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Integration of Small-Scale Farmers into Innovation Management within Contract Farming Companies in Developing Countries

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Tojonirinarisoa Nomenjanahary Ravelosaona¹

Abstract

In pursuing competitiveness and growth, contract farming companies recognise the imperative of innovation. However, innovating with small-scale farmers, who represent the majority of contractors in developing countries, necessitates a nuanced understanding of their limited resources, capabilities, and complex psychosocial characteristics. This paper focuses on the strategies employed by contracting companies, with a particular emphasis on the African context, to effectively manage innovation while integrating small-scale farmers into their operational practices. Case studies conducted with representatives from selected companies serve as the primary method for gathering evidence, which is subsequently analysed using thematic analysis. The findings indicate that contracting companies regard farmers as a fundamental source of innovation signals. In selecting innovative ideas, commonly employed criteria considering farmers are problem-solving potential, affordability, compatibility, novelty, and origin. Participatory approaches, data-driven decision-making, and tailored strategies of innovation adoption and diffusion mark the implementation stage. Continuous feedback collection from farmers fosters a dynamic, adaptive, and iterative innovation cycle. Significantly, the results offer a fresh perspective on the connection between contracting companies and smallholders in the sphere of innovation, providing valuable practical insights into the contract farming field.

Keywords: Innovation Management, Innovation Adoption, Contract Farming, Small-Scale Farmers, Developing Countries.

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1) Introduction

Minot (2007) defines contract farming as an “agricultural production carried out according to a prior agreement in which the farmer commits to producing a given product in a given manner and the buyer commits to purchasing it”. Such arrangements can be considered as a vertical integration within agricultural commodity chains (Prowse, 2012). Buyers or contracting firms impose requirements on farmers or contracted farmers regarding production processes and product specifications, while guaranteeing in advance market access for the products with a predetermined purchasing price. Depending on the contract type, farmers may receive benefits like inputs (seeds, pesticides, and fertilisers), credits, logistics, and technical supports (Eaton and Shepherd, 2001; Will, 2013).

The growth of contract farming in emerging economies has been well-documented (Minot and Sawyer, 2016; Prowse, 2012; Ton *et al.*, 2018). The promotion of such a business model features prominently in African Union’s Agenda 2063, aiming to reform agricultural systems for higher productivity. In countries like China, agreements between farmers and farming firms play a vital role in modernising agriculture (Zhong *et al.*, 2023). Scholars have recognised the potential of contract farming to drive rural development in diverse socioeconomic contexts (Bellemare and Lim, 2018; Chen and Chen, 2021; Will, 2013).

Like other enterprises, contract farming companies must continuously innovate to sustain growth and competitiveness in the global market. Innovation adoption, particularly technical practices, requires active participation from contracted farmers, leading to close engagement and integration into the innovation process. However, small-scale farmers in developing countries, who are primary contractors for these companies, face numerous limitations stemming from resource constraints (Barrett, 2008; FAO, 2018). Their decision-making process is influenced by complex socioeconomic, psychological, and societal factors

(Briggs, 2020; Pathak et al., 2019). Encouraging innovation adoption among small-scale farmers, therefore, requires context-specific strategies.

Understanding the intricate relationship between contracting companies and small-scale farmers regarding innovation is a challenging endeavour marked by power dynamics, socioeconomic considerations, and on-the-ground realities (Bellemare, 2012). To unravel this complexity, our study focuses on the methods, mechanisms, and channels companies interact with farmers to gather insights and ideas for innovation. The central research question is: “*How do contract farming companies integrate small-scale farmers in developing countries into their innovation management practices?*”

The research aims to:

- Analyse the methods employed by contracting companies for introducing and managing innovations to small-scale farmers.
- Evaluate the feedback and influence mechanisms through which small-scale farmers shape innovations.

To address these aims, we conducted an exploratory study using qualitative methods. We strategically selected case studies to investigate these phenomena within their natural context. For data collection, we utilised the semi-structured interview technique due to its flexibility and adaptability.

This paper is organised into seven sections. Following the introduction, Chapter 2 delves into existing literature, focusing on contract farming and innovations among small-scale farmers. Chapter 3 outlines the methodology, providing detailed information on the philosophical assumptions and research design used for data collection and analysis. In Chapter 4, 5 and 6, we present and discuss our findings. Finally, the manuscript concludes with the last Chapter, offering recommendations and suggesting potential directions for future research.

2) Literature review

This literary survey explores the participants of contract farming and their interconnectedness regarding innovations. The section is structured into three main segments: an overview of contract farming in developing countries, the role of contract farming as an agent of innovation for small-scale farmers and the implication of small-scale farmers in the innovation management of contracting companies.

2.1) Contract farming in developing countries

Prowse (2012) asserts that large multinationals are the dominant players driving contract farming in developing countries, often serving as processors and specialising in international markets. Some contracting firms work with a small number of farmers like Bionexx, with 15,000 farmers in Madagascar. In contrast, others engage with 600,000 farmers growers, such as Kenya Tea Development Agency (KTDA) in Kenya. The centralised model² with resource-providing contracts is the most adopted model. Small-scale farmers are the principal contractor with contracting companies.

Generally, small-scale farmers or smallholders are characterised by poverty and engage in low-intensity, subsistence-oriented farming, resulting in low yields that hinder profitability and limit investments for growth (Barrett, 2008; FAO, 2018). Their farms typically cover less than 2 hectares of land, and family labour is the primary workforce (Amanor, 2012; Azumah *et al.*, 2017). Kuivanen *et al.* (2016) categorised farms into six types based on household size, labour, land utilisation, livestock farming, and income level (Table 1). The authors further explain that livelihood strategies depend on available resources, whereby individuals with limited resources are constrained to a “survival strategy”, while those more affluent pursue a “development strategy”.

² Centralized model is a model of contract farming in which a firm vertically collaborates with numerous farmers of different scales (Will, 2013).

Type	Characteristics
Type 1	<ul style="list-style-type: none"> - High levels of resource endowment - Oriented towards non-farm activities - Large herd size - High degree of diversification into off/non-farm activities
Type 2	<ul style="list-style-type: none"> - High levels of resource endowment - Oriented towards crop sales - Large degree of legume integration
Type 3	<ul style="list-style-type: none"> - Moderately resource-endowed with income derived primarily from on-farm activities
Type 4	<ul style="list-style-type: none"> - Moderately resource-endowed with income derived primarily from on-farm activities - High degree of legume integration - Small household size - Large hired labour
Type 5	<ul style="list-style-type: none"> - Resource constrained, with production oriented towards subsistence - Low degree of diversification into off/non-farm activities
Type 6	<ul style="list-style-type: none"> - Resource constrained, with production oriented towards subsistence - Small household size - Severe resource constraints (small farm area and herd comprised mainly of poultry)

Table 1: Typology of household in developing countries (Kuivanen et al., 2016)

Heterogeneous trends can be observed in adopting contract farming among farmers in developing countries. Farmers choose to engage when perceived advantages outweigh the disadvantages. A series of studies have highlighted various dimensions of contract farming, focusing on its advantages and opportunities (Anavrat and Mokde, 2017; Arumugam and Shamsudin, 2013; Gabagambi, 2014; Singh et al., 2013; Bellemare, Lee and Novak, 2021; Zhong et al., 2023). Researchers such as Tuyen et al. (2022) have established a ranked list of the principal advantages of contract farming as perceived by stakeholders. According to their findings, the benefits, in order of significance as perceived by rice farmers in Vietnam, include:

- reduction of price instability and market risk,
- improved income,
- enhanced access to inputs and services, including credit,

- increased productivity both in terms of product quality and quantity through the adoption of technology and innovations,
- improvement in farmers' skills and knowledge.

The decision of farmers to engage in contract farming cannot be explained with a clear and straightforward model because a complex array of factors determines the decision-making process (Vamuloh, Kozak, and Panwar, 2020) (Table 2). Economists have identified key factors such as access to credit and markets and perceptions of immediate benefits (Baker et al., 2017). From a social-psychological perspective, social norms condition farmers' behaviours (Minot and Sawyer, 2016). Besides, farmers may have different perceptions of contract farming and contracting companies (Khan, Nakano and Kurosaki, 2019). A study considering self-efficacy and social capital in Ghana found that cultural factors also affect contract farming performance (Wuepper and Saure, 2016).

Some papers explained the participation of farmers in contract farming with other parameters such as household characteristics, farm characteristics and institutional factors (Rondhi et al., 2020). For example, older male farmers will likely join contract farming (Dubbert, Abdulai, Mohammed, 2021). Apart from this, the decision of farmers also depends on a set of pushed factors such as farm location, source of seeds, areas covered by crops, and labour availability (Nhan and Yutaka, 2019; Sendhil et al., 2020; Wang, Zhang and Wu, 2011).

Some limitations of contract farming have been pointed out (Table 3). On one hand, lacking adherence to contract obligations is among the main challenges of such a business model (Darakeh, Zarafshani and Sharafi, 2021). On the other hand, buyers use contract farming as an exploitative tool because of the unequal power relationships (Ragasa, Lambrecht and Kufoalor, 2017), the lack of competitors (Singh et al., 2013), and the absence of proper legal mechanisms for enforcement (Sendhil et al., 2020). Furthermore, empirical studies have indicated that contract farming is unstable and has a high failure rate (Andersson et al., 2015;

Minot and Sawyer, 2016; Sendhil et al., 2020). Various factors, such as contract attributes, perceptions, and reputation mechanisms, can be attributed as factors of explanation (Chang et al., 2022; Kunte et al., 2017; MacLeod, 2007; Ruml and Qaim, 2020).

Categories	Identified factors
Economic	Perceptions of immediate profits, income increase and stability, risk management regarding price and market, production efficiency, level of access to inputs and services, etc.
Social	Influence of community leaders and community members, culture and traditions, etc.
Psychological	Perceptions of contract farming, perceptions and attitude towards risk, confidence of farmers towards contracting companies, self-efficiency, time preferences, etc.
Household/farmers characteristics	Education level, gender, farm size, farm population, farmer group, access to agricultural extension service, experiences, etc.
Farm characteristics	Farm size, farm location, land tenure, labour and resource availability, practices, seed replacement frequency, source of seed, area covered by crops, etc.
Others	Institutional factors, contract design, etc.

Table 2: Factors explaining smallholders' behaviours regarding contract farming in developing countries

Disadvantages	Perceptions Empirical Studies by Authors
Manipulation of agreed quotas and quality specifications	RCDC, 2011
Debt accumulations	Gabagambi, 2014; Martin and Mwaseba, 2015; RCDC, 2011
Greater risk	Bounmasith and Guanglu, 2018
High price of inputs	Rugimbana, 2008
Late purchase	Singh <i>et al.</i> , 2013
Low prices	Rugimbana, 2008
Purchase of less of the product than the pre-agreed quantities or rejections for not meeting the required standards	Gabagambi, 2014; Martin and Mwaseba, 2015; Ogunleye and Ojedokun, 2014
Mistrust and monopoly exploitation	RCDC, 2011; Singh <i>et al.</i> , 2013
Reduction of the household's freedom or loss of flexibility in making decisions	Gabagambi, 2014; Martin and Mwaseba, 2015; Rugimbana, 2008

Table 3: Reported disadvantages of contract farming perceived by farmers (Tuyen et al., 2022)

2.2) Contract farming promotes innovations

Innovation is “the process of turning ideas into reality and capturing value from them” (Tidd and Bessant, 2021). In the context of agriculture, innovation refers to the implementation of research and development outcomes and novel approaches that enhance productivity and efficiency, generating economic, social, environmental, and other types of effects (Ainissyifa *et al.*, 2018; FAO, 2018; Rodionova, 2010). Various elements contribute to agricultural innovation: new or improved plant varieties, breeds and species of animals, food products, materials and equipment, technologies in crop production and processing, new organisational and management forms in different sectors of the economy, and with innovative approaches to social services.

Innovation adoption refers to incorporating an innovation into farmers' regular practices over an extended time (Dasgupta, 1989). The adoption process begins when farmers become

aware of an innovation, followed by a period of thinking, and terminates with a final adoption decision (Rogers, 2003). According to Ainissyifa et al. (2018), this process comprises several phases: awareness, interest, evaluation, trial, adoption, and confirmation (Figure 1).

The findings from a literature review conducted between 1992 and 2010 revealed that various factors influence the diffusion and adoption of innovations, including socio-economic factors, innovation characteristics, communication, availability of information, and characteristics of adopters (Briggs, 2020; Pathak et al., 2019). Rogers (2003) emphasised the importance of variables such as relative advantage, compatibility, complexity, trialability and observability (Table 4). Table 5 provides a summary of factors which can influence the decision-making of small-scale farmers regarding innovation adoption.

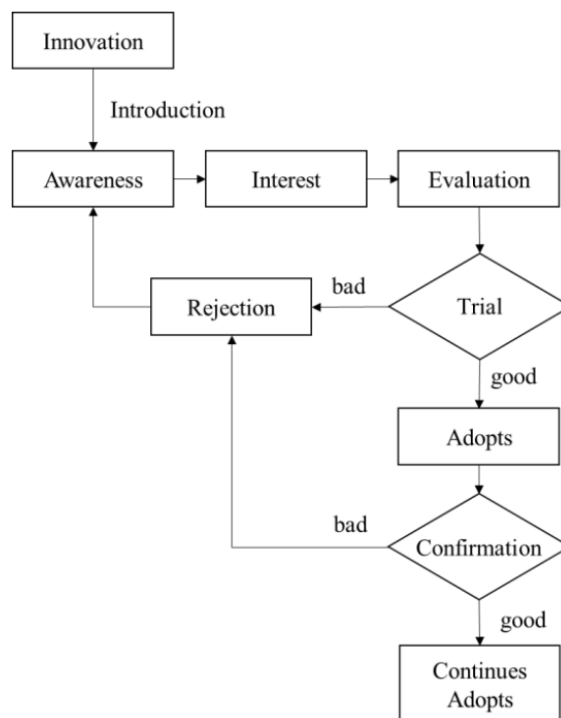


Figure 1: Stages of technological innovation adoption-Mundi model modification (Ainissyifa et al., 2018)

Parameters	Definitions
Relative advantage	Degree of how much better an innovation is perceived to be compared to what it replaces or competing products/services. It is often assessed economically, considering costs or financial benefits, but non-economic factors like convenience, satisfaction, and social prestige can also play a crucial role.
Compatibility	Degree of how well an innovation aligns with the current values, experiences, and needs of potential adopters. The concept includes two key aspects: compatibility with existing skills and practices and alignment with values and norms.
Complexity	Degree of how challenging an innovation is perceived to be regarding understanding and usage.
Trialability	Extent to which an innovation can be experimented with on a limited scale.
Observability	Extent to which the outcomes or results of an innovation are visible to others.

Table 4: Definitions of factors influencing innovation adoption and diffusion according to Rogers (2003)

Categories	Identified factors	Authors
Socio-economic	Profit associated with the innovation, access to capital and credit, influence of community and societal levels, personal beliefs, social status, risk and uncertainty, culture, and traditions	Briggs, 2020; Filser et al., 2019; Pathak et al., 2019; Toma et al., 2018
Psychological	Perceptions, intentions and goals of adopters, perceived usefulness, moral obligations, self-identity, personal beliefs, self-identity, and moral obligations, time preferences	Caffaro et al., 2020; Duflo et al. 2011; Duquette et al. 2012; Mills et al., 2017
Characteristics of the innovation	Availability of information and access to it, relative advantage, compatibility, complexity, trialability and observability	Briggs, 2020; Pathak et al., 2019; Rogers, 2003
Characteristics of adopters	Age of plot manager, level of education and knowledge, marital status	Briggs, 2020; Iheke and Nwaru, 2013; Khonje et al., 2015; Pathak et al., 2019; Theriault et al., 2017
Farm characteristics	Size, location from residence, availability of basic infrastructure and resources, nature of the farming system Plot characteristics such as size, and location from residence	Theriault et al., 2017
Others	Communication, supportive institutions	Briggs, 2020; Pathak et al., 2019

Table 5: Factors explaining the innovation adoption and diffusion of small-scale farmers in developing countries

Smallholders in developing countries face numerous challenges in adopting innovations (Egbetokun *et al.*, 2016; Kavoi, Mwangi and Kamau, 2014; Masere, 2023). They often struggle with socio-economic issues like limited finances, educational gaps, and land tenure uncertainties. Institutional weaknesses manifest as inadequate extension services, poor infrastructure, and restricted access to credit. Moreover, environmental concerns, particularly climate change and land degradation, further complicate innovation adoption. Technological innovations might also be irrelevant or too complex for local contexts, and a lack of accessible information exacerbates the problem. Fluctuating market prices and lack of market access diminish incentives, while sometimes unfavourable policies or regulations hinder the uptake of new farming practices.

Consequently, the adoption of innovation among smallholders is governed by several complex interplaying factors. Some factors, such as the psychological constructs, are difficult to measure and understand. Most of the time, unconscious thought outweighs measurable and tangible benefits (Nininen *et al.*, 2007). Thus, the adoption tendency is quite unpredictable and complicated to project. Furthermore, adoption rates change between different clusters of farmers because of the variations in characteristics and obstacles. Hence, a 'one size fits all' approach to innovation adoption is unsuitable for smallholder farmers of different types and locations (Wossen *et al.*, 2017). The last point remains among the significant obstacles to formal research in rural innovations (Waters-Bayer *et al.*, 2009).

Contract farming has been recognised as a powerful strategy to encourage farmers to adopt new technologies and innovations (Prowse, 2012). Most studies on the relationship between contract farming and innovations focalise on technological and technical innovations aiming at increasing yields. Some papers suggest that contract farming promotes innovations thanks to efficient search costs and increased awareness (Gao *et al.*, 2022; Huang *et al.*, 2018), access to services such as credit (Mwambi *et al.*, 2016), and strict terms and conditions in the

contract (Poku et al., 2018). Likewise, well-managed risk and increased income create favourable conditions for adopting innovations (Kathage et al., 2015).

Contracting firms offer more effective and better technical assistance compared to government agricultural extension services (Minto, 1986). Buyer firms have a closer relationship with farmers, allowing them to understand the farmers' context and experience better. This advantage enables them to adjust their advice accordingly, which pushes the use of certain farm practices. For example, in a study exploring environmentally sustainable production, Ren et al. (2021) found that membership in contract farming improved the adoption of ecologically sustainable control technologies and the application of practices such as manual weeding and organic fertilisation.

By comparing contracted farmers to independent ones in various commodities across the world, many scholars found that contract farming allows an increase in technology transfer, leading to higher technical efficiency (Alulu et al., 2021; Dube and Mugwagwa, 2017; Mishra, Mayorga and Kumar, 2022). In Nepal, Mishra et al. (2018) found that contract farming grows farmers' technical efficiency by 7% in rice seed commodities and 8% in ginger, while Chang et al. (2006) noted 20%.

Analysing the obstacles and behaviours of smallholders regarding innovation adoption, alongside the advantages of contract farming, reveals several significant interrelations (Table 6). Income increase and stabilisation, better efficiencies, well-managed risks, and improvement in access to information and resources are among the prominent effects which stimulate smallholders to adopt innovations. In essence, contract farming creates more favourable conditions for innovative practices and tools but cannot deal with all challenges.

Categories	Obstacles to small-scale farmers in innovation adoption	Advantages of contract farming
Economic	<ul style="list-style-type: none"> - Limited financial resources - Lack of access to credit - Lack of access to inputs and services - Income instability - High risk and uncertainties, particularly in terms of market and prices 	<ul style="list-style-type: none"> - Assured and stable markets - Lower transportation and input costs - Reduction of marketing cost and production risks - Reduction of pre- and post-harvest losses - Better, fair, and guaranteed price - Stable and better income - Better access to credit - Reduction of risk and uncertainty - Profit of innovation associated with those of contract farming
Socio-psychological	<ul style="list-style-type: none"> - Lack of education - Language and literacy barriers - Weak agricultural extension service - Influence of community and societal level - Moral obligations 	<ul style="list-style-type: none"> - Effective technical supports and trainings - Access to agricultural extension service - Strict terms and conditions in the contract - Social interaction and learning through different cooperatives and associations related to contract farming
Innovation characteristics	<ul style="list-style-type: none"> - Limited access to information - Irrelevance of technology - Complexity of technology - Maintenance 	<ul style="list-style-type: none"> - Introduction new techniques and technologies - Efficient search costs - Increased awareness - Better technology transfer
Farm characteristics	<ul style="list-style-type: none"> - Lack of inputs and resources - Poor infrastructure - Limited research and development 	<ul style="list-style-type: none"> - Reliable supply of inputs and services

Table 6: Advantages of contract farming which improve innovation adoption of small-scale farmers

2.3) Contract farming and innovation management of contracting firms

2.3.1) Innovating under contract farming as a challenge

For contracting firms, adopting certain innovations necessitates the close involvement of contracted farmers. Based on the literature review, a variety of complex and interactive factors, both internal and external to farms, play a critical role in farmers' decision-making regarding contract farming and the adoption of innovations (Briggs, 2020; Pathak et al., 2019;

Vamuloh, Kozak, and Panwar, 2020). If contracting firms impose inappropriate innovations in contract obligations, smallholders might choose to disregard the changes or even decide to breach the contract. Such a situation is avoided by companies because rebuilding trust with farmers or creating a new network is challenging and often fails (Ruml and Qaim, 2020).

From another perspective, contract farming is also recognised as a tool promoting innovations to small-scale farmers. This occurs using extension services, contract terms, interactions with the companies' technicians and farmers, risk reduction, and additional income (Prowse, 2012). Agribusiness firms should leverage these advantages to facilitate farmers' successful adoption of innovations.

Consequently, fostering innovation adoption among farmers necessitates a comprehensive understanding of the factors influencing smallholders' perspectives. Contract farming firms should exploit the innovation-promoting potential inherent in contract farming. All the factors above should be incorporated into the approach employed by contracting companies for managing innovation processes.

However, current research trends on contract farming tend to focus on the relationship between contract farming and contracted farmers. To the best of our knowledge, no studies have investigated the implications of contract farming in contracting companies. Thus, the existing literature reveals a significant gap in understanding how firms manage innovations involving farmers to ensure successful adoption. Our work aims to provide empirical evidence on how companies incorporate contracted farmers into their innovation processes.

2.3.2) Innovation management and Tidd, Bessant and Pavitt's Model

Innovation, a process comprising interconnected activities, necessitates effective management (Tidd, Bessant, and Pavitt, 2005). Each company has its unique managerial style, taking into consideration its specific context, including factors such as size, industry, location, and others (Robayo Acuña, 2016). Therefore, innovation management practices are diverse and

can manifest in numerous possible forms. They all aim to enable organisations to effectively address external and internal factors to seize new opportunities and foster innovative ideas (Kelly and Kranzburg, 1978).

To systematise the process of developing innovations, researchers have proposed a range of innovation management models. Longanezi *et al.* (2008) distinguished two categories of models: the descriptive models related to macro level (society, economic system and industry), and the normative models to micro level (businesses, departments, projects, or even products).

Tidd, Bessant, and Pavitt (2005) proposed an innovation management model focusing on continuous learning and adaptation. The innovation process model encompasses four phases: search, select, implement and learn (Figure 2).

➤ Search phase

The first phase is about scanning for potential innovations within the company and its external environment. Signals, or stimuli companies must address, can originate from various sources, like research activities, development forecasting and competitors' behaviours.

➤ Select phase

As resources are limited, companies make strategic selections from all identified signals. New ideas with the highest probability of generating competitive advantages are prioritised.

➤ Implement phase

The implementation phase is about taking the selected new ideas from an initial concept through various stages: acquiring the knowledge/resources to support the selected new ideas, executing the project under conditions of uncertainty, which require extensive problem-solving, launching the innovation and managing the process of initial adoption, and sustaining adoption and use in the long term.

➤ Learn

Learning examines the experiences from the previous phases to capture pertinent knowledge and learn to manage the process better. The feedback mechanism improves the efficiency of the system.

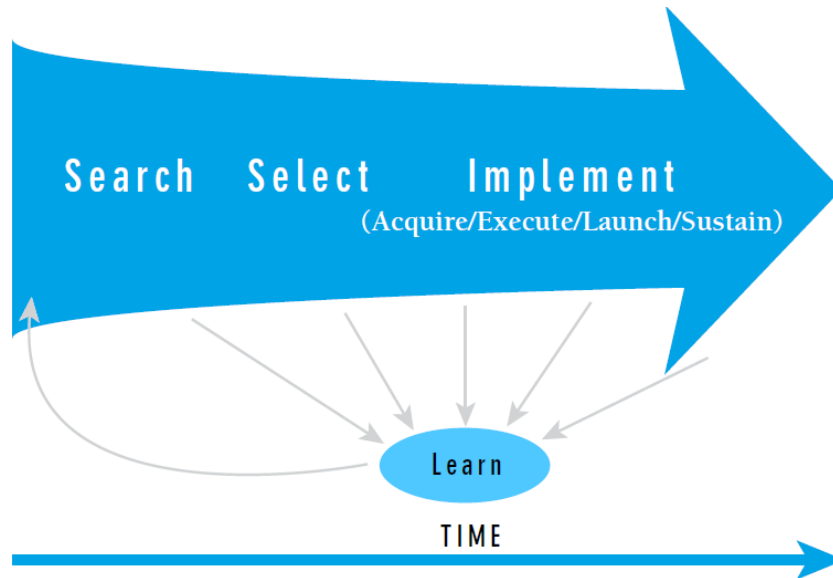


Figure 2: Innovation process model (Tidd, Bessant and Pavitt, 2005)

The authors emphasised four dimensions of the innovation process model: strategy, efficient external relationships, implementation mechanisms and supportive organisational context (Figure 3).

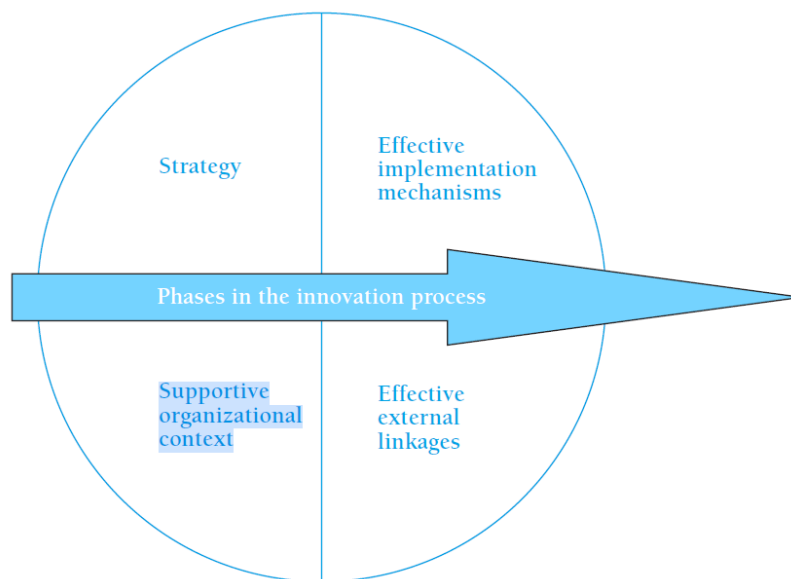


Figure 3: Behaviour or routines for innovation (Tidd, Bessant and Pavitt, 2005)

The strategy dimension highlights three main ingredients. The primary element concerns the position of the organisation regarding products, processes, technologies and the national innovation system within which it operates. The subsequent aspect pertains to conceivable technological trajectories that the organisation could pursue, depending on the acquired aggregated competencies. The ultimate facet relates to processes that facilitate the dissemination of knowledge across all hierarchical levels and sectors within the organisation.

In the realm of effective external linkages, establishing strong and meaningful engagement with markets, technology providers, and other participants within an organisation is extremely vital. These connections provide valuable opportunities for acquiring knowledge, from demanding customers and innovative users, rivals, strategic partnerships, or differing viewpoints.

The dimension of effective implementation mechanisms is important to transition innovations from mere concepts or opportunities into tangible outcomes. The process requires effective problem-solving, a transparent decision-making structure, proficiency in project management and adeptness in navigating uncertainty. Additionally, managing the process encompasses the ability to foresee and manage the apprehensions of individuals impacted by the changes.

Lastly, the supportive organisational context fosters the emergence and successful implementation of creative concepts. Promoting favourable circumstances consists of dealing with various elements, including organisational structures, arrangements for work organizationorganisation, training and skill enhancement, systems for acknowledging and rewarding contributions, and communication setups.

2.3.3) Adapting Tidd, Bessant and Pavitt's Model to contract farming companies

The innovation process model has been tested across a wide variety of companies belonging to different industries and complex systems (Tidd, Bessant, and Pavitt, 2005). The

framework provides a structured approach to understanding the processes of innovation within organisations. It can be adapted to analyse how contract farming companies engage with farmers in their innovation efforts. Besides, the authors emphasise the important role of stakeholders such as farmers in innovation management: “effective external linkages”.

This systematic approach model facilitates examining farmer participation in the generation, evaluation, implementation, and refinement of innovations by contracting firms. Given the complex factors that determine smallholders’ behaviour towards innovation adoption, the link can be observed at various stages or throughout the entire innovation process. It includes their strategies and interactions, communication channels, and the learning mechanisms established with small-scale farmers.

Furthermore, the innovation process model underscores the cyclical nature of innovation and how each cycle informs and improves subsequent ones. As mentioned in the literature review about innovation adoption, farmers’ behaviours are more shaped by intangible than measurable factors. Hence, not all factors are predictable, necessitating companies engage in continual learning to be successful. The learning phase allows us to have a deep analysis of this aspect.

Integrating small-scale farmers into the innovation management of contracting companies involves aligning each phase of the ‘search, select, implement, and learn’ model with the realities and specificities of farmers. To be successful, innovations diffused to farmers must overcome all challenges that we have previously identified [see 2.2) *Contract farming promotes innovations*]. The motivation and advantages for farmers to participate in contract farming must be preserved, and all influencing factors should remain favourable [see 2.1) *Contract farming in developing countries*]. The contract farming system’s innovation promoter should also be leveraged to facilitate adoption [see 2.2) *Contract farming promotes innovations*]. Adapting the framework to the context of contract farming and small-scale

farmers in developing countries requires consideration of how each stage of the framework might manifest within the agricultural and innovation landscape specific to our study (Table 7).

<p>Search phase</p> <ul style="list-style-type: none"> - Determine the extent to which contract farming companies consider insights and ideas from small-scale farmers. - Examine the strategy or mechanisms for gathering information about farmers’ needs, challenges, and innovative ideas. - Investigate communication channels and interactions between companies and farmers during the ideation process.
<p>Select phase</p> <ul style="list-style-type: none"> - Examine how contract farming companies prioritise and choose innovative ideas. - Investigate the criteria and decision-making processes companies use to select ideas for implementation, with a focus on how farmers are considered. - Consider how companies balance the potential benefits of innovations with their feasibility and alignment with farmers’ capabilities.
<p>Implement phase</p> <ul style="list-style-type: none"> - Analyse the collaborative approach companies employ with farmers. - Investigate the mechanisms for translating ideas into practical innovations on the ground and how new ideas are validated for diffusion. - Explore how companies implement and diffuse the innovation to the network of small-scale farmers.
<p>Learn phase</p> <ul style="list-style-type: none"> - Evaluate how contract farming companies collect feedback and insights from farmers. - Explore the mechanisms for knowledge transfer and learning between companies and farmers. - Examine how companies adapt their strategies based on the outcomes of implemented innovations and farmer feedback.

Table 7: Adaptation of the Tidd, Bessant and Pavitt’s Model to our research

3) Methodology and methods

The forthcoming chapter outlines the steps taken to explore our research question. The “research onion” is a potent instrument for constructing a research plan (Saunders and Lewis, 2012). We will employ it to develop our research, progressing through various stages systematically: exploring philosophical foundations, formulating an approach to theory development, selecting appropriate methodologies, and devising an overall research strategy.

3.1) Methodological approach and research framework

As defined by Saunders et al. (2019), research philosophy refers to a set of beliefs and assumptions guiding knowledge development and the nature of research. The research aligns with interpretivism, stressing examining social phenomena within their environmental context. In other words, emphasis is placed on the idea that the world is socially constructed and subjective. The choice of this philosophy is motivated by the complex factors influencing innovation adoption by small-scale farmers in developing countries, each with unique contexts and practices. A comprehensive exploration of firms’ experiences, perspectives, and contexts is essential to fully understand the relationship between innovation adoption and management.

We have adopted an inductive research approach, as Saunders and Lewis (2012) described, involving theory building through the analysis of existing data. Induction allows for a deep understanding of the research context, avoiding biases that deductive approaches based on existing theories might introduce. Moreover, the collection of ample data for formulating new theories or perspectives is facilitated, especially in cases where existing theories are scarce. This approach also offers flexibility in adjusting our research focus as our investigation progresses.

Our research has utilised an exploratory study strategy, often associated with qualitative methods (Saunders et al., 2019). Qualitative research involves close interaction with participants in real-life settings, enabling a flexible and open-ended exploration of the research

subject. A case study approach, employing the semi-structured interview technique, facilitates the collection of empirical evidence, providing a comprehensive understanding of the research context and its dynamics.

3.2) Data collection

Participants were managers or appropriate persons closely involved in innovation management in contract farming companies intervening in African countries. Companies having more than seven years of experience in the field are considered appropriate. In addition to this criterion, the size of the farmer network, characteristics of farmers and agricultural commodities of activities help us to identify and select potential participants. Our target aims to hire firms of different agricultural commodities, of small and large farmer networks, and different household types according to Kuivanen et al. (2016)'s typology to reduce research biases. However, all possible combinations of each parameter could not be considered as the research is restricted regarding resources and participants. Instead, we try to include all these characteristics among our interviewees.

A non-probability sampling technique is used since it is impossible to have an exhaustive list of the contract farming companies in developing countries and since the project is resource resource-constrained (Saunders and Lewis, 2012). Being the most frequently used form of non-probability sampling, purposive sampling is the technique adopted to identify our participants. Typical cases are chosen to be illustrative and considered representative to logically generalise our research. According to Baxter and Jack (2008), the number of case studies mainly depends on the research objectives. A strategic selection of cases is crucial in the case study, mainly when the objective is to build a theory (Eisenhardt, 1989). For our case, considering all restrictions and challenges to overcome, we targeted to interview at least six companies.

For participant hiring, we gathered information through online research (on companies' website, case studies papers, newspapers, LinkedIn) and by asking relevant people. We then contacted the potential participants to explain the project and ask about their willingness to participate (Appendix 1). Afterwards, those interested were scheduled at their convenience and given further information if needed. Interviews were completed via Skype, Zoom, or telephone in June and July 2023. Each interview took between 20 to 45 min, depending on the interviewees' availability and the discussion flow.

The interview questions (Appendix 2) were structured into five main sections, including the introduction and general information. The conversations were conducted in Malagasy, French, or English to ensure that participants shared their perspectives and experiences without inhibitions. All instructions for leading good interviews advanced by Saunders *et al.* (2019) were followed to guarantee good quality research.

3.3) Ethical considerations

Ethical approval for this research was acquired from Birkbeck, University of London. During the data collection stage, the consent issue was explained in the introductory mail sent to potential participants from the beginning of the hiring process. Before starting each interview, each candidate was asked to be recorded giving their consent. The explanations of the research purposes and interview procedures precede each primary interview. Interviews were documented by recording and note-taking following the respondents' approval. Participants could interrupt the session at any time they felt uncomfortable.

After each interview, recorded data was protected by password access and immediately uploaded to a personal OneDrive account for security. Only the researcher had access to the database. Interviewees may withdraw their data by the end of data analysis. Besides, we tried to limit the collection of personal data to ensure anonymity and data confidentiality.

3.4) Data analysis technique

Thematic analysis is applied for our data analysis, defined as a method “that involves the research for themes, or patterns occurring across a data set” (Saunders et *al.*, 2019). Braun and Clarke (2006) qualified this method as a foundational, systematic, and flexible method for qualitative analysis. Thematic analysis highlights four principal components: becoming familiar with the data; coding the data; searching for themes and recognising relationships; refining themes, and testing propositions (Saunders et *al.*, 2019). Of course, it is not a linear process, but concurrent, recursive and moves back-and-forth.

Each interview was immediately transcribed verbatim using Microsoft Word in the respective language to ensure data accuracy (Gray, 2014). During the analysis, each transcript was read and re-read to familiarise with the data. The next step consisted of classifying data with similar meanings using codes to obtain data units. Seeking for patterns and correlations in the list of codes followed the coding, ending up at the identification of themes related to the research question. The thematic analysis process terminates with the development of testable propositions.

4) Results and discussions

The coming chapter presents the findings and discussions of our research. It is structured into seven sections: the first two provide an overview of our findings, while the third to sixth sections explore each stage of Tidd, Bessant, and Pavitt's model. The final section discusses the findings in detail.

4.1) Presentation of collected data and summary of findings

Despite the constraints, the final sample includes six companies operating in three different African countries: four in Madagascar, one in Tanzania, and one in Zimbabwe. All aim to export raw materials or semi-manufactured goods in the international markets. Our participants have 6 to 15 years of experience in contract farming and specialise in six different agricultural commodities. All of them involve between 600 and 100,000 small-scale farmers characterized by the scarcity of available resources. In general, the interviewed individuals are research and development department heads or responsible managers of agricultural improvement projects.

Phases	Characteristics
Search	<ul style="list-style-type: none"> - Farmers as the principal and direct source of innovations through reward-based techniques, interviews, surveys, field visits, and focus groups. - Indirect contribution of farmers to idea generation by means of internal teams and rural agricultural sector actors.
Select	<ul style="list-style-type: none"> - The main criteria considering farmers for idea selection: problem-solving capability, affordability, compatibility with local conditions, required capabilities, accessibility, social acceptability, and risk level - Data-driven decisions - Prioritisation of targeted farmer-led innovations - Prioritisation incremental innovations over radical innovation
Implement	<p>Acquiring the knowledge/resources and executing the project</p> <ul style="list-style-type: none"> - Participatory approaches throughout the process, with farmers as co-creators - Structured validation: conditioned environment to strategical contracted farmers to strategical delimited zone - Data-driven decisions <p>Launching the innovation and sustaining the use</p> <ul style="list-style-type: none"> - Strategies facilitating and motivating the adoption process by manipulating input and services provisions, prices and contract - Effectiveness strategies of communication: competent and well-prepared teams with approaches tailored to farmers' behaviours
Learn	<ul style="list-style-type: none"> - Use of surveys, interviews, observations, workshops, training sessions, and collaborative forums for farmer feedback, promoting continuous learning and iterative cycle of innovation - Data-driven decisions - Knowledge management through reports and documentation

Table 8: Summary of findings

4.2) Search phase

All participants highlighted that farmers are among the best and most efficient sources of innovation. The words of one participant exemplify this: “We do not only view farmers’ competencies in their openness to adopt innovative ideas or methods but also their dedication and ability to innovate. Farmers can produce diverse agricultural system innovations, an achievement that proves challenging for scientific research to accomplish”. Another participant

noted that “Farmer-sourced innovations are likely to be immediately effective, acceptable, and adaptable to farming conditions”.

Contracting firms use various mechanisms to recognise and gather new ideas from small-scale farmers. All six participants adopt the following techniques: prizes and contests, surveys, interviews, and direct observations. Some companies conduct other techniques such as focus group discussions, local agricultural shows and fairs, and community engagement events such as workshops.

Contracting companies primarily focus on staff members working directly on the frontlines with farmers. The latter agents serve as a crucial communication link between companies and farmers in terms of innovation signal and combine their expertise and innovativeness with new ideas, resulting in better solutions. According to one manager, “Technicians working directly with farmers are important for production and the continual improvements of our production system”. Communication within the company is structured to facilitate efficient idea transfer from frontline teams to the R&D departments, with several employing digital platforms and mobile apps. One participant stated, “Our company has recently introduced the use of smartphones equipped with KoboCollect³ app, permitting our team to convey any information at any time, from anywhere instantly”.

Furthermore, networking with the relevant actors, such as Non-Governmental Organizations (NGOs), agricultural research centres, development practitioners, local agronomists, and extension and advisory services, is essential for contracting companies to uncover opportunities for farmer innovations. One participant stated “Agricultural innovation flourishes when companies collaborate with various partners who have direct connections to

³ KoboCollect is a mobile data collection application that's typically used for field data collection in various sectors such as health, education, agriculture, and humanitarian response. It is based on the Open Data Kit (ODK) and allows for offline data collection, which can then be synced to a central server when an internet connection is available.

farmers”. Another participant noted, “Around 20-30% of our changes in technical management are taken from watching and partnering with actors in rural development”.

4.3) Select phase

Contracting companies consider five major factors from the perspective of small-scale farmers: needs, capabilities, resource availability, peasant logic, and behaviours regarding the adopted contracts. These factors are used to establish general criteria for evaluating the potential of each innovative idea. From the statement of our participants, the main criteria for selecting relevant new ideas are problem-solving capability, affordability, compatibility with local conditions, required capabilities, accessibility, social acceptability and level of risk (Table 9). Additional criteria such as scalability, regulatory compliance and impact on the existing operational framework can be considered depending on the contexts. Investigations are necessary to gather sufficient data for making informed decisions. Thus, the selection and ranking are data-driven.

Decision criteria	Definition
Problem-solving capability	Capacity of the idea to address and resolve specific problems or challenges faced by farmers.
Affordability	Ability to afford the necessary resources, inputs, equipment, and technologies to embrace the innovation.
Compatibility with local conditions	Degree to which an idea is suited to the specific environmental, economic, and social circumstances of a particular geographic area or community.
Required capabilities	Individual’s inherent expertise, experiences and skills, necessary in the innovation adoption.
Accessibility	Extent to which required resources and capabilities are easily usable, understandable, and available to individuals with a wide range of farmers.
Social acceptability	Degree to which an idea is deemed suitable, desirable, and morally or culturally acceptable by a particular society, community, or group.
Level of risk	Degree of potential harm, loss, or uncertainty associated with the new idea.

Table 9: The main criteria used by contracting companies in the innovation selection process

Contracting companies tend to prioritise innovations from farmers with common traits as targeted farmers. A participant argued: “Farmer-sourced innovations are likely to be immediately effective, acceptable, and adaptable to farming conditions. They are resource-saving, namely time, logistics and funds, while decreasing adoption uncertainties”. The priority order regarding signals relies on several parameters about the innovators, including farmers’ activities, locations, and socio-economic and technical characteristics.

In general, incremental innovations are significantly prioritised over radical ones. Companies try to reduce the risks and uncertainties associated with the innovations as much as possible to ease the adoption. Introducing breakthrough innovation to farmers is highly challenging and often fails.

“Farmers are naturally cautious and risk-averse when adopting new practices. They prefer small, gradual changes that they can understand and control. Trying to introduce radical innovations to them is like asking them to leap into the unknown, and it’s often met with resistance”.

4.4) Implement phase

All participants highlighted the necessity of using participatory approaches, considering them the “golden rule” of success. These approaches actively involve farmers in decision-making and problem-solving processes. Farmers are deeply engaged in bridging gaps between R&D activities and local contextual knowledge. Joint experiments and intensive exchanges assess the efficiency and feasibility of new techniques and farmers’ perceptions. Various data collection methods, such as field monitoring, in-depth interviews, focus groups, and workshops, ensure refinement and relevance.

Contracting companies consistently validate innovations, progressing from controlled environments to contracted farmers and, ultimately, to a broader zone. Controlled environments optimise technical productivity, while contracted farmers evaluate real-world feasibility, considering social and cultural aspects. The validation decision relies on data-driven evidence, preventing the launch of innovations without sufficient farmer backing (Figure 4).

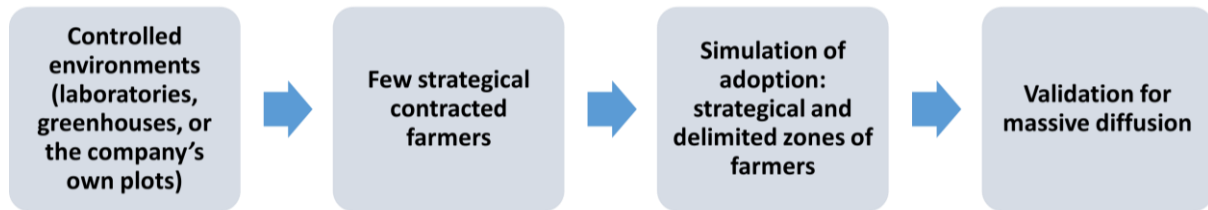


Figure 4: The process of innovation validation adopted by contracting companies

Besides, companies employ four principal variables as innovation promoters: input and services provisions, pricing, communication strategies, and contract design (Table 10). These parameters permit to encourage farmer adoption while preserving contract participation. Firms should be adaptable to the needs and preferences of farmers. As one interviewee said: “Companies have more ability to adapt to farmers than farmers to the company”. However, some firms stressed that keeping the contract and the working mechanism unchanged as much as possible is important to avoid farmers’ confusion. As a manager argued: “Adaptations are needed when adopting an innovation, but we try not to change the contract terms and conditions as much as possible and limit the provision of free inputs”.

Successful diffusion of innovations requires multidisciplinary teams with technical proficiency, communication skills, and an understanding of the local context (Table 11). These teams undergo comprehensive training before innovation launches, focusing on knowledge dissemination and implementation strategies. Collaborative partnerships with local leaders, authorities, and stakeholders are vital for effective communication and distribution.

Variables	Use
Input and services provisions and facilitations	<ul style="list-style-type: none"> - Provision of additional input/services or adjustment of the existing ones. - Accessibility enhancement to input/services - Extensive training and support - Financing services and facilitation
Price	<ul style="list-style-type: none"> - Stability - Price manipulation of the core product or inputs to motivate farmers regarding innovation adoption
Strategy of communication	<ul style="list-style-type: none"> - Clear and consistent communication channels - Intervention and introduction at the right time with the appropriate approach
Contract design	<ul style="list-style-type: none"> - Change in the terms and conditions of the contract

Table 10: Variables serving as innovation promoters according to contracting companies

Skills	Description
Technical proficiency	Agronomy, in-depth understanding of the technical aspects of the innovation, troubleshooting, any required maintenance
Communicational proficiency	Excellent communication skills with low educated persons, ability to well contextualise the innovation introduction, ability to establish good liaisons with local farmers
Knowledge on the targeted farmers and local context	Socio-economies, cultures, psychology and environment, histories

Table 11: Major skills of teams responsible of innovation extension

Finally, innovations are disseminated through various means, making them accessible to all farmers, especially those with limited literacy. Effective communication methods include formal training sessions, farmer schools, demonstration plots, field trials, technical sheets, posters, and radio broadcasts. Establishing efficient distribution networks and fostering partnerships is crucial when implementing significant changes in agricultural practices.

4.5) Learning

As mentioned, contract farming companies employ various methods to gather farmer feedback, including surveys, interviews, and observations. Furthermore, the knowledge

transfer and learning mechanisms involve workshops, training sessions, and collaborative forums, fostering a culture of continuous improvement. These activities are carried out throughout the process from search to post-implement. All learnings are utilised in the problem-solving process, the decision-making process and signal generation for iterative cycle and future innovations. As a result, the ability of companies to adapt and refine their strategies becomes more agile, leading to an iterative and farmer-centric innovation process that mutually benefits both stakeholders.

Companies use physical and numerical reports and documentation to store information, warranting the accumulation of knowledge and learnings. This step is very important because, as complex factors shape farmers understanding, every project teaches new knowledge that are useful, not only for the running project, but also for all future ones.

“The success of innovating with rural farmers lies in understanding, adapting, and evolving with every cycle. Knowledge drawn from experiences teaches us and makes us more and more effective and creative. Using Knowledge Management System (KMS)⁴ helps us a lot in this direction”.

5) Discussions

In the search phase, findings emphasised that farmers are among the best sources of innovation. Farmers are active experimenters and serve as a valuable repository of indigenous knowledge and agricultural innovations (Biggs, 1990; Tambo, 2018; Van Huis and Meerman, 1997; Waters-Bayer et al., 2009). Ideas originating from the user’s context and community have the potential for widespread adoption and diffusion because these are more likely to satisfy key parameters influencing innovation adoption, as outlined by Rogers (2003) and Reij and Waters-Bayer (2001). Farmer-led innovative practices are asserted to be cost-effective,

⁴ A Knowledge Management System (KMS) is a centralized system where employees can document, store, retrieve, and share knowledge.

readily available, suited to local conditions, and easily expandable (Waters-Bayer and Bayer, 2009). Many scholars argue that farmers should lead in crafting farming systems customised to their socio-technical and ecological circumstances (Dogliotti et al., 2014; Dolinska and d'Aquino, 2016; Douthwaite and Gummert, 2010; Waters-Bayer et al., 2009).

Reward-based techniques, surveys, interviews and direct observations are among the techniques widely used by contracting companies to uncover signals from farmers. Some papers agreed that the previous techniques provide an efficient avenue to identify and recognise farmer-generated innovations (Reij and Waters-Bayer, 2001; Tambo, 2018). In addition to the above techniques, Reij and Waters-Bayer (2001) mentioned that self-identification through radio stations, exchange visits and study tours among farmer innovators enhance the encouragement of sharing. Nonetheless, relying solely on the direct involvement of farmers in the signal search appeared effective in gathering only technically oriented practices (Tambo, 2018).

Internal teams and actors in the rural agricultural sector serve as an indirect source of farmer innovations. Scholars highlighted that extension agents, NGO field staff, government agencies, village leaders, students, teaching staff, scientists and farmers are pivotal bridges between companies and farmers regarding innovations (Brigg, 1990; Nielsen, 2001; Yohannes, 2001). Still, rural agricultural sector actors are often biased with their missions (Reij and Waters-Bayer, 2001), so it is essential to connect with multiple actors.

In the select phase, contracting companies introduce parameters for evaluating innovations from the adopters' perspective, considering problem-solving capability, affordability, compatibility with local conditions, accessibility, social acceptability, and risk aversion. These criteria showcase the psychosocial specificities, the limited resources and capacity, needs, and the risk-averse nature of small-scale farmers, which are the determinant

factors to the decision-making process of innovation adoption (Briggs, 2020; Pathak et al., 2019; Rogers, 2003).

Data-driven decision-making ensures well-grounded ideas. Salembier et al. (2016) have stressed the significance of considering farmers' self-assessed criteria when analysing their cropping systems. Companies often adopt an incrementalist strategy due to low industry competition and small-scale farmers' risk-averse nature (Kathage et al., 2015).

The priority order of innovation origin underlines the influence of shared characteristics and decision-making processes. Several scholars agreed that the characteristics of adopters are among the main determinants of innovation adoption (Duquette et al., 2012; Nininen et al., 2007; Theriault et al., 2017). The same category of farmers normally has similar characteristics, which make the innovations suitable for farmers and likely to be adopted.

The implementation phase emphasises a participatory approach, recognising farmers as integral partners in the development and adoption of innovations. This co-evolution with users enhances innovation quality (Hellin et al., 2009; Mubiru et al., 2004). A structured validation procedure is fundamental, moving from controlled environments to contracted farmers and then to a broader zone to assess the viability of innovations (Briggs, 2020; Pathak et al., 2019). It acknowledges that innovations are about technical feasibility and their acceptability and adaptability in real-world farming settings (Briggs, 2020; Pathak et al., 2019). Data-driven decision-making reinforces the need for empirical evidence before scaling up innovations (Ainissyifa et al., 2018).

Diffusing innovations requires powerful strategies, easing and inciting their adoption. All used techniques, methods and approaches are tailored to the farmer's specificities and aim to influence the innovation adoption process, especially converting awareness to interest and adoption (Ainissyifa et al., 2018). Contract farming companies also use efficient search costs and increased awareness to stimulate innovation success (Huang et al., 2018; Gao et al., 2022).

In the learn phase, the research highlights the importance of knowledge gathering and management in contract farming. Decisions and learnings throughout the process are driven by data and serve as resources for future initiatives (Tidd, Bessant and Pavitt, 2005). The learning phase enhances the system, not just the innovation itself.

6) Contribution to the literature and research limitations

This research significantly contributes to the existing literature by providing practical insights into the innovation processes within contract farming. It underscores the invaluable role of small-scale farmers as sources of indigenous knowledge and practical expertise in driving innovation. The techniques discussed for identifying farmer-generated innovations and the parameters used for evaluating innovations by contracting companies offer valuable insights applicable beyond the agricultural sector. Additionally, the emphasis on participatory approaches in innovation implementation and tailored validation and diffusion strategies highlight the importance of involving local communities and end-users in the innovation process. Overall, this research offers a holistic perspective on how contract farming companies can harness innovation from small-scale farmers and effectively implement agricultural advancements, making it a valuable resource for practitioners and policymakers.

However, our research design is limited in terms of the number of participants, which could potentially impact the representativeness of our collected data. However, the selection of cases has been done to guarantee population representativity. As Yin (2014) stated, data from case studies can be generalised to theoretical propositions rather than populations.

Additionally, we purposively selected case studies and conducted semi-structured interviews. We employed thematic analysis to analyse the collected data. Some sections of the transcripts were translated from other languages into English before being incorporated into the manuscript. Consequently, the researcher's influence on the research might be significant.

Nonetheless, the researcher undertook thorough preparations before each task and tried to standardize every procedure to ensure as much objectivity as possible (Saunders et al., 2019; Braun and Clarke, 2006; Gray, 2014).

Lastly, a significant limitation of our study is the absence of direct interviews with small-scale farmers, who are critical stakeholders in the contract farming process. Their perspectives and experiences would have provided valuable insights into integrating innovation management practices.

7) Conclusions and recommendations

Innovating within the framework of contract farming necessitates active participation from farmers in the innovation process. Our research aims to explore how contracting enterprises integrate small-scale farmers into their innovation management processes. The findings highlighted the crucial role of farmers as sources of indigenous knowledge and practical expertise. Various methods, including surveys, interviews, rewards, and observations, are key for identifying farmer-generated innovations. Internal teams within companies and relevant actors in the rural agricultural sector also serve as bridges between companies and farmers. Companies consider farmers' perspectives when selecting innovations, emphasising parameters such as problem-solving, affordability, and local compatibility. The risk-averse nature of small-scale farmers often leads to incremental innovation strategies. Finally, farmers play a central role in the structured validation processes of innovation through participatory approaches. Effective diffusion requires motivation, facilitation, and strategies tailored to the characteristics and behaviours of small-scale farmers. Alongside the process, companies capitalise on lessons learned for future projects.

This study enhances the current understanding of how innovation is applied in contract farming by recognising farmer expertise and knowledge. Methodological insights guide researchers and practitioners in effective techniques, while emphasising the role of intermediaries highlights the importance of collaboration between companies and farmers. The results also illuminate innovation selection and prioritisation criteria, informing decision-makers. The need for structured validation and data-driven decisions underscores farmers as co-creators.

For contract farming companies, the findings stress the need for a user-centric approach. Managers should actively involve farmers from project initiation, adopting an iterative development process that values pilot projects and real-time feedback. Robust feedback

mechanisms, tailored training, cultural sensitivity, and transparent communication are pivotal. Fostering a collaborative relationship ensures innovations align with technical needs and socio-cultural realities.

For individuals involved in or affected by contract farming, active engagement in shaping innovations to suit their needs and characteristics is crucial. Providing feedback, continuous learning, and collaborating with peers can improve outcomes. Individuals are encouraged to empower themselves with knowledge and creativity, emphasizing their central role in innovation.

For policymakers and governments, the findings highlight the importance of crafting user-centric policies through active engagement with beneficiaries, such as small-scale farmers. Pilot programs can serve as test beds for more significant initiatives, ensuring potential issues are addressed early on. By fostering mechanisms for continuous feedback, allocating resources for capacity-building, and aligning policies with socio-cultural realities, governments can create more readily accepted and effective regulations.

However, this research relied on limited case studies, potentially resulting in a skewed representation of the population under investigation. The purposive selection of case studies could introduce selection bias, casting doubt on the generalizability of the findings. Neglecting established household typologies may lead to missed opportunities to capture key dynamics and roles, potentially resulting in incomplete data collection.

In light of these limitations, future studies should delve deeper into the complexities surrounding innovation processes in contract farming, involving a more diverse range of participants to achieve a holistic view. Leveraging established typologies, such as the Kuivanen *et al.* (2016) framework, offers a structured approach for richer insights. A comprehensive examination incorporating perspectives from small-scale farmers and companies and a

comparative analysis between different firms and industries would provide more insightful findings. Exploring other models as conceptual frameworks could offer new perspectives.

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Appendices

Appendix 1: Interview Questionnaire

How do small-scale farmers under contract farming influence the way contracting companies in developing countries manage technological and technical innovations involving small-scale farmers?

A. General Information:

- 1) Position/Title
- 2) Years working with the company
- 3) Role or department within the company
- 4) Characteristics of the company
- 5) Characteristics of contracted farmers

B. Search (Identifying the need for change and innovation):

- 1) How does your company identify the need for innovations for the farmers?
- 2) What role do small-scale farmers play in influencing the company's search for these innovations?
- 3) How do you gather insights or feedback from farmers during the search phase?

C. Select (Deciding which changes to make):

- 1) What criteria does your company use when deciding which innovations to adopt for contract farming?
- 2) How are small-scale farmers consulted or involved in this selection process?
- 3) Can you describe a scenario where farmers' feedback significantly impacted your selection decision?

D. Implement (Making the change happen):

- 1) How does your company develop and implement innovations with the farmers?

- 2) What challenges have you faced in the past during the implementation phase, especially regarding farmer adaptability or acceptance?
- 3) How do you support farmers during the transition to new technologies or techniques?

E. Learn (Capturing the learning to do it better next time):

- 1) After introducing an innovation, how does your company collect feedback and insights from the farmers?
- 2) Can you give an example of how you've modified or adjusted an innovation process based on farmer feedback?
- 3) What mechanisms are in place to ensure that learning from past innovations is used to improve future ones?

F. Contracting Company Perspective:

- 1) How would you describe your company's relationship with the small-scale farmers?
- 2) In what ways do you believe small-scale farmers influence the innovation processes within your company?
- 3) How do you ensure that the voices and concerns of small-scale farmers are integrated into your innovation strategies?

G. Closing:

- 1) What are the primary challenges in aligning the interests of small-scale farmers with the company's innovation goals?
- 2) Are there any further insights or experiences you'd like to share about your company's approach to innovations and the role of small-scale farmers in this process?

Appendix 2: Abstract of Interview Transcript

In this interview, we had the opportunity to gain valuable insights into a contracting company's approach to innovation in agriculture and its relationship with small-scale farmers. The interviewee, who holds a key position within the company, shared their expertise and experiences.

A. General Information

We began with an introduction to the interviewee's position, tenure with the company, department, and an overview of the company's characteristics, as well as the profile of the contracted small-scale farmers.

B. Search (Identifying the need for change and innovation)

The interviewee detailed how the company identifies the need for innovations, emphasising the pivotal role of small-scale farmers in influencing these decisions. Methods for gathering insights and feedback from farmers during the search phase were discussed.

C. Select (Deciding which changes to make)

We explored the criteria used by the company for selecting innovations for contract farming and how small-scale farmers are actively involved in the selection process. An illustrative scenario was provided where farmer feedback significantly impacted innovation choices.

D. Implement (Making the change happen)

The interviewee described the company's approach to developing and implementing innovations collaboratively with farmers. Challenges faced during the implementation phase, particularly concerning farmer adaptability and acceptance, were candidly discussed. Furthermore, the support mechanisms for farmers transitioning to new technologies were highlighted.

E. Learn (Capturing the learning to do it better next time)

Insights were shared on post-implementation feedback collection, adjustments made based on farmer feedback, and mechanisms in place to ensure that learning from past innovations informs future ones.

F. Contracting Company Perspective

The interviewee characterised the company's relationship with small-scale farmers, emphasising collaboration and mutual benefits. The ways in which small-scale farmers influence the company's innovation processes were explored, highlighting their integral role. The integration of farmer voices and concerns into innovation strategies was discussed.

G. Closing

The challenges in aligning the interests of small-scale farmers with the company's innovation goals were identified. The interview concluded with an invitation for the interviewee to share any additional insights or experiences related to their company's innovative approach and the role of small-scale farmers in driving change and progress in agriculture.