for agricultural stakeholders

Semi-structured interview – topics and questions
Section 1 - Information about Questionnaire and Date of Interview.
Questionnaire ID
Date of the interview
Name of inquirer
Location of the interview - Province/District/Community
Section 2 - Links between the respondent, the organization they represent, and the small-scale farmers
Age of respondent?
Gender of the respondent?
Affiliation to organisations/initiatives/projects?
Mandate of the organisation?
What is your role in the organisation?
Do you have any links with small-scale farmers?
What type of information do you provide to small-scale farmers?
What type of information do small-scale farmers provide to you?
How often do you share information with small-scale farmers?
Section 3 - Links between the respondent, or their organisation, and other agricultural stakeholders
Do you have links with other innovation actors?
What forms of collaboration characterise your relationship other organisations?
What type of activities facilitate interactions with other organisations?
How often do you interact with other organisations?
How often do you participate in field days with other organisations?
Are there links between LSLIs and small-scale farmers?

Section 4 - Likert scale to measure the perceptions of the innovation actors regarding interactions between LSLI and small-scale farmers

Please circle one number from 1 to 5 which indicates the extent to which you agree or disagree with the following statements (where 1 represents strongly disagree, and 5 represents strongly agree).

Perception of innovation actors with regards to the contribution of LSLIs to innovation.	Strongly disagree	Disagree	Neither agree /nor disagree	Agree	Strongly Agree
The links between LSLIs and farmers facilitate diffusion of innovations to small farmers	1	2	3	4	5
Interactions between innovation system actors contribute to learning	1	2	3	4	5
Interactions with LSLIs affect innovations in small-scale farming	1	2	3	4	5
LSLIs contribute to a farmer's exposure to innovations	1	2	3	4	5
Farmers have adopted innovations introduced by the LSLIs	1	2	3	4	5
Farmers innovative behaviour is influenced by their interactions with LSLIs	1	2	3	4	5

Type of relationship.	Strongly disagree	Disagree	Neither agree/nor disagree	Agree	Strongly Agree
Small-scale farmers are competitors	1	2	3	4	5
The main feature of the relationship with small-scale farmers is collaboration	1	2	3	4	5
There is complementarity between activities of LSLIs and the activities of the farmers	1	2	3	4	5
Farmers constitute a source of labour for the LSLIs	1	2	3	4	5
Small-scale farmers are out-growers	1	2	3	4	5
LSLIs provide technical assistance to farmers	1	2	3	4	5
LSLIs facilitate access to inputs for farmers	1	2	3	4	5
Small-scale farmers are customers of LSLIs	1	2	3	4	5
Farmers are partners of the LSLIs	1	2	3	4	5

Appendix 4: The interview guide. Agricultural stakeholders

Themes	Typical questions
Enabling environment	What are the relevant agricultural policies or projects that mediate your relationship with other agricultural actors? How do these conditions affect the innovation process? To what extent do these policies enable, or constrain, agricultural innovation? Are there incentives to create links between innovation actors? Do you support implementation of LSLIs? Why/why not?
Actors and their roles	What is the name of your organisation? What is your role in the organisation? What is the mandate of your organisation? What is the role of your organisation during the implementation of LSLIs? Do you have links with other organisations? Please specify What type of relationship do you have with small-scale farmers? Do you have links with small-scale farmers? To what extent are activities of the agricultural organisations complementary?
Attitudes and practices of innovation actors	Are there technology transfers between LSLIs and small-scale farmers? How do small-scale farmers benefit from LSLIs? Why do you regard LSLIs as models for small-scale farmers? How does the organisation view innovation in agriculture? What forms of collaboration are present in the agricultural sector?
Patterns of interaction	What opportunities are there for you to exchange information with other organisations? Do you have opportunities to meet other organisations regularly? How often do you participate in agricultural workshops? Are there organisations responsible for coordination within the sector? How is coordination implemented? How often do you interact with LSLIs? What are the channels through which you and small-scale farmers exchange knowledge, information, and technology? How is knowledge transmitted between network actors?

Appendix 5: The interview guide. Small-scale farmers

Themes	Typical questions
Understanding practices of the small-scale farmers	What crops do you produce on your farm? What factors influence your decisions about crops? What are the main activities performed on your farm during the growing season? (Seasonal calendar) What factors determine your choice of agricultural crops? What are the main problems you encounter on your farm?
Identifying sources of agricultural information	Who do you ask for information when you have problems on your farm? What are your main sources of agricultural information? Are LSLIs important as a source of agricultural information for you?
Understanding the innovation process	Do you learn from LSLIs? How? In relation to LSLI crops, how do your practices compare to your practices during the production of other crops? Do you adopt all the recommendations suggested by LSLI technicians? How is the choice to adopt or adapt innovations put into effect? What factors influence your decision to innovate? How did you learn to produce cabbage?
Interactions with LSLIs	Do you have links with LSLIs? Who are the intermediaries? To what extent are your farming decisions influenced by LSLIs? Can you provide examples of innovations introduced by LSLI? What crops or agricultural practices have been adopted as a result of your interactions with LSLIs? Why are you producing LSLIs crops? When did you start producing chilli pepper? Why? Why are you intercropping maize and LSLIs crops?

Appendix 6: Chi-Square Tests for Independence between Variables

Null hypothesis (H0): There is no association between row and column variables (the responses of the research participants are independent of their status as association members or not)

Alternative hypothesis (H1): There is an association between row and column variables (there is a difference in the responses between association members and non-members)

Decision criteria: if p- value is smaller than 0.05, the decision is to reject null hypothesis. If p-value greater than 0.05, the decision is not to reject null hypothesis because there is not enough evidence to concluded that there is no association between row and column variables.

Chi-square test for independence between variables: association between transport ownership and membership to farming groups in Manica and Sofala provinces.

Chi-Square Tests

Province		Value	df	Asymptotic Significance (2-sided)
Manica	Pearson Chi-Square	15.813[a]	1	.000
	Continuity Correction[b]	14.592	1	.000
	Likelihood Ratio	16.100	1	.000
	Fisher's Exact Test			
	N of Valid Cases	169		
Sofala	Pearson Chi-Square	16.815[c]	1	.000
	Continuity Correction[b]	14.650	1	.000
	Likelihood Ratio	18.769	1	.000
	Fisher's Exact Test			
	N of Valid Cases	61		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 34.30.

b. Computed only for a 2x2 table

c. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.51.

Decision: Reject the null hypothesis

The p-value, shown in the last column in the above table, is smaller than 0.05. The results below show that there is association between ownership of transport association membership in both provinces.

Crosstab: Ownership of transport? * Membership to farming groups?

				Membership to farming groups		
Province				Yes	No	Total
Manica	Ownership of transport?	Yes	Count	63	22	85
			% within Ownership of transport?	74.1%	25.9%	100.0 %
			% within Are you or any member of your household an association member?	63.0%	31.9%	50.3%
			% of Total	37.3%	13.0%	50.3%
		No	Count	37	47	84
			% within Ownership of transport?	44.0%	56.0%	100.0 %
			% within Are you or any member of your household an association member?	37.0%	68.1%	49.7%
			% of Total	21.9%	27.8%	49.7%
	Total		Count	100	69	169
			% within Ownership of transport?	59.2%	40.8%	100.0 %
			% within Are you or any member of your household an association member?	100.0%	100.0%	100.0 %
			% of Total	59.2%	40.8%	100.0 %
Sofala	Ownership of transport?	Yes	Count	18	14	32
			% within Ownership of transport?	56.3%	43.8%	100.0 %
			% within Are you or any member of your household an association member?	90.0%	34.1%	52.5%
			% of Total	29.5%	23.0%	52.5%
		No	Count	2	27	29
			% within Ownership of transport?	6.9%	93.1%	100.0 %
			% within Are you or any member of your household an association member?	10.0%	65.9%	47.5%
			% of Total	3.3%	44.3%	47.5%
	Total		Count	20	41	61
			% within Ownership of transport?	32.8%	67.2%	100.0 %
			% within Are you or any member of your household an association member?	100.0%	100.0%	100.0 %
			% of Total	32.8%	67.2%	100.0 %

Chi-square test for independence between variables: association between cattle ownership and member membership to farming groups in Manica and Sofala provinces.

Chi-Square Tests

Province		Value	df	Asymptotic Significance (2-sided)
Manica	Pearson Chi-Square	16.972[a]	1	.000
	Continuity Correction[b]	15.551	1	.000
	Likelihood Ratio	17.250	1	.000
	Fisher's Exact Test			
	N of Valid Cases	140		
Sofala	Pearson Chi-Square	4.444[c]	1	.035
	Continuity Correction[b]	2.500	1	.114
	Likelihood Ratio	5.991	1	.014
	Fisher's Exact Test			
	N of Valid Cases	40		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 23.31.

b. Computed only for a 2x2 table

c. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.00.

Decision: Reject the null hypothesis

The Chi-square results show that there is an association between cattle ownership and membership to farming groups in Manica province. In Sofala province not all assumptions hold.

Crosstabs: Cattle ownership? * Membership to farming groups?

				Membership to farming groups?		
Province				Yes	No	Total
Manica	Cattle ownership?	Yes	Count	60	16	76
			% within Does your household own cattle?	78.9%	21.1%	100.0 %
			% within Are you or any member of your household an association member?	67.4%	31.4%	54.3%
			% of Total	42.9%	11.4%	54.3%
		No	Count	29	35	64
			% within Does your household own cattle?	45.3%	54.7%	100.0 %
			% within Are you or any member of your household an association member?	32.6%	68.6%	45.7%
			% of Total	20.7%	25.0%	45.7%
	Total		Count	89	51	140
			% within Does your household own cattle?	63.6%	36.4%	100.0 %
			% within Are you or any member of your household an association member?	100.0%	100.0%	100.0 %
			% of Total	63.6%	36.4%	100.0 %
Sofala	Cattle ownership?	Yes	Count	4	0	4
			% within Does your household own cattle?	100.0%	0.0%	100.0 %
			% within Are you or any member of your household an association member?	20.0%	0.0%	10.0%
			% of Total	10.0%	0.0%	10.0%
		No	Count	16	20	36
			% within Does your household own cattle?	44.4%	55.6%	100.0 %
			% within Are you or any member of your household an association member?	80.0%	100.0%	90.0%
			% of Total	40.0%	50.0%	90.0%
	Total		Count	20	20	40
			% within Does your household own cattle?	50.0%	50.0%	100.0 %
			% within Are you or any member of your household an association member?	100.0%	100.0%	100.0 %
			% of Total	50.0%	50.0%	100.0 %