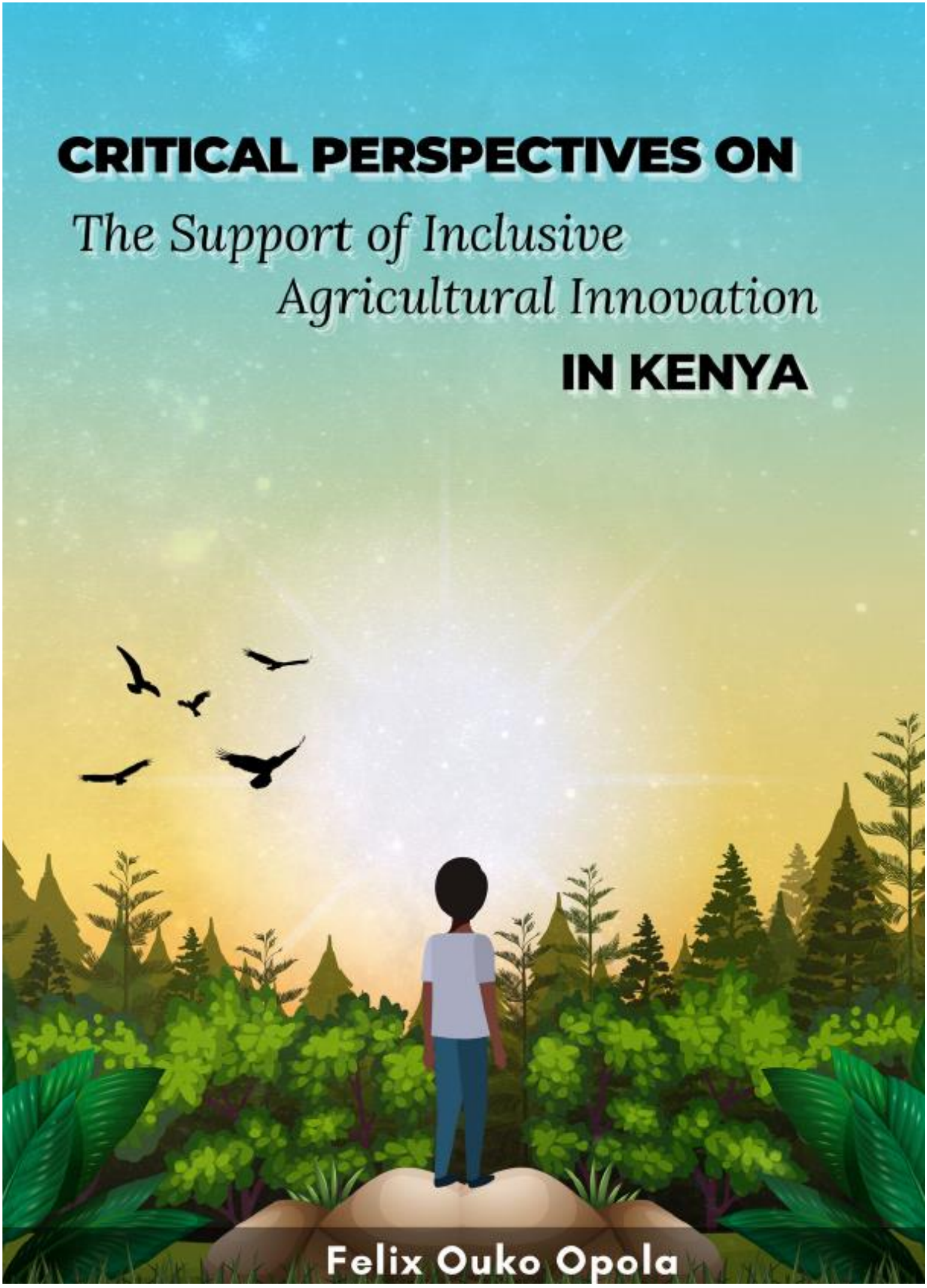
CRITICAL PERSPECTIVES ON

The Support of Inclusive Agricultural Innovation

IN KENYA



Felix Ouko Opola

Propositions

1. Approaches to inclusive innovation tend to be socially exclusive.

   (this thesis)

2. The fuzziness of inclusive innovation can be useful for developing context specific approaches and practises for social and economic development.

   (this thesis)

3. In scientific research, obtaining information from research participants without financial compensation is unethical.

4. *Aloe vera* plant extracts can be used as organic preservatives in fresh fruits and vegetables.

5. In competitive team sports, experienced players underestimate the performance of rookies.

6. Performing folk dances outside their geographical settings is cultural appropriation.

Propositions belonging to the thesis entitled:

Critical Perspectives on the Support of Inclusive Agricultural Innovation in Kenya

Felix Ouko Opola

Wageningen, 6th July, 2022

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IN KENYA

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The Support of Inclusive Agricultural Innovation

IN KENYA

Thesis

submitted in fulfilment
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in the presence of the
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It is like baking a cake and after it is done you divide it among people. Suppose you baked it in a bad way, do you think those people will eat the cake simply because it was your intention that you feed them?

Interview with a fruits and vegetables farmer in Kuinet, Uasin Gishu, Kenya. 21st February 2020

Summary

This thesis is a critical exploration of how the concept of inclusive innovation is understood and practised as well as its legitimacy across different spheres in the Kenyan agricultural sector. Though social exclusion from innovation processes has been a long-standing concern, the concept of 'inclusive innovation' has emerged recently to denote how innovation can include marginalised actors in its processes and outcomes. Despite its rhetoric within various policy and academic circles, the concept remains ambiguous and there lacks a consensus on what it entails and how it can be assessed. The central research question that this thesis engages with is therefore:

- How do processes of inclusive innovation unfold and relate across different spheres in an agricultural innovation system?

Within this broad objective, the aim is to investigate discourses and practises about inclusive innovation in the spheres of academia, organisations, and local communities. It employs four separate empirical studies to understand these issues across various spheres in the Kenyan agricultural sector.

Empirical chapters

The first study uses literature review and document analysis to explore the historical background and current landscape of the agricultural innovation system in Kenya to identify key issues relating to social inclusion and exclusion within this system. It finds that a key issue in the history of state-led agricultural innovation and development in the country was the annexing of prime agricultural land for European settlers and the exclusion of many rural areas from official agricultural research, education, and development support. Farmers in rural areas therefore emerged as an important group of actors that were excluded from agricultural innovation processes and where subsequent efforts focussed on in order to make innovation processes inclusive.

The second study employs framing analysis to investigate how the issue of inclusive innovation if framed both in literature and by different actors within the Kenyan agricultural sector. It finds that there exists three district narratives about inclusive innovation in literature: A bottom of the pyramid narrative, a grassroots narrative, and a political economy narrative. By comparison, there are four narratives about inclusive innovation by agricultural practitioners in Kenya, which are a hybridity of the theoretical narratives. There lacks complete alignment to any of the existing theoretical narratives of inclusive innovation by organisations such as state agencies, knowledge institutions, the private sector or civil society organisations in

Kenya. Instead, various organisations in Kenya frame the issue based on their own backgrounds and interests.

The third study unravels how inclusive innovation is operationalised within agricultural extension and advisory services in Kenya. It first develops an operational framework for assessing social inclusion within agricultural extension and advisory services (AEAS) building on the ladder of inclusive innovation, a concept from innovation research. It then applies this framework to analyse the levels and forms of social inclusion within three cases of AEAS in Kenya. Across these programmes, findings indicate a skewed focus on lower levels of social inclusion such as the intention to include and the delivery of AEAS to the farmers that are assumed to be excluded. Higher levels of inclusion such as assessing the usefulness of AEAS, including targeted farmers in the design, delivery, and control of AEAS programmes and changing existing social structures to include the knowledge and voice of farmers in discussions about socially inclusive AEAS are largely missing.

The fourth and final study investigates how farmers in Uasin Gishu, Kenya who have been the target of various interventions that promote inclusive agricultural research and innovation in the region accord legitimacy to such interventions using a case study approach. It finds that procedural elements of legitimacy such as participation, control and ownership over the programmes is a key factor that leads to the accordance of legitimacy to inclusive innovation programmes by farmers in Uasin Gishu. It therefore demonstrates that innovations are inclusive not only when they have practical benefits the day to day lives of the targeted actors but also when the procedures employed are inclusive. Additionally, it demonstrates that a 'society looking inward' perspective on inclusive innovation, in this case how farmers assess the benefits of innovative interventions by different organisations, may differ from the 'organisation looking outward' perspective i.e., how different organisations legitimise their intentions and processes to their intended beneficiaries.

General conclusions

The following four key conclusions can be derived from the synthesis of the findings across the four empirical chapters of the thesis:

1. In theory, and as a rhetoric among actors such as agricultural practitioners, inclusive innovation remains a fuzzy concept. However, when concrete actions by organisations involved in inclusive innovation interventions and farmers' perspectives on the issue are examined, there is clarity in the problems being addressed and the solutions sort after.
2. Inclusive innovation goes beyond redistribution of resources such as knowledge

and technologies and requires 'higher' levels of inclusion such as including the discourses of the targeted actors on what constitutes an inclusive innovation process.

3. Both distributive and procedural forms of justice are equally important goals of social justice to be aimed for and attained in inclusive innovation processes.
4. Qualitative indicators are an important addition to the ladder of inclusive innovation as an assessment tool for inclusive innovation processes. This is because they enhance the ladder by making explicit the indicators of social inclusion across all the levels and adding indicators at higher levels of social inclusion in the ladder.

Implications of the findings for theory, policy, and practice

Five implications and recommendations can be derived from this thesis. First, the fuzziness of the concept of inclusive innovation creates an opportunity to develop novel solutions that are context specific and appropriate. Both researchers and practitioners can therefore make explicit the inclusive innovation processes being sort, the actors being targeted and how the consequences will be dealt with for different contexts and scenarios. Secondly, the ladder of inclusive innovation, enhanced with the proposed qualitative indicators in this thesis, can be an important tool to evaluate the social inclusiveness of policies and programmes such as by state agencies, civil society organisations or private enterprises. Third, inclusive innovation theory and practise need to pay attention to the agency of the actors that are targeted with such processes. For instance, the knowledge of such actors on what constitutes an inclusive innovation process can be an important criterion of designing, implementing, and assessing inclusive innovation processes. Fourth, inclusive innovation should be conceptualised not only in terms of how innovation processes and outcomes can be made to be inclusive but also how innovation can be used as a tool to realise social inclusion in processes such as food production. Finally, Kenya's current policies and practises on inclusive agricultural innovation remain rhetorical due to deep-rooted historical development trajectories. Decolonisation and rethinking of these policies and approaches is therefore instrumental to attaining inclusive innovation in the country.

1

Chapter 1

General Introduction

Background to the study and problem statement

This thesis is inspired by my childhood experience of growing up and working in a small farm in Western Kenya, and my visits to many such farms later in life. I was introduced to the pleasure as well as the hardships of smallholder food productions systems at an early age and with time, became aware of the innovative capability of these farmers in seeking and applying knowledge and technologies to solve their day-to-day challenges to improve their farms. However, I also became aware of the acute wealth inequality that exists among various farmers and how this led to disparity in how farmers were able to transform or improve their farms. I observed unequal access to, and utilisation of agricultural research information, skills and technologies produced and distributed by government agencies, universities or agricultural businesses as most farmers could either not afford them or did not find them useful. Currently, social exclusion from the processes and benefits of innovations such as new or modified technologies and skills remain a key concern in Kenya as well as in other less industrialised countries across the globe (Crivits *et al.*, 2014; Papaioannou, 2014).

In the book, 'Science, Ideology and Development', Mafeje (1978) argues that agricultural reforms and development are a prerequisite for broader social and economic development in less industrialised countries. This is because these countries are agrarian-based and the developments in the sector can function as a base for broader social and economic development. There is therefore an important link between agricultural development and inclusive innovation in less industrialised countries such as Kenya since agriculture is the most important sector in terms of the number of people directly and indirectly involved in it and its contribution to a country's revenue. Innovation has been the key driver of the various industrial revolutions across the world leading to better health care, more efficient agricultural production techniques, quicker transport and a variety of energy sources among other socio-economic advances (Godin, 2017). Currently, the fourth industrial revolution or 'Industry 4.0' is being proclaimed as an era where digitalisation, artificial intelligence and use of data can be utilised to make processes such as food production, manufacturing and healthcare to be more efficient, reliable and 'smart' (Benitez, Ayala and Frank, 2020; Zheng *et al.*, 2020). In agriculture, processes such as automation and the use of artificial intelligence are suggested to have the potential for reducing food waste, enhancing the safety and quality of food and creating better working conditions for farm labourers (Lim *et al.*, 2021). Despite these advances in science, technology and innovation, social inequality remains a key concern within and across countries and regions in the world (Nelson, 2011; Habiyaremye, Kruss and Booyens, 2019; Cozzens, 2021).

There has therefore been considerable interest from academic as well as policy cycles in recent decades on how innovation can be inclusive and how it can be used as a tool to eradicate or reduce social inequality (Silva, 2020; Cozzens, 2021). Within academic discourses, the paradigms that guide innovation and economic growth are being questioned and evaluated for their role in creating social inclusion or exclusion (Arora and Romijn, 2012; Poole, Chitundu and Msoni, 2013; Mdee *et al.*, 2020; Cozzens, 2021). In policy cycles, inter-governmental organisations such as the African Union and the United Nations have called for innovation and development processes that are socially inclusive and where 'no one is left behind' (African Union Commission, 2014; Gupta and Vegelin, 2016; Telleria, 2020). This interest has resulted in a number of approaches and theoretical reflections to making innovation inclusive from different disciplines and within different practice domains of innovation.

In knowledge creation, dissemination and use, perspectives from de-colonisation debates have argued for recognition and inclusion of under-valued, distorted or misrepresented forms of knowledge, theories and education systems (Arocena, Göransson and Sutz, 2017, 2018; Kidd, Medina and Pohlhaus, 2017). Research approaches such as participatory research and citizen science also aim to include marginalised actors such urban residents and resource poor rural farmers as active producers of knowledge (Chambers, 1994; Hounkonnou *et al.*, 2006; Almekinders, Thiele and Danial, 2007; Nyadzi *et al.*, 2020). In market development and access, 'inclusive growth', 'inclusive development' and 'inclusive value chain' models and approaches have been proposed and applied as ways through which actors that are excluded from commodity, service, financial and other markets can participate in and benefits from the production and distribution of skills and technologies (Prahalad, 2005; George, Mcgahan and Prabhu, 2012; Kanu, Salami and Numasawa, 2014; Gupta, Pouw and Ros-Tonen, 2015; van Gent, 2017). Other approaches have emphasised the agency of the so-called marginalised actors in innovation processes. For instance, grassroots innovation movements and perspectives call for the recognition and inclusion of local and community-based forms of innovation, as opposed to innovations driven and promoted by 'experts' such as state agencies and research institutions (Patel, 2009; Alonso-Fradejas *et al.*, 2015; Copeland, 2019).

When closely examined, the different approaches to inclusive innovation identify a specific group of actors that are marginalised from the agricultural innovation system. These include for instance workers and artisans in the informal sector, labourers, producers and distributors of food in rural and urban areas, women, the youth as well as pastoral communities in semi-arid lands (George, Mcgahan and Prabhu, 2012; Foster and Heeks, 2013; Chataway, Hanlin and Kaplinsky, 2014).

The logic for including these marginalised actors in the innovation system is based on competing interests as well as different normative assumptions about social justice. (Levidow and Papaioannou, 2018; Timmermann, 2020b; Thapa, 2021). This includes different assumptions about why and how marginalised actors should be included in the process and benefits of innovation. For instance, approaches that aim at the distribution of the benefits of innovation such as the transfer of knowledge or technologies from one group of actors to a marginalised group allude to distributive forms of justice (Cozzens, 2007; Pansera and Owen, 2018; Timmermann, 2020b). Secondly, approaches that involve co-production of knowledge skills and technologies between one group of actors and a marginalised group allude to procedural justice (Timmermann, 2020a). Finally, approaches with the objective of highlighting the initiatives and contribution of the marginalised themselves in innovation processes and outcomes allude to contributive justice (Timmermann, 2018; Copeland, 2019).

Inclusive innovation therefore has different approaches in theory and practise, from different scientific disciplines and policy cycles and with different logical interpretations concerning social justice. As a result, it remains a vague concept both in theory and practise (Pansera and Owen, 2018; Opola *et al.*, 2021). What the concept entails, how it can be assessed as well its usefulness in creating just and socially inclusive innovation processes therefore remains largely unknown and under theorised (Cozzens, 2021). This raises a number of questions such as how can an inclusive innovation process be understood, how is it realised in practise and how can it be assessed? This are the questions that I engage with in this thesis.

The study was conducted as part of a transdisciplinary research initiative-The 3R (Resilient, Robust and Reliable) Kenya from 'Aid to Trade. It was a collaborative initiative of Wageningen University Research, the African Centre for Technology Studies, Egerton University, Jomo Kenyatta University of Agriculture and Technology as well as other organisations in Kenya. It aimed to investigate and generate evidence on market-led approaches to agriculture and food systems development in Kenya through inclusive and sustainable trade and investment rather than development aid. The project was funded by the Embassy of the Kingdom of the Netherlands in Kenya, at a time when the Netherlands Government policy was transitioning from providing mainly development aid to a trade engagement strategy in support of agri-food systems innovation and transformation in Kenya. In this PhD study, I examined the inclusive component of the transformation processes. In the section below, I provide a more detailed account on the theoretical orientation of the study, indicating the knowledge gaps and how the study makes a contribution. This is followed by a section outlining my research objectives and questions. I then present the research methodology employed in this study before ending the chapter by explaining how the thesis is organised.

Theoretical insights and research objectives

According to Rogers (1995), innovation is a process where skills or technologies are produced in one location and then diffused across time and space. Despite different approaches to innovation over time, this linear model of innovation of innovation, with a distinction between 'producers' of innovation on one end and 'users' of innovation on the other has been the predominant paradigm within which innovation is understood and innovation processes unfold across the world (Kibwika, Wals and Nassuna-Musoke, 2009; Minh *et al.*, 2014). In recent times, the linear model of innovation is being replaced, at least in theory, by a systems perspective where innovation is understood to be a process of shared learning among a network of different rules, norms and actors possessing skills sets, knowledge and technologies (Lundvall *et al.*, 2011; Moschitz *et al.*, 2015). Innovation processes therefore go beyond the production and application of new technologies but include development and application of new social arrangements such as the facilitation of linkages between actors to enable sharing of knowledge and skills as well as the development of rules and norms that guide such processes (Klerkx, van Mierlo and Leeuwis, 2012). In this thesis, I conceptualise innovation as a process by which technical, organisational and social novelties are introduced into a 'system' composed of various rules, social norms and actors such as government agencies, civil society organisations, private business enterprises, rural and urban residents and research organisations and where knowledge is exchanged through mutual interactions (Hall *et al.*, 2003; Lundvall *et al.*, 2011; Kilelu, Klerkx and Leeuwis, 2013).

However, different actors have unequal access to knowledge and resources and control over how those resources are distributed and utilised which leads to the marginalisation of some actors within the innovation system from the process and outcomes of innovation (Chataway, Hanlin and Kaplinsky, 2014; Eidt, Pant and Hickey, 2020; Mdee *et al.*, 2020). Inclusive innovation has been used as a concept that refers to how actors who are marginalised from the innovation system due to lack of resources or lack of influence over innovation processes can participate in and benefit from new skills, technologies and social arrangements (Foster and Heeks, 2013; Pansera and Owen, 2018). In business and management literature, it is argued that such an inclusive process of innovation could involve a number of approaches (Mortazavi *et al.*, 2021). First, affordable products and services can be provided to marginalised groups of people through what has been termed as frugal innovation (Prahalad, Di Benedetto and Nakata, 2012; Hossain, 2018). Through this approach, resource constraints can be overcome such as through the use of simple and easily available and accessible technologies and knowledge (Pansera and Sarkar, 2016; Onsongo and Knorringa, 2020). Secondly, innovation can in itself be a tool for social inclusion by developing new social arrangements or business models where marginalised actors can participate

in knowledge and technology production and utilisation (Altuna *et al.*, 2015; Mortazavi *et al.*, 2021). Finally, businesses can facilitate participation of marginalised actors in innovation processes by including them as co-innovators in the design and development of new skills, technologies or social arrangements (Simanis and Hart, 2011).

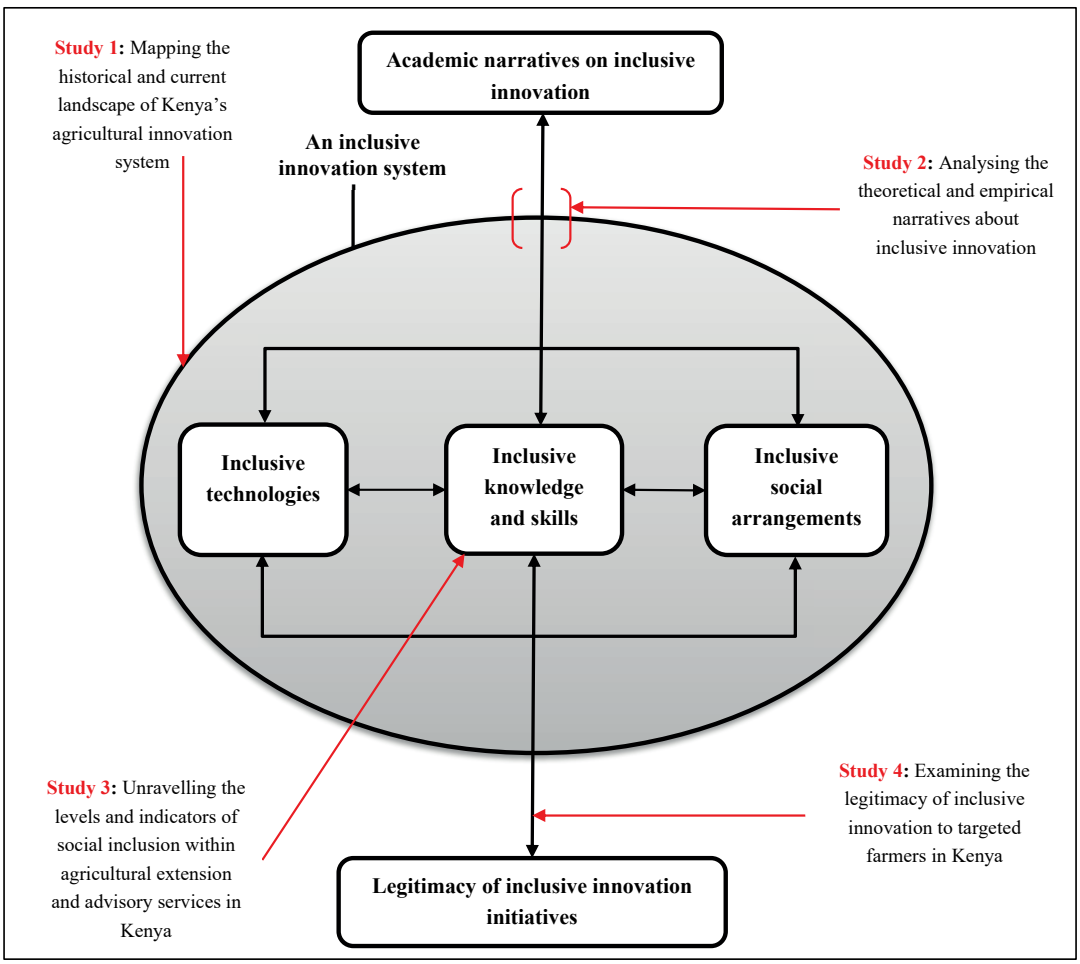
Other perspectives, such as from political economy and critical agrarian studies schools of thought have been sceptical of business-centred approaches to inclusive innovation, advocating instead for changes in the underlying social structures that lead to social exclusion (e.g. Arora and Romijn, 2012; Poole, Chitundu and Msoni, 2013; Mdee *et al.*, 2020). Social exclusion, according to this view is due to the tendency of governments and markets to advertently and inadvertently respond to the needs and interests of those with significant material and social resources thus creating privileged class of innovators and beneficiaries in urban and rural areas (Rusca *et al.*, 2015; Stott and Tracey, 2018). This later approach to inclusive innovation has also called for the recognition and promotion of grassroots or local forms of innovation processes (Patel, 2009; Smith, Fressoli and Thomas, 2014). 'Local people' such as farmers in remote areas are therefore recognised as innovative and knowledgeable with the ability to provide solutions to social and economic challenges facing their local contexts (Patel, 2009). The grassroots perspective on inclusive innovation therefore highlights the agency of 'local people' by eliminating or removing the barriers that they face in producing and utilising knowledge, skills and technologies (Karanja, Kamau, Macoloo, Righa, van Veldhuizen, *et al.*, 2017; Jiménez, 2018).

There is still a lack of a consensus on what causes social exclusion in innovation processes, how an inclusive innovation process should be realised in practise, who or what should be included and whether the outcomes of inclusive innovation are desirable (Levidow and Papaioannou, 2018; Pansera and Owen, 2018; Cozzens, 2021). In communication sciences literature, it is pointed out that individuals and organisations construct a narrative about an issue or event based on their backgrounds and interests (Entman, 1993; van Woerkum, Aarts and van Herzele, 2011). Two key issues emerge concerning an innovation system and attempts to make it socially inclusive across different spheres. At the sphere of organisations, influential actors such as the state, research institutions, development agencies and large business enterprises are likely to construct different and contrasting interpretations of the problems being addressed and the solutions that are to be promoted through inclusive innovation (Vossen and van Gorp, 2017; Pansera and Owen, 2018). The problems and solutions being addressed at this sphere are likely to differ from those being addressed by other actors within other spheres, especially those at a the sphere of rural communities (Parkinson, 2009; van Oers, Boon and Moors, 2018). 'Local people' therefore assess innovation processes and outcomes promoted to them from other spheres in order to ascertain whether they

are aligned to their own values and interests (Geels and Verhees, 2011; Uddin *et al.*, 2014). This evaluation includes whether an organisation and the innovation it promotes are ethically sound, can be easily understood and has practical value to their day to day lives. This assessment can be termed as legitimacy (Suchman, 1995).

In the figure below, I present an outline of these main theoretical insights that I draw from in this thesis and the objectives of the study. First, at both the academic and organisations spheres, we unravel the narratives about inclusive innovation, including how problems and solutions are being framed. Secondly, at the sphere of organisations, we examine the agricultural innovation system in Kenya, including its historical background, key actors, current structure and the approaches and practises regarding inclusive innovation. Finally, at the sphere of local communities, we examine how farmers in rural Kenya as targets of inclusive innovation initiatives assess how legitimate such processes are to them.

Figure 1.1. Overview of specific research questions



Research questions

The central research question addressed by this thesis is: How do processes of inclusive innovation unfold and relate across different spheres in an agricultural innovation system? Within this broad question, the following four specific research questions will be addressed:

I. What is the history and current landscape of the Kenyan agricultural innovation system and how does it relate to social inclusion and exclusion?
II. How is inclusive innovation framed in theory and by various agricultural practitioners in Kenya and how do the two relate?
III. How and to what extent is social inclusion attained within agricultural extension and advisory services in Kenya?
IV. What criteria do targets of inclusive innovation initiatives use to assess the legitimacy of such initiatives?

Research methodology

In this section, I explain the research methodology employed in this study, including the study design, study location, sampling plan and the methods used for data collection and analysis in each of the four sub-studies.

The research paradigm and study design

According to Howcroft and Trauth (2005), social reality can be improved to make life better for various actors and research has a role to play in this by producing knowledge which reveals or explains various forms of domination and oppression. This research paradigm, belonging to the critical inquiry school of thought, acknowledges that social and cultural phenomena, such as technology, events, language or knowledge are socially constructed (Carspecken and Michael, 1992) . Some actors in a society can therefore enhance their authority by controlling social phenomena and constructing social realities for their own benefit (Foucault, 1982; Carspecken and Michael, 1992). Research can therefore have an emancipatory role and in fields such as innovation studies, it can be used to explore and examine the unequal influence and authority over innovation processes and outcomes such as technology development and deployment (Zheng and Stahl, 2011). Within this broad research paradigm, I employ a range of qualitative research approaches to explore the historical context, current structure, practises, and legitimacy of inclusive innovation within the Kenyan agricultural sector. The focus is on eliciting and understanding the lived experiences and perspectives of the participants in my study. This falls under interpretive frameworks where the study participants are believed to makes sense of events and phenomena through interactions with others, such as the researcher (Maxwell, 2012; Creswell and Poth, 2017).

Since inclusive innovation remains a fuzzy concept, and is a relatively new field of research (Pansera and Owen, 2018; Joseph *et al.*, 2021), this was an appropriate research design since it enabled me to focus on a small sample size of participants and a specific context, and therefore explore complex social phenomena and meanings under the unique circumstances in these specific settings (Maxwell, 2012; Marshall and Rossman, 2016). In chapter 2, I set the scene for the study by using literature review and document analysis (Marshall and Rossman, 2016) to explore the history and current structure of Kenya's agricultural innovation system. In chapter 3, I use literature review as well as methods of analysing discourse (Entman, 1993; Dewulf and Bouwen, 2012) to explore how narratives about inclusive innovation are constructed both in literature and by the participants in my study. In chapter 4, I use a multiple case study approach (Merriam, 1998; Yin, 2009) to investigate how social inclusion is realised within three programmes of agricultural extension and advisory services in Kenya. Finally, chapter 5 is a single case study (Merriam, 1998; Yin, 2009) on how farmers in Uasin Gishu, Kenya that are targets of inclusive innovation initiatives assess the legitimacy of those initiatives.

Study location and sampling plan

The context of this study is the Kenyan agricultural sector. A detailed account of the Kenyan agricultural innovation system is presented in chapter 2. According to Marshall and Rossman (2016), the study context chosen for qualitative research should meet various criteria including ease of access to the study location, participants and events, a high probability that the phenomena being studied will be present and an assured quality of data. Kenya was therefore an ideal setting for this study due to a couple of reasons. First, it was easily accessible to me given that I am a Kenya citizen and was able to stay in Kenya for fieldwork for prolonged periods of time with minimal bureaucratic interruptions such as visa related restrictions. In addition, I was familiar with the research context and spoke one of the local languages which eased my interaction with the study participants. Secondly, the country adopted a new constitution in 2010 that introduced a decentralised form of government in addition to the central government structures. Additionally, it has a liberalised economy with many actors within the agricultural innovation system experimenting with various ways to improve the sector (Christoplos, 2010). The plurality of actors and innovation processes within the Kenyan agricultural sector therefore provided a high likelihood that various inclusive innovation approaches and initiatives will be present, which was important for the study objectives.

Within the sector, I selected as cases for my study agricultural development organisations and programmes that have two objectives. First, they engaged in the developing, improving or disseminating agricultural technologies, skills, or social

arrangements. Secondly, they had a component of social inclusion by targeting their initiatives to farmers that they considered to be excluded from the processes and benefits of agricultural innovation processes. Specific programs and respondents for the study were purposefully selected for homogeneity in instances where data corroboration was required and for maximum variation in instances where the aim was to explore the broad aspects of the phenomena under study. A pilot study was initially conducted in the beginning of the study to identify potential cases and participants. Gatekeepers such as university researchers, farmer association leaders and government extension agents were used to identify suitable programmes and participants for the study. Snowballing was also used to identify additional participants. Data collection and analysis proceeded concurrently with theoretical sampling (Strauss and Corbin, 1990; Maxwell, 2012) being used to identify and recruit participants who could provide more insights as the study progressed.

Data collection and analysis methods

In the table below, I outline the research question, main approaches and the data collection and analysis methods employed for each chapter.

Table 1.1. Outline of the study design

	Study 1	Study 2	Study 3	Study 4
Research question	What is the history and current landscape of the Kenyan agricultural innovation system and how does it relate to social inclusion and exclusion?	How is inclusive innovation framed in theory and by various agricultural practitioners in Kenya and how do the two relate?	How and to what extent is social inclusion attained within agricultural extension and advisory services in Kenya?	What criteria do targets of inclusive innovation initiatives use to assess the legitimacy of such initiatives?
Main study approach	Literature review	Literature review Discourse analysis	Multiple-case study	Single-case study
Data collection methods, tools, and sources of data	Literature Government legislations Policy documents	Literature, in-depth interviews, memos, event logs, field notes	In-depth, interviews, participant observation, memos, event logs, field notes	Interviews, participant observation, non-participant observation, memos, event logs, field notes
Data analysis methods and tools	Historical analysis Document analysis Deductive analysis	Framing analysis Deductive analysis Inductive analysis Thematic analysis Constant comparison	Quasi-statistics Deductive analysis Inductive analysis Constant comparison	Deductive analysis Abductive analysis Thematic analysis Constant comparison

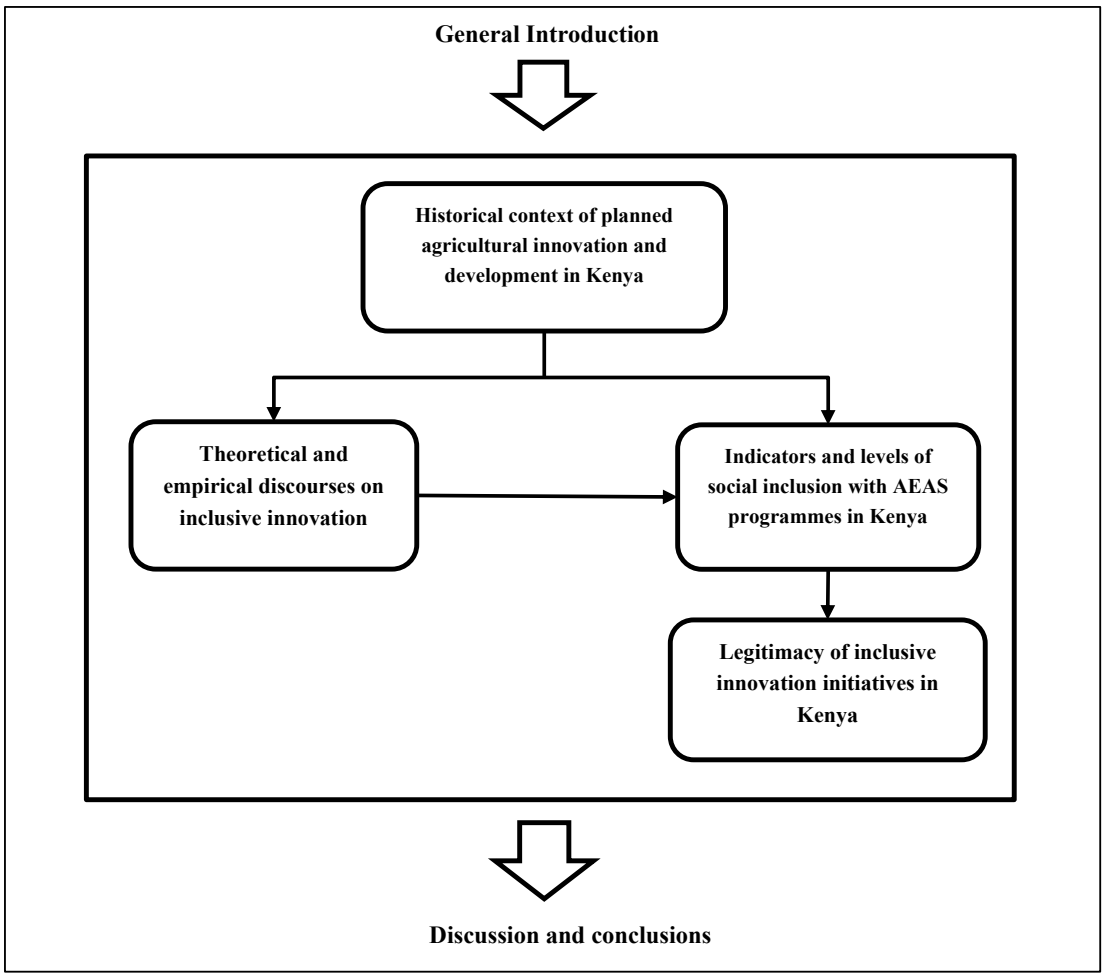
In general, methods of collecting data across the studies were observation techniques, interviews, and secondary data. These were the best methods to identify and explore lived experiences and "participants' perspectives" on the phenomena under study (Maxwell, 2012:17). Through interviews and secondary data, we could obtain information on past events that we could not observe and through observations, we were able to draw inferences about meanings and perspectives that could not be obtained through interviews or secondary data (Maxwell, 2012). Triangulation in data collection therefore enabled us to obtain rich and credible data. Study 1 mostly utilised secondary data, including historical books, journal articles, policy reports and government documents. In study 2, we mainly used key-informant interviews and secondary data. In study 3, we used in-depth interviews and participant observation and in study 4, we used both participant and non-participant observation as well as semi-structured interviews. Across the studies, field notes, memos and events logs were gathered and included in the collected data.

Data analysis proceeded early in the study with interview transcripts, field notes and memos being analysed to provide insights on emerging themes. Theoretical sensitivity was employed by using concepts on inclusive innovation derived from literature as sensitising concepts to derive important inferences from the data. (Strauss and Corbin, 1990; Maxwell, 2012). This deductive approach to data analysis proceeded simultaneously with an inductive approach where we explored new and emerging themes and concepts from the gathered data. We employed the constant comparison method (Strauss and Corbin, 1990) where emerging concepts and propositions were constantly compared to existing data to ascertain whether emerging propositions were supported by existing data. In chapter 3, we used quasi-statistics (Maxwell, 2012) to complement our analysis with numerical data. Data analysis was done both manually using memos and diagrams as well as with the aid of the ATLAS.ti data analysis software.

Organisation of the thesis

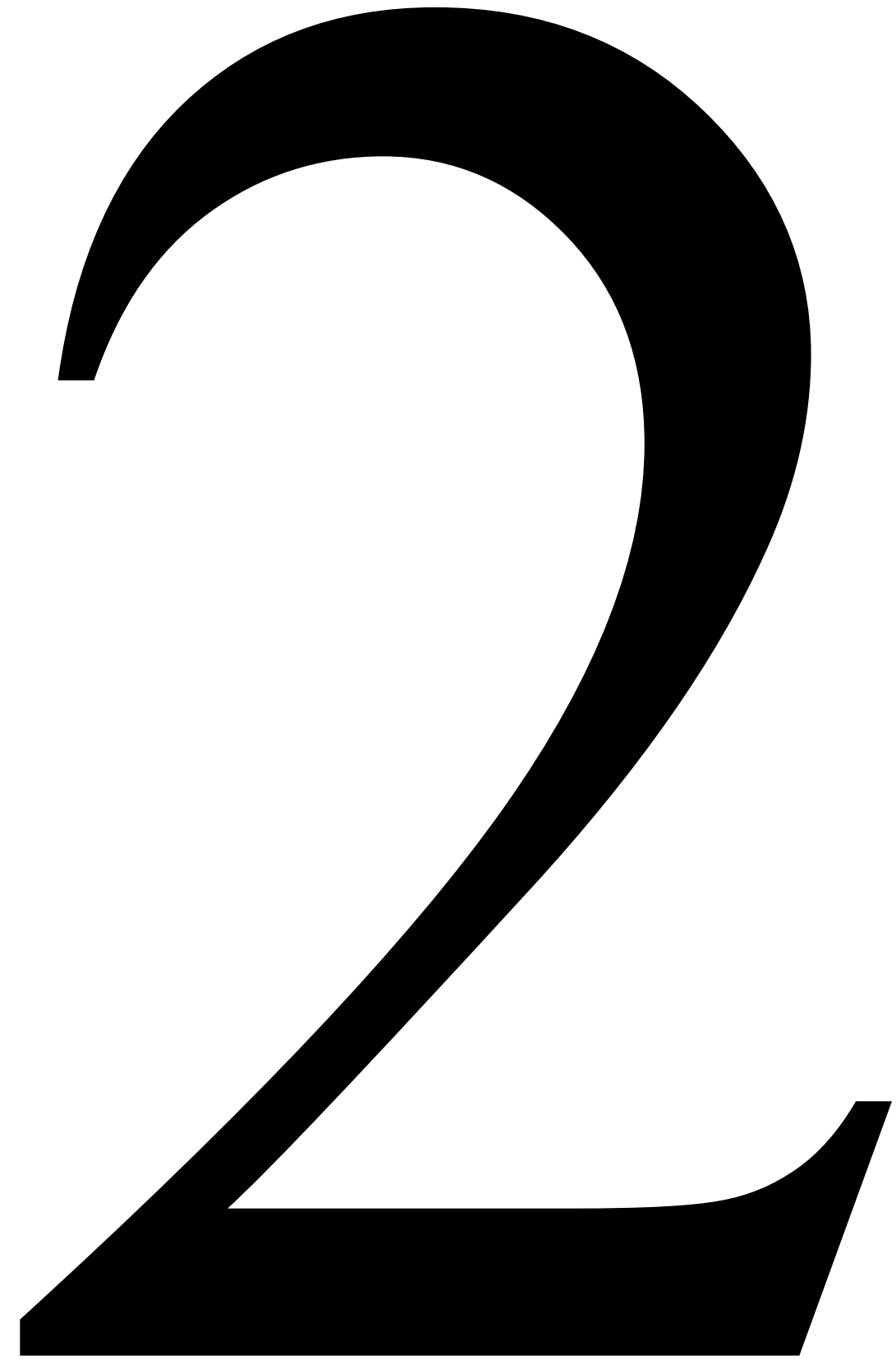
The figure below outlines the six chapters of the thesis, starting with the general introduction, to the four main chapters and ending with a discussion and general conclusions chapter.

Figure 1.2. General outline of the thesis chapters



The thesis is organised as follows. **Chapter 1** lays out a general introduction to the thesis by reviewing literature and theories on inclusive innovation and outlining the research questions and methodology. **Chapter 2** then sets the scene for the rest of the study by exploring the historical and current landscape of the Kenyan agricultural innovation system. Using the analysis of secondary data, we explore how exclusion from innovation processes emerged during different historical periods in Kenya. We also explore the landscape of the current agricultural innovation system in Kenya across domains such as research, enterprise, demand, and the intermediary domain and how this relates to social inclusion or exclusion.

In **chapter 3**, we employ framing analysis as a methodological guide to investigate how the concept of inclusive innovation is framed as an issue both in theory and by agricultural practitioners in Kenya. This includes how social exclusion is constructed as a problem, what are presented as the causes of this problem and what are recommended as the solutions to make an innovation process inclusive. In **chapter 4,** we apply the ladder of inclusive innovation, a holistic framework for examining inclusive innovation processes to unravel the indicators and levels of inclusivity within agricultural training and advisory programmes in Kenya. We first translate the ladder to AEAS by developing AEAS related indicators to inclusion at the various levels of the ladder before applying to study three cases of AEAS in Uasin Gishu county, Kenya**. Chapter 5** then studies how legitimate inclusive innovation processes are to smallholder farmers in Uasin Gishu, Kenya. We use the dimensions of moral, cognitive, and pragmatic legitimacy to unravel how these farmers assesses inclusive innovation processes. Finally, I synthesise our findings and draw implications for theory, policy and practise based on our analysis and findings in **chapter 6.**



Chapter 2

A Review of Kenya's Agricultural Innovation System: A Brief History, Key Features and Social Inclusiveness

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A Review of Kenya's Agricultural Innovation System:
A Brief History, Key Features and Social Inclusiveness

Abstract

This chapter reviews the history and current landscape of the agricultural innovation system in Kenya and how this relates to issues of social inclusion and exclusion. It employs a document analysis of historical records and key policy documents and government legislations in Kenya. I find that smallholder farmers in rural Kenya emerged as an important interest group of marginalised actors since they were excluded from state driven research, innovation, agricultural extension, and other forms of support to farmers. This group remain a significant target group for policies and practises on inclusive agricultural innovation and development. I also find that inclusive innovation can emerge as a goal aimed for by actors such as the state as a result of unplanned and unexpected events that forces these actors to react in a certain way.

Introduction

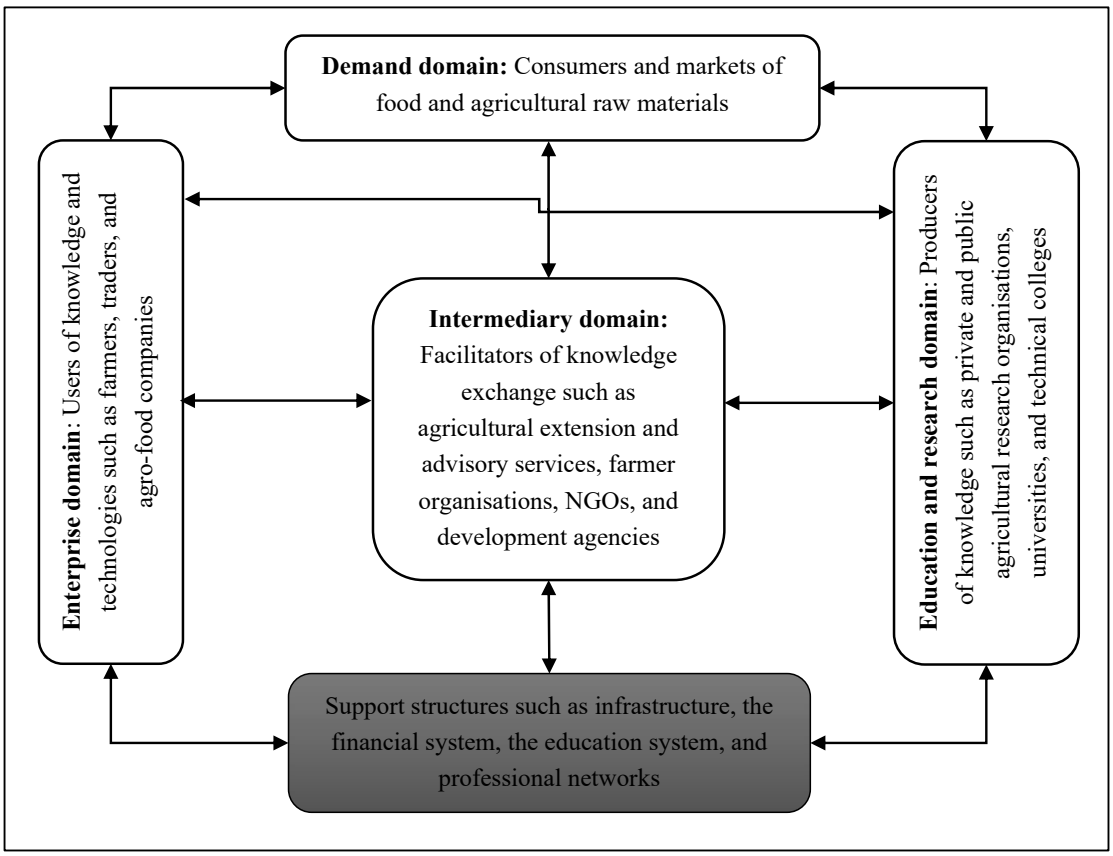
In many countries, agriculture is multi-functional and is promoted and practised by different individuals and organisations for a variety of purposes including food and nutrition provision, biodiversity conservation, as a cultural practise, economic activity and for improving livelihoods (Knickel *et al.*, 2009; Juma, 2011; Pigford, Hickey and Klerkx, 2018). The focus of this thesis is on the latter role of agriculture in achieving social development, specifically how social inclusion can be understood and practised within agricultural innovation processes. This chapter provides a background to the rest of the thesis by exploring a brief history of the key elements of Kenya's agricultural innovation system. It then analyses the forms of social inclusion and exclusion across different historical periods and within the current agricultural innovation system in the country.

I conceptualise agricultural innovation as new or improved knowledge, technology of social arrangements introduced into a system composed of various actors and elements with the aim of solving various challenges facing agriculture (Hall *et al.*, 2003; Pigford, Hickey and Klerkx, 2018). In Kenya, as well as other less industrialised countries, agricultural innovation is being promoted and experimented with in order to solve various social, ecological and economic challenges (Fu, Pietrobelli and Soete, 2011; Nakawuka *et al.*, 2018; Mgendi, Shiping and Xiang, 2019). For instance, improved irrigation technologies and drought resistant seed varieties are considered instrumental in increasing yields and sustaining agricultural production under harsh climatic conditions (Karanja, Kamau, Macoloo, Righa, Veldhuizen, *et al.*, 2017; Tadele, 2017; Zougmoré, Läderach and Campbell, 2021). Developments in information and communication technologies have also facilitated the sharing of agricultural knowledge such as crop and animal production practises, weather patterns or the price of agricultural products (Salemink, Strijker and Bosworth, 2017; Munthali *et al.*, 2018; Onsongo and Knorringa, 2020). Similarly, new social arrangements such as cooperative organisations and integrated supply chains have been promoted as a way to facilitate interactions and knowledge exchange between various individuals and organisations involved in the production, distribution and consumption of food (Jäske, 2019; Danse *et al.*, 2020).

However, social inequality and unequal access to opportunities still exist in many countries and various farmers' organizations, civil society organizations, researchers and policy makers have raised concerns over how agricultural innovation marginalizes some actors within its system (African Union Commission, 2014; Papaioannou, 2014; Eidt, Pant and Hickey, 2020; Mdee *et al.*, 2020). Poole *et al.* (2013) for instance argue that the push towards commercialization of agriculture has

led to the exclusion of farmers with little resource endowments from the benefits and processes of agricultural innovation. In Kenya, similar to other less industrialised countries, smallholder farmers in rural areas, who typically are producing food on about 2 hectares or below of land (Gatzweiler and Von Braun, 2016) have been particularly an 'interest group' for policy and programmes on agricultural transformation due to a number of reasons (Birner and Resnick, 2010: 1445). First, the transformation of smallholder agriculture into productive farms is considered a key pathway to economic growth and prosperity in Kenya (MoALF Kenya, 2021c). Secondly, agriculture in the country is dominated by small farms in rural areas thus making them an important constituency for political patronage by incumbent and aspiring regimes (Ochieng, 2007; Birner and Resnick, 2010; Poulton and Kanyinga, 2014). Finally, pressure from political movements such as farmers' organisations and civil society organisations has led to focus on policy and support for rural smallholder farms (Birner and Resnick, 2010). Despite this interest and initiatives focussing on smallholder farmers, they still remain some of the most marginalised from participating and benefiting from innovation within the agricultural innovation system (Arza and van Zwanenberg, 2014; Mdee *et al.*, 2019; Eidt, Pant and Hickey, 2020).

Figure 2.1. Features of an agricultural innovation system (Rajalahti et al. 2008)



To understand and interpret the subsequent chapters in this thesis, which address the discourses, approaches, and legitimacy of inclusive agricultural innovation in Kenya, it is necessary to highlight the history of agricultural innovation system in the country and how the various changes over time may be relevant to understand social inclusivity within the current system. An agricultural innovation system is an interlinked network of different actors, rules and norms that perform various functions to produce and apply new agricultural knowledge, technologies and social arrangements for social and economic use (Hall *et al.*, 2006; Pigford, Hickey and Klerkx, 2018). According to Rajalahti *et al.* (2008), this system is composed of four key domains as outlined in the figure below.

First, the demand domain comprises of both the demand or need for food as well as the demand for the items used to produce and distribute food such as farm machinery, knowledge, seeds and other raw materials or transportation vehicles (Arnold and Bell, 2001). Secondly, the enterprise domain comprises of individuals and organisations in rural and urban areas who take the risks to apply available knowledge and technologies to produce and distribute food. These include farmers, retailers, technology developers or transporters of food (Rajalahti, Janssen and Pehu, 2008).

Third, the education and research domain includes actors and practises that develop new knowledge and skills for food production and distribution (Rajalahti, Janssen and Pehu, 2008). While codified or formal knowledge is produced by organisations such as state agencies, private research foundations and national as well as international agricultural research organisations, informal or indigenous forms of knowledge is produced by farmers and other community-based actors in the Kenyan agricultural system (Chitere and Omolo, 1993; Rajalahti, Janssen and Pehu, 2008; Songok, Kipkorir and Mugalavai, 2011). Finally, the intermediary domain is composed of actors and activities that facilitate networks, interactions and exchanges among the various actors involved in food production, distribution, and consumption. For instance, agriculture knowledge and skills is shared among different actors and organisations through agricultural extension, multi-stakeholder forums, or seminars (Rajalahti, Janssen and Pehu, 2008; Kilelu, Klerkx and Leeuwis, 2013).

The rest of this chapter is structured as follows. I first outline the method used to conduct the study. I then present the key developments in Kenya's agricultural innovation system across different historical periods and the relation to social inclusion and exclusion within each period. This is followed by a mapping of Kenya's current agricultural innovation system and its relation to social inclusion and exclusion. The chapter then ends with a brief discussion and concluding section.

Methodology

To unravel the historical background of planned agricultural development in Kenya, I used Scopus, Web of Science and Google Scholar to search for books and documents about historical developments in Kenya's agricultural innovation system. Key terms used included, 'Kenya,' 'agricultural development,' 'innovation,' 'history,' 'agricultural research,' 'agricultural extension,' 'agricultural education' and 'technology.' Eventually, a total of fourteen books and six government and development agency policy documents as well as thirteen journal articles were used with publication periods ranging from 1971 to 2021 for analysing the historical context. For analysing the current state of the agricultural innovation system in Kenya, twenty government, multi-government, and development agency policy documents, three government legislations and fifteen journal articles were analysed. Innovation processes within the current agricultural innovation system were examined for social inclusion or exclusion across the four domains proposed by Rajalahti *et al.* (2008). The understanding of social inclusion in literature that is based on the marginalisation of a group of actors from the benefits and process of agricultural innovation (Foster and Heeks, 2013) was used as a sensitizing concept to pick out who the marginalised actors were and how they were marginalised from the various domains of the agricultural system across different historical periods up to the current system. The following section presents the findings of this analysis.

Historical background of planned agricultural development in Kenya

The table below points out the main historical periods in the development of a formal system of research and innovation in Kenya's agricultural landscape. I start by sketching out technological and institutional innovations in Kenyan agricultural communities before colonial occupation and state formation from the late 19th century. I then highlight the state-led agricultural innovation system in Kenya after European colonial occupation and how different events in Kenya and the world influenced this innovation system. I finally examine the agricultural innovation system from Kenya's independence up to the current status. Within each period, I highlight major events that influenced technological and institutional innovations as well as the innovations themselves and the key actors involved in each period. In addition, I offer reflections on how agricultural innovation within each period is linked with social inclusion or exclusion.

Table 2.1. History of national agricultural research and development in Kenya

Historical period	Key events and state of agricultural innovation	Status of agricultural education, research, and extensio	Key technological and institutional innovations that emerged	Key actors
Before 1903	Agricultural innovation and development organised around various native societies in Eastern Africa	Everyday experiences and experimentations by farmers e.g., for animal breeding and disease management	Indigenous forms of irrigation, pest and disease management and ecosystem preservation Indigenous forms of plant and animal breeding Plantation agriculture of crops such as coconuts and sugarcane to reduce production costs	Farmers and their agricultural/pastoral communities Traders within and across communities and from other world regions
1903 -1930's	British colonial occupation Formation of Kenya as a protectorate Introduction of European settler farmers in Kenya	Establishment of state and private agricultural research facilities and experimental farms across the country	State-led support for agricultural innovation and development Introduction of new crop and animal varieties in East Africa Development and adoption of disease resistant plant and animal varieties	British colonial government Settler farmers from Britain and other European settlers in the 'white highlands' Kenyan farmers in the 'rural reserves' Agricultural research centres
1930's - 1963	Global economic depression War in Europe Drought and famine Locust invasion Political uprisings in the rural reserves Rise in population	Introduction of agriculture in schools Establishments of agricultural research and education centres in the reserves Establishment of agriculture departments and courses in colleges and universities Introduction of agricultural extension	Establishment of agricultural co-operatives and marketing boards Privatisation of land through government legislation Improved varieties of native crops and animals and new production practises in the reserves Promotion of farm mechanisation in the reserves	Colonial government Agricultural education and training institutes and colleges Private agricultural companies and input suppliers Agricultural co-operatives
1963 -1980s	Independence from Britain Land redistribution through sale/ privatization Change in regime Rise in population	Establishment of a national agricultural research institute and expansion of nationwide agricultural institutes Introduction of university degree courses in agriculture	Farm mechanisation promoted by state and non-state actors Establishment of irrigation and resettlement schemes across the country	State agencies Universities and colleges Agricultural training institutes Development agencies International organisations Agricultural co-operatives Large and small farms
1980s -2010	Structural adjustment programmes of the World Bank leading to decline in state support for agriculture Entrance or expansion of new actors in the innovation system such as NGO's and the private sector Rise in population	Decline in the number of farmers training institutes Decline in number of agricultural courses in universities and colleges	Contract farming schemes University -led farmers outreach and extension programmes Privatization of agricultural service delivery and input access	International organisations Private agricultural enterprises and service providers in food production, processing, distribution, and export Universities and colleges State agencies NGOs Agricultural training institutes Larger and small farms

Before 1903: Agricultural innovation within native societies in Eastern Africa

Before 1903, Kenya did not exist as a country. The agricultural production system was organised within various societies that lived in present day Eastern Africa. For instance, along the East African Coast, the Swahili communities cultivated coconut palm, grains, fruits, and root tubers such as sweet potatoes. They also had plantations of coconuts and sugarcane and kept animals such as camel, sheep and goats (Talbott, 1990). The food produced in this region was for local consumption as well as for trade with Chinese, Indonesian and Arab merchants along the coast (Talbott, 1990). In the hinterland, communities such as the Akamba, Kikuyu and Luhya also practised agriculture for both consumption and trade, mainly producing horticultural crops, grains, and root tubers (Talbott, 1990). Pastoral communities such as the Somali and Maasai kept sheep, cattle goats and camels for consumption and also traded their animal produce with the communities that predominantly practised crop production (Nakawuka *et al.*, 2018).

Within the various native communities, agricultural innovation was employed to improve crop and animal yields, manage diseases and pests, and preserve the ecosystem. For instance, Ngigi, (2002) points out that the communities living along the Tana River in present day Kenya practised a system of using flood water for irrigation more than 500 years ago. Communities such as the Swahili practised crop rotation techniques to preserve the soil and control diseases. In the hinterland, crop rotation, various irrigation technologies and shifting cultivation in communal land was employed to manage diseases and soil fertility and to improve crop yields. (Talbott, 1990; Ngigi, 2002; Nakawuka *et al.*, 2018). Pastoral communities such as the Somali and Maasai used indigenous breeding techniques to improve their herds (Mwangi and Rutten, 2012; Nakawuka *et al.*, 2018). Within these native forms of agricultural innovation and development, Talbott (1990) points out that some ethnic communities such as the Kikuyu were distinctively wealthier than others due to access to rich agricultural lands and favourable agricultural weather and climate. There were also distinct roles for women, men and children in relation to agricultural innovation and development as dictated by cultural norms and practises within the communities (Talbott, 1990).

1903 – 1930s: State formation and the marginalisation of native agricultural practises

With British colonial occupation and the subsequent formation of Kenya as a state in the early 20th century, state-driven agricultural innovation and development was initiated in 1903 with the establishment of the Scott Agricultural Station close to Kenya's capital city, Nairobi (Makanda W.D and Oehmke, 1995). The experimental station was designed to carry out research and trials for crops that were of interest

to the colonial government such as wheat, maize and coffee (Makanda W.D and Oehmke, 1995, NACOSTI Strategic Plan, 2018). The colonial government divided agricultural land in Kenya into different zones for different agricultural practises depending on climate and soil fertility (Hodge, 2010). The 'white highlands' were annexed for European settler farmers for the exclusive production of crops that were newly introduced in Kenya and valued for export such as tea, coffee and horticultural crops (Anderson and Throup, 1985). The development of the settler farms was to meet the demand for food as well as raw materials in the expanding food processing industry in Europe (Talbott, 1990). The 'reserves' on the other hand were land or areas of less agricultural value throughout the rural areas of Kenya that was left for settlement and use by Kenyans (Anderson and Throup, 1985; Hodge, 2010). Similarly, in animal production, high breed cattle were exclusively kept in the white highlands while farmers in the reserves and pastoral lands could only keep their local breeds (Chema and Gathuma, 2004).

State-led research was focused on developing and promoting the crops grown in the white highlands. A national plant breeding station at Njoro (present day Egerton University) was set up in 1927 as a response to outbreaks of crop pests and diseases such as wheat rust and locusts and aimed at developing disease and pest resistant crop varieties (Makanda W.D and Oehmke, 1995). A coffee research station and veterinary research station were also established in Ruiru and Kabete respectively to support coffee cultivation and dairy production in the 1920's (Makanda W.D and Oehmke, 1995). The colonial government encouraged formation of agricultural cooperatives and unions in the white highlands mostly for marketing of products such as coffee and milk (Hedlund, 1992). Within the reserves, several experimental stations in large farms were established in Central and Western Kenya, which were the regions with a high native population. However, these experimental centres were understaffed and underfunded and the curricula did not match the conditions and needs of native agriculture (Corry, 1971). There was therefore a dual system of settler agriculture on the one hand and native agriculture on the other hand with government support such as research and education being skewed in favour of settler agriculture during this period (Talbott, 1990). As Heyer *et al.* (1976) note, there was also a significant rise in the native population in Kenyan reserves which put pressure on the available land for agriculture.

1930s – 1963: Plan for commercialisation of smallholder farms in Kenya

The early agricultural development plans in Kenya created a class of marginalised smallholder farmers in the reserves as well as a landless class of labourers for the European settler farms (Hodge, 2010). The great economic depression, effects of war in Europe, drought and famine in Kenya as well as a locust invasion in Kenya

had a profound effect on Kenya's agricultural landscape in the 1930's and 1940's. Agricultural production in the white highlands, which relied on the export market, collapsed while smallholder farmers in the reserves, who relied on the domestic market, thrived due to increased prices in the local market caused by drought and famine (Anderson and Throup, 1985; Berry, 1993; Pearson *et al.*, 1995). These developments empowered the smallholder agricultural class in the reserves and created political rebellions and uprisings and in the reserves to protest against land grabbing and political exclusion by the colonial government (Anderson and Throup, 1985).

As a result of these events, the colonial government developed a strategic plan to support and intensify smallholder agricultural production in the reserves in order to curb political rebellion and stabilise food production (Ochieng, 2007). The Swynnerton Plan, as it was refereed to at the time, involved a series of agrarian reforms implemented between 1954 and 1959 that promoted agricultural commercialisation in rural reserves through conversion of communal land to private land and the introduction of high value crops such as cofree and tea into the rural reserves of Kenya, which hitherto was exclusively grown in the white highlands (Ochieng, 2007; Hodge, 2010). Institutional changes such as dividing agricultural land into zones based on agricultural potential, changing of legislation to allow formation of farmers co-operatives and the training and hiring of African agricultural instructors to replace the European colonial officers were implemented during this period (Talbott, 1990). The aim was to increase income for farmers in rural areas in order to create political stability as well as improve the domestic market for food produced in the settler farms (Talbott, 1990). In marketing, agricultural co-operatives and state marketing boards for various commodities such as maize, coffee, tea, sugar, pyrethrum and dairy were established to regulate domestic prices and improve quality for marketing Kenyan produce abroad (Heyer, Senga and Maitha, 1976; Talbott, 1990; Hedlund, 1992).

During this period, there was also a concerted effort to improve the state of agricultural education and training and elementary, secondary tertiary levels. Agriculture was introduced into the curriculum of primary and secondary schools in order to increase interest in agriculture (Corry, 1971). Experimental farms in the reserves were turned into education centres with Bukura in Western Kenya and Embu in Central Kenya being the first education centres in the reserves to train Kenyan farmers and agricultural officers (Corry, 1971). The curriculum and facilities at the Scott agricultural station in Kabete was also expanded to include Kenyan farmers and students (Corry, 1971). The Egerton Agricultural College was established between 1955 and 1962 as the first agricultural college to offer formal certificate and diploma

courses in agriculture (Makanda W.D and Oehmke, 1995). While it exclusively admitted European students, Kenyan students were allowed into the college from 1962. Agriculture courses were also introduced at Makerere, the main university for African students in East Africa (Corry, 1971). The establishment of a national system of agricultural extension in Britain in the 1940's had a spill over effect in Kenya with agricultural extension being introduced in the country to train Kenyan farmers on issues such as soil management and agroforestry (Corry, 1971; Talbott, 1990).

Anderson and Throup (1985) point out that the agrarian reforms conducted during this period created a rural elite of commercial smallholder farmers who were able to buy and consolidate land for commercial agricultural production. A sub-class of small and subsistence farmers in rural areas who were either landless or were unable to buy land were therefore marginalised from official agricultural development plans (Hodge, 2010). The strategy and support of commercialisation of smallholder farms therefore accelerated agricultural development among farmers who had better resources. It however marginalised a majority of farmers with minimal resources from commercially oriented innovation and development processes (Anthony, 1988; Bebbington *et al.*, 1993).

1963 – 1980s: The post-independence era

After gaining independence in 1963, Kenya embarked on land redistribution measures to transfer most of the European owned farms to Kenyans. Owing to land privatisation measures prior to independence, land was redistributed through market exchanges and the prime agricultural land was either transferred to Kenyans who were able to pay or retained by Europeans thus excluding resource poor farmers from land ownership (Makanda W.D and Oehmke, 1995). The new government sustained the agricultural policies and strategies of the colonial government with agricultural commercialisation being the key objective of public support for agriculture (Berry, 1993). Agricultural innovation was driven by the need to feed the rapidly growing population by improving domestic production to substitute food imports into the country especially for staple foods (Makanda W.D and Oehmke, 1995). In addition, the country's economy was reliant on industrial cash crops such as coffee and tea and therefore needed to sustain and improve production of these crops through innovations such as reforming marketing boards and co-operatives (Berry, 1993).

Large scale infrastructure projects supported by the state and international development organisations such as settlement and irrigation schemes were implemented in various regions in the country in order to stimulate commercial agriculture (Nakawuka *et al.*, 2018). Organisations such as the Food and Agriculture Organisation, World Bank and the British Development Agency promoted technology adoption by farmers in the

country through various projects (Anthony, 1988). The country promoted agricultural mechanisation such as use of on-farm machinery and irrigation technologies as part of its development plans (Nakawuka *et al.*, 2018; Mgendi, Shiping and Xiang, 2019). The role of agricultural education was to train farmers and students of agriculture as a source of self-employment and to train agricultural experts who would replace the European agricultural officers who had left the country after independence (Ngugi *et al.*, 2002). Various agricultural training institutes were established during this period to offer certificate and diploma training in agricultural courses such as general agriculture, animal health and range management (Heyer, Senga and Maitha, 1976; Ngugi *et al.*, 2002). The first degree programme in agriculture was also established in 1968 at the University of Nairobi (Ngugi *et al.*, 2002). The Kenya Agricultural Research Institute (KARI) was established in 1977 as a national research institute to carry out research and promote industrial crops and food crops and a national system of extension was also established around the same period (Cuellar *et al.*, 2006; Miruka *et al.*, 2012).

In 1978, there was a regime change after the death of Kenya's first president. The new regime was less focussed on commercialisation and state-led agricultural research and innovation targeted the majority of farmers and food distributors in rural areas and informal sector of urban areas who were marginalised to a large extent from official development planning (Makanda W.D and Oehmke, 1995). The government intervened to have small farms represented in the Kenya Farmers Association and had government research and extension expanded to include targeted support for resource poor farmers (Makanda W.D and Oehmke, 1995). Participation of farmers in agricultural research training and extension through methods such as train and visit, participatory research and farmers field schools also emerged in this era as the needs and interests of small holder farmers became a priority (Karlsson, Sundberg and Wigren, 2001). As a result of the close contact between researchers, extension officers and farmers, it was realised that smallholder farmers were not a homogeneous category and categories such as model farmers and laggards were identified (Karlsson, Sundberg and Wigren, 2001). Self-exploitation such as such as through use of child labour and as a result of gendered division of labour was noted within smallholder farms during this period (Talbott, 1990).

1980s -2010s: The structural re-adjustments era

From the 1980's onwards, there was a sharp decline in state support for agricultural research, innovation and development owing to structural re-adjustment policies of the IMF and World Bank (Chema and Gathuma, 2004; Hodge, 2010). While government expenditure in agriculture was 11.2 % of the country's total revenue in 1986, this had dropped to 4.9% by 1992 (Ngugi *et al.*, 2002). This gap was filled by the private sector,

various development agencies and NGOs that emerged as prominent organisations in agricultural research, extension, technology development, agricultural finance and provision of farm inputs (Chema and Gathuma, 2004; Birner and Resnick, 2010; Banks, Hulme and Edwards, 2015). Since agricultural policy before structural adjustments had been focussed on farmers with little resource endowments, the new actors in Kenya's agricultural innovation system experimented with diverse ways of tackling the issue of social inclusion. Within the private sector, **c**ontract farming schemes that aimed to include smallholder food producers in global markets for high value crops such fruits, vegetables and flowers while simultaneously reducing production risks for the companies that bought the produce for the farmers were introduced (Grosh, Little and Watts, 1996; Dolan, 2005). Development agencies, NGO's and international research organisations also promoted participation in agricultural research and development by farmers that were marginalised due to resource or gender constraints (Karlsson, Sundberg and Wigren, 2001; Songok, Kipkorir and Mugalavai, 2011; Cristóvão, Koutsouris and Kügler, 2012). As new the actors emerged, agricultural innovation was expanded beyond food production to include other aspects of agriculture such as environmental conservation and nutrition security (Christoplos, 2010; Juma, 2011).

The receding state support for agricultural innovation and development was also manifested in agricultural education and extension in Kenya. There was a decline in farmers training institutes and agricultural courses across the country. Egerton University for instance reduced its number of agricultural courses to only 4 in 1998 from 14 in 1974 (Ngugi *et al.*, 2002). However, Kenya's population had risen threefold from about 10 million at independence to about 30 million by 1998 which created a need to expand agricultural education and training as a means to provide a source of livelihood to the rising population (Ngugi *et al.*, 2002). New agricultural colleges and vocational training institutes such as the Jomo Kenyatta College of Agriculture and Technology, the Bukura Agricultural College and the Dairy Training Institute were established during this period. Universities such as Moi, Egerton and Nairobi also set up agricultural extension and outreach facilities and programmes to improve adult education and advisory services for farmers in the country (Ngugi *et al.*, 2002).

In 2010, Kenya adopted a new constitution after a successful referendum that created a devolved system of government. Through the County Governments Act (2012) forty-seven semi-autonomous administrative counties were created in the country to decentralise policy making and implementation processes to local governments. In agriculture, various functions previously offered by the federal government such as agricultural extension and advisory services was devolved to the local governments.

There were also local independent agriculture ministries and departments within the counties (Republic of Kenya, 2012a). In addition, Kenya also became a signatory to various regional and global treaties on food production, distribution, and consumption. Currently, the agricultural innovation system in Kenya is composed of a variety of actors with different backgrounds and interests including the national government, local governments, private providers of agricultural technologies, inputs and services, NGOs, universities and research institutes (Christoplos, 2010; Hunsberger, 2010; Opola *et al.*, 2021).

Forms of social inclusion and exclusion within the historical periods

In summary, planned and unplanned innovation and development in Kenyan agriculture has historically been linked to the existence of the smallholder farming system in rural areas and strategic actions aimed at achieving political goals. On the one hand, earnings from agricultural commercialisation created political and economic capital for rural peasants in Kenya during British colonial occupation. On the other hand, both the colonial and independent governments in Kenya used state-led agricultural research and innovation as a tool to achieve specific political goals such as calming peasant rebellions and acquiring political support. For most of Kenya's history therefore, the intention to include rural smallholder farmers in agricultural research and development has not been out of egalitarian goals but as means to achieve strategic policy objectives by incumbent government regimes. Table 2.2 below highlights various forms of social inclusion and exclusion in Kenya's agricultural innovation systems as well as the agendas pursued by the state across different periods.

Table 2.2. Forms of social inclusion and exclusion across different periods in history

Historical period	Objectives of agricultural innovation strategies	Reflection on forms of social inclusion or exclusion in agricultural innovation
Before 1903: The native innovation era	Agricultural innovation within ethnic communities for purposes such as irrigation, controlling pests and diseases and improving animal herds.	Some communities were wealthier due to favourable climatic conditions for agriculture and there had better access to resources for innovation
1903 – 1930s: Marginalisation of ethnic agricultural practises	Promoting European settlement in Kenya Creation of economic value from agriculture for the colonial government in Kenya Meeting the demand for food in Europe	Agricultural land was divided into prime agricultural land occupied by British settlers and the reserves of lower agricultural quality occupied by Kenyans thus creating a marginalised rural class Agricultural innovation and research were exclusively focused on improving the agricultural practises in the settler farms Inferior agricultural education system for natives compared to settlers
1930s -1963: Intensification of smallholder agriculture	Calming political rebellions Stabilising agricultural production in the country Meeting the demand for food for the growing population	Government support and extension focused on addressing the challenges in the previously marginalised reserves Skewed focus of government support for agricultural development in regions areas such as Central Kenya and Nyanza due to political patronage Land consolidation and privatisation created a rural elite and a land-deprived class of rural farmers in rural areas leading to exclusion from resources needed for agricultural innovation for the latter Inclusion of small farmers through institutional innovations such as marketing boards to stabilise prices
1963 – 1980s: The post-independence era	Stabilising agricultural production in the country Meeting the demand for food for the growing population Meeting the needs and interests of farmers with little resource endowments	Division among farmers made apparent based on affordability and access to land, agricultural inputs, and technologies Inclusion of commercially oriented small farmers through state-led irrigation and resettlement schemes Research targeted to small farmers through extension and rural based agricultural training centres Exclusion of smallholder farmers with little resource endowments Gender based inclusion and exclusion within farming communities
1980s to 2010s: Structural re-adjustment and integrated agricultural development era	Use of agriculture to achieve multiple objectives such as food production, environmental conservation, nutrition security and gender empowerment	Initiatives to include smallholder farmers in market-oriented agricultural development programmes Exclusion of farmers with little resource endowments from initiatives such as contract farming schemes Gender balanced agricultural development initiatives

Initially, smallholder farms in rural areas were considered insignificant to the colonial government's agendas for agricultural innovation and development. However, global events such as war and economic depression has a profound effect on the agricultural innovation system in Kenya and forced state-led support for agricultural innovation and development to refocus their efforts on the smallholder sub-sector which had ironically been resilient because they had been marginalised from the export market. The policy of commercialisation of smallholder farms and political patronage in innovation support, which was continued after independence created subgroups within smallholder farmers. Farmers and farming communities that had political and economic capital were able to accumulate and utilise land, farm inputs and agricultural technologies and agricultural knowledge offered by the state, private enterprises, and other actors in Kenya's agricultural innovation system. Farmers with minimal resource endowments were excluded from this commercially oriented innovation and development even though there was a brief period of state support for this particular group of farmers in the 1970s and 1980s. The typology of farms in Kenya based on the ability to access and use research, technologies and knowledge that was created during various periods in Kenya's history is likely to be prevalent in the present agricultural innovation system in Kenya.

Current state of agricultural research, innovation, and development in Kenya

I now turn focus to the current agricultural innovation system in Kenya. Within this system, I examine the four key domains outlined by Rajalahti *et al.* (2008): Demand, education and research, enterprise and intermediary. First, I unravel the state of demand for skills, technologies and other inputs required for agriculture as well as the demand for agricultural outputs. Secondly, I examine the state of agricultural research, education, and extension in Kenya. Third, I map out the enterprise domain, which consists of concreate innovative activities conducted by different actors such as farmers and enterprises that support agriculture such as through providing agricultural skills or technologies. Finally, I examine the state of intermediary functions in agriculture such as agricultural extension and support for agriculture through various programmes and networks.

The demand domain

Kenya's population has grown significantly over the past several decades. Agricultural innovation is therefore necessitated by a domestic demand for food. In the cities and towns, rural to urban migration has led to a necessity for affordable and nutritious food leading to new ways of producing and distributing (Ayuya, Soma and Obwanga, 2021). In some rural areas, such as the arid and semi-arid lands, food

insecurity remains a challenge as some households are not able to produce or purchase adequate food. New and improved animal husbandry and crop cultivation practises are therefore needed and promoted in order to improve food production and counter the effects of climate change (Republic of Kenya, 2012a; MoALF Kenya, 2021c). Food and nutrition security is one of the current priority agendas by the Kenyan government and is cited as a reason for the transformation of the food system in the country to be more efficient and reliable (Zougmoré *et al.*, 2021, Rebublic of Kenya, 2021). Beyond the domestic demand for food, agricultural research and innovation in Kenya is also driven by the export market. Agriculture remains a primary source of revenue for the government with the export of agricultural commodities such as tea and horticultural products accounting for over 60% of the country's total exports (MoALF Kenya, 2021c)

Agricultural production in Kenya has also stimulated a demand for commodities and services used to produce and distribute food such as farm tools and machinery, irrigation equipment, farm inputs, transportation vehicles and food preservation equipment (MoALF Kenya, 2021c). Kenya's policy discourses on agricultural commodities and services are centred on social equity. In line with the Agriculture and Food Authority Act 2013, the Kenyan government promotes equitable access to infrastructure, farm machinery and other commodities needed for agricultural production through various projects and programmes. The country is also guided by the Vision 2030 strategic plan which aims to facilitate access to infrastructure such as irrigation dams and food storage facilities to all farmers to enhance food and nutrition security (Republic of Kenya, 2021). Current state-led projects include the Agricultural Sector Development Support Programme, the Kenya Climate Smart Agriculture Programme as well as a variety of projects designed and implemented by local governments' agriculture departments (MoALF Kenya 2021a, MoALF Kenya, 2021b). The programmes are meant to assist farmers with minimal resources and in remote areas to meet the demand for agricultural production tools and equipment such as irrigation technologies as demonstrated by one of its missions below:

"This sub-component supports community micro-projects identified through community participation in seventeen semi-arid and medium to high potential project counties. This includes improving water and soil investments, promoting livelihood and crop diversification, dairy farming, and agro-forestry as well as small scale farmer managed irrigation schemes." (MoALF Kenya, 2021b).

The education and research domain

Various organisations in Kenya have been involved in agricultural research and education in Kenya (Saina *et al.*, 2012). Table 2.3 below outlines the key legislations

that guide agricultural research in the country and the objectives they aim to achieve.

Table 2.3. Overview of laws and policies on innovation and social inclusion in Kenyan agriculture

Legislation/policy	Organisation	Objective
Science Technology and Innovation Act 2013 STI policy	Kenya Government	Create organisations to co-ordinate research and innovation and align it to the governments social and economic policies Establish a fund to finance innovation in the country
Kenya Agricultural and Livestock Research Act 2013 NARS policy, 2012, KALRO Strategic Plan, 2017 – 2021)	Kenya Government	Harmonise research on agriculture and livestock and align it to the government's strategic objectives on agricultural research Foster equitable access to agricultural research and technology in the country
The Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods (2014)	African Union	A commitment by African States to invest in agricultural research as a means to equitable prosperity in the continent
UN Sustainable Development Goals	United Nations	A pledge by member states of 'leaving no one behind' in development initiatives in various sectors such as education, health, energy, and agriculture

The Science and Technology Act: 2013 by the Kenyan government established organisations such as the National Commission for Science Technology and Innovation, the National Research Agency and the and the National Research Fund to co-ordinate and finance research and innovation as well as align them to the government's economic and social policies. In addition, the Kenya Agricultural and Livestock Research Act: 2013 were created to promote and harmonise research and development in the agricultural sector and lead to the transformation of the Kenya Agricultural Research Institute (KARI) to the Kenya Agricultural and Livestock Research Organisation (KALRO). A key rationale of these acts was equitable access to and benefits of various research activities. Section 5 of the Kenya Agricultural and Livestock Research Act: 2013 for instance stipulates that one of the functions of agricultural research and development in the country shall be to *"expedite equitable access to research information, resources and technology and promote the application of research findings and technology in the field of agriculture."* Kenya is also a signatory to continental policies and charters such as the African Unions Agenda 2063 and the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods which stipulate that at least 10% of the county's budget shall be spent on agricultural research (African Union Commission, 2014) In addition, it has committed to the United Nations Sustainable Development Goals as a member state which promotes equitable access to education as one of its goals. The country's domestic policies on agricultural research and education are therefore aligned to continental and global goals that prioritise innovation in various

sectors such as agriculture that led to equitable development.

Agricultural research in the country is carried out by a variety of public research institutions for specific agricultural sectors such as fisheries, livestock and crops under the umbrella of the Kenya Agricultural and Livestock Research Organisation in addition to research carried out by universities in and outside the country, international research organisations, NGOs and private agricultural enterprises (Birner *et al.*, 2009; Christoplos, 2010; Republic of Kenya, 2012a). Concerning agricultural education, Kenya recently embarked on efforts to decolonise and reform its education system and has adopted a new competency-based curriculum within elementary, secondary and tertiary levels of education that aims at aligning education to the social and economic needs and contexts of the country (Gichuru *et al.*, 2021; M'mboga, 2021). In agriculture for instance, the curriculum introduced to Kenyan education institutions during the colonial period was meant to serve colonial interests and the new curriculum is meant to be aligned to the needs of Kenyan farmers (Gichuru *et al.*, 2021).

At tertiary level, there are 27 agricultural technical and vocational education and training centres (ATVETS) across the country offering a variety of agriculture related certificate and diploma courses (Egeru, Mungai and Adipala, 2018). A number of universities also offer agriculture related diploma and degree courses as well as post-graduate studies in agriculture related fields (Egeru, Mungai and Adipala, 2018). Various research and education institutions in Kenya are promoting and experimenting with ways of including farmers with little resource endowments in the benefits and processes of agricultural education and research in the country (Republic of Kenya, 2012b, 2012a; Adekunle, A *et al.*, 2013). For instance, it has been realised that smallholder farmers have a detailed knowledge of aspects of innovation such as identification of local pests and diseases which should be included in formal agricultural research and education initiatives (Ponge, 2011).

The enterprise domain

Concrete innovative activities and functions are conducted by various actors within Kenya's agricultural innovation system. These include the typical actors mentioned in agricultural innovation systems literature such as farmers, input suppliers, food distributors, food processors, financial institutions and technology developers (Christoplos, 2010). The role of these actors in the enterprise domain is to take risks and use existing knowledge and skills to solve various challenges related to the production and distribution of food (Hekkert *et al.*, 2007; Rajalahti, Janssen and Pehu, 2008). Kenya has a large informal agricultural sector in a predominantly smallholder farming system where farmers innovate through use of both codified

and tacit knowledge and learning by doing to solve the challenges that they face (Karanja, Kamau, Macoloo, Righa, van Veldhuizen, *et al.*, 2017). Such farmers are innovative and entrepreneurial in developing and applying various solutions to the challenges that they face. Research done by Ponge (2011) for instance revealed that farmers in Western Kenya employed traditional means of preserving harvested grains and indigenous vegetables using readily available resources such as sun drying the use of ashes.

There also exists agricultural enterprises in Kenya that provide various products and services such as farm inputs, agricultural advisory services, and agricultural technologies to farmers in Kenya, some of which target smallholder farmers. Under the banner of 'inclusive business' or 'social entrepreneurship', private agricultural business enterprises in Kenya are involved in initiatives to deliver goods and services to small-holder farmers which they would otherwise not afford (Wangu, Mangnus and van Westen, 2020). One of the key areas where private enterprises has been active in Kenya agriculture is the development and application of information and communication technologies (Onsongo and Schot, 2017). Communication devices and applications have been particularly useful in enhancing access to information such as on food prices, weather forecasts, management of pests and diseases and soil testing and management (Aker, Ghosh and Burrell, 2016). Banks such as Equity and micro credit lending institutions have also developed financial services and credit facilities that are tailor made to the needs of farmers in rural areas and it considered a means by which farmers such as the youth with minimal resources can access credit and other services that support food production and distribution (Benni, Berno and Ho, 2020).

The intermediary domain

While agricultural research in Kenya is promoted, controlled, and facilitated by the national government, the sharing of research and knowledge such as through extension and advisory services is under the responsibility of the various county governments. Each of the forty-seven counties in the country has semi-autonomous agriculture departments and develop their own by-laws, agricultural development projects and extension programmes and are at liberty to partner with other actors such as universities, development agencies and international organisations in executing their mandate (Republic of Kenya, 2012a). Knowledge from government research institutes is therefore disseminated through extension programmes and officers located in rural communities and towns (Muatha, Otieno and Nyikal, 2017). Agricultural research universities such as Egerton University and the University of Eldoret also have farmers outreach and extension programmes that are aimed at making knowledge produced by universities accessible and useful particularly

to small farmers with minimal resources (B. Bebe, 2019 personal communication, 18 July). In addition, various platforms and networks also exist to enable farmers with minimal resources to access agricultural skills and technologies (Katothya et al., 2020; Kilelu et al., 2021). Other means of sharing knowledge include media such as newspaper articles and television programmes, ICT applications and peer to peer learning among farmers through exchange visits (Muyanga and Jayne, 2006; Clarkson *et al.*, 2018).

Farm innovation and entrepreneurship in Kenya is supported by other actors such as NGO's, development agencies and the state. Such support may target farmers who are identified to be excluded from the benefits of innovation such as the women or the youth as the government document below illustrates:

"The path to achieving these outcomes must address the unique challenges and opportunities for women and youth in the sector by incorporating tailored opportunities for these groups as an integral part of delivering the ASTGS. Women comprise more than half of Kenya's population, youth between 18-35 comprise ~35%, but these two groups are underrepresented in agriculture and as a result do not receive full benefits of participation in the sector" (MoALF Kenya, 2021c: 21).

In summary, all the four domains of an agricultural innovation system are well attained with a high demand for agricultural inputs and outputs, a vibrant and extensive education and research system and an enterprise and intermediary domains a wide variety of actors and practises. In the section below, I examine how these features relate to forms of social inclusion and exclusion within the country's agricultural innovation system.

Forms of social exclusion within the current agricultural innovation system in Kenya

The major agrarian reforms conducted just before independence such as privatisation of land, formalisation of marketing cooperatives, creation of state marketing boards, and the creation of agricultural colleges and training institutes had the most profound impact on Kenya's agricultural innovation policy and strategies. The reforms were focussed on commercialisation of agriculture and targeted farms which had significant land and capital to produce and distribute food in contrast to neighbouring Tanzania which pursued a strategy of supporting all types of farms. Though Kenya experienced accelerated economic growth because of agricultural commercialisation strategies, the side effect was an exclusion of small farmers who had little resource endowments of less political capital. Social inclusion and exclusion in agriculture is therefore mainly related to wealth inequality and the ability of small farms to benefit and participate from agricultural innovation. Table 2.4 below highlights forms of

social exclusion within Kenya's agricultural innovation system

Table 2.4. Forms of social exclusion within Kenya's current agricultural innovation system

AIS Domain	Forms of social exclusion
Demand	Exclusion of some farmers from commodity and financial markets and from fully participating and benefiting from high value supply chains
Enterprise	Marginalisation of indigenous forms of innovation such as on-farm trials and experimentations from mainstream innovation practises
Research and education	Elitist forms of research and education that focus on farmers and students with better resources Marginalisation of indigenous forms of knowledge
Knowledge intermediaries	Power asymmetries within the agricultural innovation system that marginalises some actors such as small farmers. Fragmented link between research and extension

In the demand domain, farmers with little resource endowments are excluded from accessing and utilising certain commodities and services that are used in food production and distribution such as raw materials, farm inputs or production and distribution technologies that are available in Kenya (MoALF Kenya, 2014). This is because they are not able to afford them, or they do not find them suitable for their contexts. At the enterprise domain, the innovative practises initiated by actors in marginal areas such as farmers in rural areas or pastoral communities are often unrecognised or neglected due to their informal nature and therefore excluded from official agricultural development and innovation plans (Karanja, Kamau, Macoloo, Righa, van Veldhuizen, *et al.*, 2017; Tambo and Wünscher, 2017). At the research and education domain, research and knowledge produced by organisations such as universities and agricultural research institutes may be either incomprehensible or unaffordable to certain farmers such as those who practise small-scale farming. Additionally, formal research and knowledge is given precedence over indigenous forms of knowledge (London, Anupindi and Sheth, 2010; Santiago, 2014). At the domain of intermediaries, social exclusion occurs when networks and collaboration between different actors are impeded by power asymmetries when some actors dominate the agricultural innovation system while others remain dormant (Mdee *et al.*, 2020). Exchange of knowledge between various actors therefore become a challenge.

Discussion and conclusions

The Kenyan agricultural innovation landscape has been changing over time influenced by both planned and unplanned events. While these changes were sometimes planned to achieve certain objectives, other times it was unplanned and was as a result of unexpected global or domestic events. During colonial occupation, agricultural innovation was mainly driven by a technology transfer paradigm where

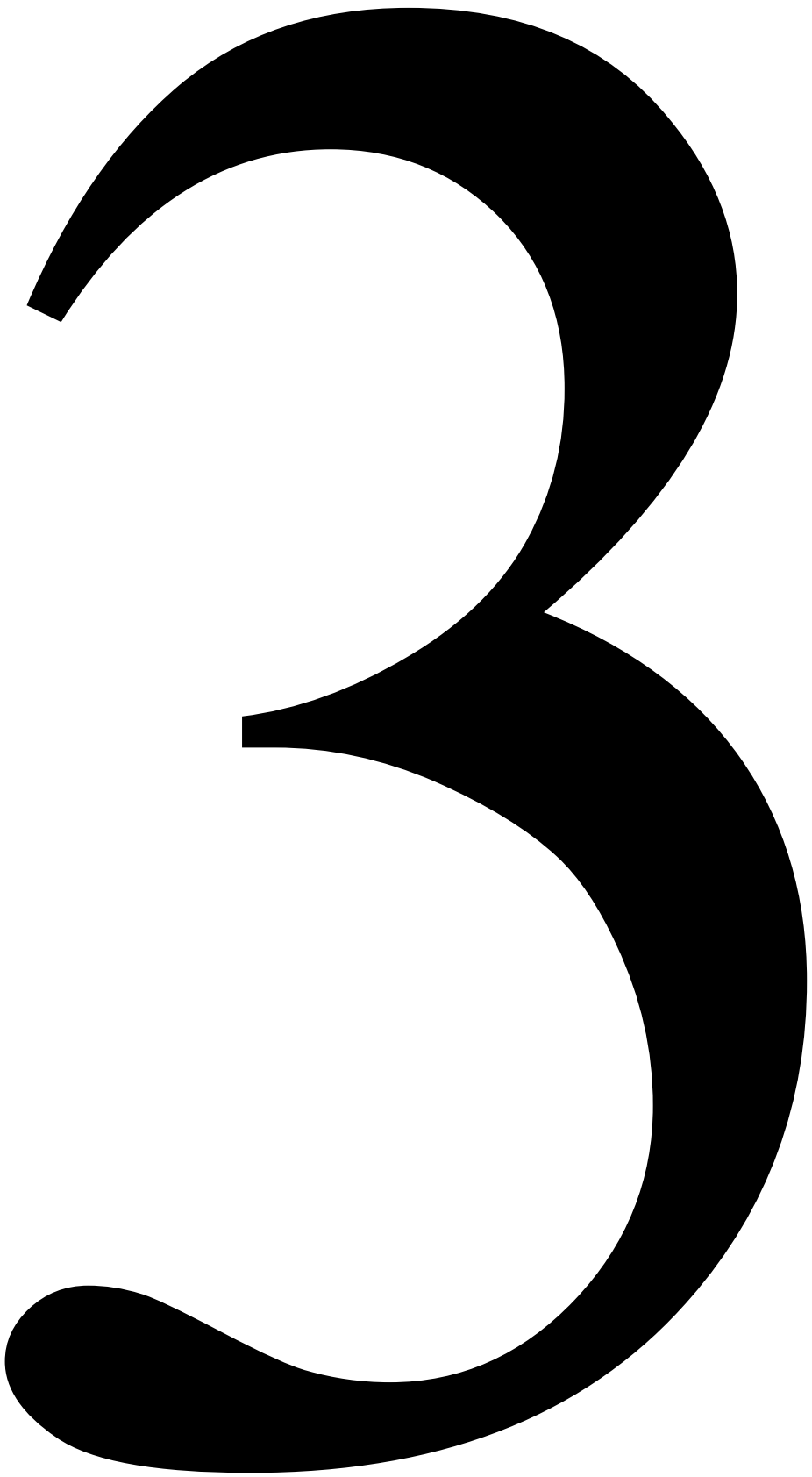
the state used innovation as a means to achieve its political and economic goals. Technologies, skills, and financial support was therefore transferred to European settler farmers in Kenya who were assumed to have the capacity to produce enough food for export and exploit the agricultural potential of the country for economic gain. Events such as war, famine, global recession, and a locust invasion created a change in the innovation paradigm with previously neglected smallholder production systems proving to be resilient and important for the country's food security and the state's development plans. This confirms Hall *et al.*'s (2006) proposition that agricultural innovation is influenced by a variety of drivers, actors and institutions. In this analysis, I have shown that non-human actors such as a locust invasion or drought can play a key role a driver on an innovation system and can influence towards pathways that were not pre-envisioned.

The implication of this is that an innovation system may become inclusive or exclusive either by design or through unplanned change. An innovation trajectory can influenced by funding priorities and interests of powerful actors such as the state (Vanloqueren and Baret, 2017). However, as van Woerkum *et al.* (2011) pointed out, change does not only occur through a planned trajectory of events and unforeseen events or circumstances may create change in unexpected ways. An unexpected pathway may therefore emerge from the fringes of the broader innovation system as a result of experimentation with new forms of knowledge, skills or technologies to solve unforeseen or overlooked challenges (Pigford, Hickey and Klerkx, 2018) (Pigford, Hickey and Klerkx, 2018). Kenya's history with agricultural innovation and development demonstrates that such a pathway was created during Kenya's colonial occupation for the inclusion of smallholder rural farms in the broader system of actors and institutions involved in agricultural innovation because the smallholder farmers proved to be instrumental in stabilising agricultural production in the country after the impacts of war, global recession, locust invasion and famine.

However, even though previously marginalised smallholder farmers in rural reserves were later included in the processes and benefits of agricultural research, education, and development, it was under the condition that they would contribute to economic development and therefore focussed on farmers who were better off within this group. Kenya therefore inherited and elitist and exclusionary system of agricultural research, education and development which has persisted in the present-day agricultural innovation system. Innovation paradigms are still mainly driven by the interests of powerful actors within the system despite efforts at social inclusion (Mdee *et al.*, 2020; Osumba, Recha and Oroma, 2021). Looking at Kenya's history and current status of agricultural innovation, the biggest concern on social inclusion is that of smallholder food producers and how this particular group or certain

subgroups within them can be included in the process and benefits of agricultural innovation. Attempts to include small holder farmers within this system has been a challenge as demonstrated by scholars such as (Mdee *et al.* (2020) and Eidt *et al.* (2020) who find that current attempts to include farmers with minimal political or economic power in the participation, control and benefit of agricultural research, education, extension and development have not bore much fruit. Though the country currently experiments with ways to decolonise and restructure its agricultural research, education, extension, and development to make it comprehensively inclusive, which group of farmers are to be included in the process and benefits of agricultural innovation, how and with what results remain unclear.

In conclusion, I have highlighted the key transitions in Kenya's agricultural innovation journey, from the pre-state times to the current devolved system of government. Over various periods, the state has played a key role in agricultural innovation and development and inclusion and exclusion of various groups of farmers in such state led support has been based on the needs and interests of respective regimes. I find that while innovation is sometimes planned and structured, other times it is sporadic and takes unexpected turns due to random events to which it must respond. The reaction influential actors such as of the state to such events may therefore create an innovation pathway that may lead to either social inclusion or exclusion of certain groups of actors within the system. Inclusive innovation can be attained either intentionally through a planned course of events or accidentally as response to unplanned events. However, the terms under which both planned and unplanned inclusion in innovation processes and outcomes is understood and realised should be questioned given the historical roots of social exclusion. There is therefore a need to evaluate the current discourses on inclusive innovation to understand the problems being addressed and the solutions being recommended. There is also a need to explain how social inclusion is currently practised and assessed as a vice within Kenya's agricultural innovation system and how useful such approaches are to the farmers that they target. These issues are the subject of the subsequent chapters in this thesis.



Chapter 3

The Hybridity of Inclusive Innovation Narratives between Theory and Practice: A Framing Analysis

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Abstract

Inclusive innovation remains an under-conceptualised and ambiguous concept despite garnering political and academic interest in recent decades. This paper explores the narratives of inclusive innovation that exist in literature and how these are framed in practice, using a case study of the Kenyan agricultural sector. Findings indicate that while there is significant similarity between the theoretical and empirical framing of the concept, there are also stark differences. In addition, different actors such as the state, development agencies, the private sector or universities do not fully ascribe to any of the existing theoretical narratives on inclusive innovation. Instead, they frame it based on their own contexts, mandate and interests using concepts borrowed from existing theoretical narratives. This indicates that instead of a grand theory of inclusive innovation that applies universally, there are several ways of enacting inclusive innovation. This also limits the transferability of a one-size-fits-all model of inclusive innovation.

Introduction

Innovation can be conceived as a process of change, where new or modified knowledge, expertise, social arrangements or technologies are applied to solve various challenges in society (Kilelu, Klerkx and Leeuwis, 2014; Swaans *et al.*, 2014). The significance of innovation in providing solutions to social problems such as income inequality and food insecurity has been emphasised in the recent past (Banks, Hulme and Edwards, 2015; Baud, 2016; Rip, 2018). For instance, the African Union's Agenda 2063 acknowledges that the achievement of the continent's development goals is linked to innovation in critical areas such as agriculture, health and energy (African Union Commission, 2014). However, there have been concerns over the exclusive nature of the innovation process and its tendency to marginalise actors with less resource endowments (Chataway, Hanlin and Kaplinsky, 2014). As a response, the past few decades have witnessed an emphasis on innovation processes that are compatible with the constraints and opportunities that are faced by those who are side-lined in the innovation process such as individuals and organisations in the informal sector, in remote areas or those with little resource endowments (Chataway, Hanlin and Kaplinsky, 2014; Heeks, Foster and Nugroho, 2014; Kanu, Salami and Numasawa, 2014). Such a process has been captured in concepts such as social innovation (Altuna *et al.*, 2015), frugal innovation (Knorringa *et al.*, 2016), bottom of the pyramid innovation (Prahalad, Di Benedetto and Nakata, 2012; Peredo, Montgomery and McLean, 2017), pro-poor innovation (Stott and Tracey, 2018), grassroots innovation (Smith, Fressoli and Thomas, 2014; Hossain, 2016) or more broadly, inclusive innovation (Chataway, Hanlin and Kaplinsky, 2014; Heeks, Foster and Nugroho, 2014; Pansera and Owen, 2018), the term which will be henceforth used in this paper.

The concept of inclusive innovation is perceived as a new paradigm within development narratives (Pansera and Owen, 2018). However, despite the increased usage of the term, it remains an ambiguous concept with multiple interpretations from different political actors and academic disciplines (Pansera and Owen, 2018). This has significant implications as theoretical models usually influence how development policy and interventions are designed and implemented (Bryden *et al.*, 2017; Godin, 2017). For instance, multi-stakeholder partnerships may be hindered by actors who adhere to different logics with varying normative assumptions and values when perceiving a problem or solution (Levidow and Papaioannou, 2017; Osei-Amponsah, van Paassen and Klerkx, 2018). A study of development co-operation between Brazil and Ghana revealed that within the partnership, Brazil's government was concerned with low tillage conservation agriculture while in contrast, the Ghanaian government was keen a pathway that led to a highly mechanised agriculture (Cabral, 2016). It has

been suggested that an elaborated theory of inclusive innovation is required in order to accommodate all the differing logics and perspectives regarding inclusive innovation and the problems and solutions that are being highlighted (Klochikhin, 2012; Gupta, Pouw and Ros-Tonen, 2015).

In communication sciences literature, it has been pointed out that through language and symbols, individuals and organizations highlight certain aspects of an issue either due to their backgrounds and experiences or because they would like to promote a certain interest or agenda (Entman, 1993; Cacciatore, Scheufele and Iyengar, 2016). In line with framing literature that explores this discursive process (Dewulf *et al.*, 2009), it can be expected that there exists different narratives about inclusive innovation. Gee (2004) defines a narrative as the linguistic device through which people make sense of the problems that concern them and their attempts to resolve these problems. A narrative of inclusive innovation therefore includes how exclusion is constructed as a problem within the innovation process and what solutions innovation can provide for inclusion. There is limited systematic analysis of what these narratives are both in theory and empirically as well as their implications for innovation and social inclusion practises (Pansera and Owen, 2018). This is the knowledge gap that this paper aims to address.

Using framing analysis (Entman, 1993; Dewulf *et al.*, 2009) as a methodological guide, we explore the narratives of inclusive innovation that exist in literature as well as within the Kenyan agricultural sector. We focus our analysis on the Kenyan agricultural sector for three reasons. First, it is characterised by diverse organisations that are engaged in development or modification of knowledge, technologies and social arrangements including state agencies, NGO's, research institutions, and commercial enterprises (Christoplos, 2010; Banks, Hulme and Edwards, 2015). We use 'organisations' as a broad concept that encompasses these types of actors. Secondly, social inclusion is one of the key anchors in the current government 10-year strategic plan for agriculture in the county that stipulates how the sector can transformed to benefit more that 3 million farming households and increase the resilience of farmers in areas with poor climate (MoALF Kenya, 2021c). Finally, the sector is dynamic and unpredictable with new approaches to innovation and social inclusion being experimented by different public and private organisations (Kilelu, Klerkx and Leeuwis, 2014). Our aim is to answer the following two questions: a) How is inclusive innovation framed by organisations in the Kenyan agricultural sector? And b) How do these empirical frames relate to existing theoretical narratives about inclusive innovation?

In the next section, we provide a detailed analysis of how the concept of inclusive

innovation is framed in existing literature in order to develop an analytical framework for exploring the empirical framing of the concept.

Three theoretical narratives of inclusive innovation

Though the social consequences of innovation has been a long standing concern (Tracey and Stott, 2017), the concept of inclusive innovation has garnered interest in development and innovation literature over the past two decades (Chataway, Hanlin and Kaplinsky, 2014; Pansera and Owen, 2018). We identify three distinct narratives that have emerged regarding how the concept is framed or defined: A bottom of the pyramid (BOP) narrative, a grassroots narrative, and a political economy narrative as summarised in Table 3.1 below.

Table 3.1. Summary of the narratives on inclusive innovation

	What is the problem?	Causes of exclusion in the innovation process	Recommended solutions for inclusion
The BOP narrative	BOP actors are partially or wholly excluded from commodity, financial and labour markets.	Material and immaterial resource scarcity at the BOP Lack of interest in the BOP market segment by commercial firms	Capacity building and creating market linkages at the BOP Co-innovation with BOP producers and consumers by actively engaging them in the innovation process
The grassroots narrative	Top-down interventions have led to the exclusion of innovation processes initiated and managed by grassroots actors	Emphasis and dependence on formal and scientific knowledge, technologies and practises thus excluding other types of knowledge and practises.	Facilitating innovation processes initiated and managed by local actors Empowerment of grassroots communities and organisations Decentralised governance structures
The political economy narrative	Current innovation processes occur within unequal social structures thus exclude powerless actors	Unequal power relations and social hierarchies between different actors involved in the innovation process Cultural and social rules, norms and practises that exclude certain actors from the innovation process.	Empowerment of individuals and organisations that are excluded from the innovation process. Change in existing laws and policies and governance structures to enable inclusion

The BOP narrative

The problem of exclusion: This narrative stipulates that producers and consumers at the bottom of the economic pyramid have been neglected by the private sector due to minimal returns (Prahalad, 2005; Danse *et al.*, 2020). Common in business and management literature, it considers the problem of exclusion as the hindrance BOP actors face from actively participating in commodity, labour, financial and other markets either as producers or consumers (Chataway, Hanlin and Kaplinsky, 2014; Knorringa *et al.*, 2016; Higgins and Richards, 2019).

Causes of exclusion: Resource scarcity at the BOP is thought to be a key reason for their exclusion from the innovation process. It's argued that innovation is a skill and capital intensive process and that BOP consumers and producers lack the material and immaterial resources for innovation (Pansera and Sarkar, 2016; Pansera and Martinez, 2017). In addition, it is pointed out that private companies have shied away from the BOP market segment due to low returns on investment thus excluding them from various markets (Prahalad, 2005).

Recommended solutions: Inclusive innovation within this narrative is perceived as how the challenge of resource constraints at the BOP can be overcome through market-based solutions that link BOP actors to existing markets. Concepts such as frugal innovation and social entrepreneurship (Knorringa *et al.*, 2016; Venot, 2016; Higgins and Richards, 2019) that emphasise the role of multinational and local business enterprises in providing solutions to resource constraints at the BOP emerged from this literature. A new strand of BOP literature goes beyond provision goods and services and emphasises co-innovation with BOP actors as a way to include them in the innovation process (Simanis and Hart, 2011; Chataway, Hanlin and Kaplinsky, 2014).

The Grassroots narrative

The problem of exclusion: According to this narrative, the problem is that innovation processes prioritise formal or 'scientific' knowledge and practises over local or informal forms of knowledge and practises (Fressoli *et al.*, 2014; Pansera and Martinez, 2017). For instance skills, knowledge and technologies from the informal sector, rural areas or arid lands may be excluded from official development planning and practises (Arza and van Zwanenberg, 2014; Cozzens and Sutz, 2014; Stott and Tracey, 2018).

Causes of exclusion: The cause of such exclusion is thought to be top-down innovation processes due to the fact that the technology-push model is a well-established and relatively less costly model of innovation (Stoop and Hart, 2005; Minh *et al.*, 2014). As a result, such interventions are not compatible with the priorities, needs and interests of local communities (Moschitz *et al.*, 2015).

Recommended solutions: Grassroots-based innovation processes emphasise knowledge, practises and technologies that are initiated and managed by local communities or organisations that are not hindered by formal understanding of the innovation process (Smith, Fressoli and Thomas, 2014). Despite of and even due to financial and other constraints, farmers, traders and other actors at the grassroots are thought to be innovative in developing solutions to the social and economic challenges they face (Swigert-Gacheru, 2011; Karanja, Kamau, Macoloo, Righa,

van Veldhuizen, *et al.*, 2017). According to this narrative, external actors should therefore find ways of aligning official development planning and interventions to these grassroots initiatives, priorities and innovations rather than impose new forms of knowledge, practises and technologies (Minh *et al.*, 2014).

The political economy narrative

The problem of exclusion: This narrative is based on Giddens (1979) thesis stipulating that rules and practises in any society embody the interests of those actors with influence and authority over how resources are allocated, accessed, and used. Studies have revealed how new expertise or technologies and other resources have been subject to capture and control by elite individuals and organisations (e.g. Kenis and Mathijs 2014; Lowe et al. 2019; Parkinson 2009). Innovation may therefore be used as a tool to achieve certain agendas and interest of the elite and therefore excluding the needs and interests of other actors (Illich, 1973; Arora and Romijn, 2012; Borda-Rodriguez and Johnson, 2020).

Causes of exclusion: Exclusion in the innovation process, according to this narrative, is due to the tendency of the innovation process to respond to the needs and interests of actors who have influence and control over allocation of resources (Merrey and Cook, 2012; Nemes and Augustyn, 2017). As a result, the development of and control over knowledge, practises and technologies is dominated by influential actors in politics, business and even within local communities (Arora and Romijn, 2012; Poole, Chitundu and Msoni, 2013; Rusca *et al.*, 2015; Borda-Rodriguez and Johnson, 2020).

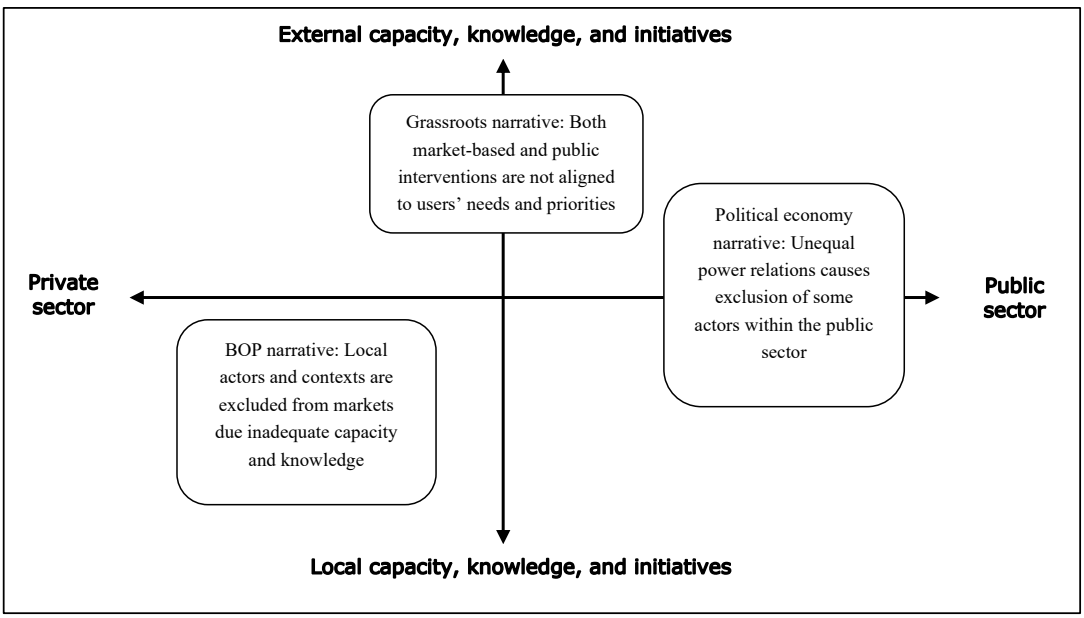
Recommended solutions: The political economy perspective advocates for broad-based systemic change and social transitions with the state and public organisations as key drivers of an inclusive innovation process (Arora and Romijn, 2012; Poole, Chitundu and Msoni, 2013; Onsongo and Schot, 2017). Solutions that are social in nature such as multi-actor partnerships, decentralised systems of governance and new policies and regulations are emphasised as a means by which power imbalances can be overcome and the marginalised can participate in the design and implementation of new expertise, knowledge and technologies (Heeks, Foster and Nugroho, 2014; Osei-Amponsah, van Paassen and Klerkx, 2018). Tracey and Stott (2017:58) point out that innovation in marginalised spaces requires a novel approach and that 'social innovation' can be a means by which new organisational arrangements that embody the interests of marginalised actors are developed.

When looking closely at the three narratives presented, they differ along two independent axes or dimensions regarding how problems and solutions are constructed. The first axis (horizontal axis in figures 3.1 A and B below) contains the role of the private

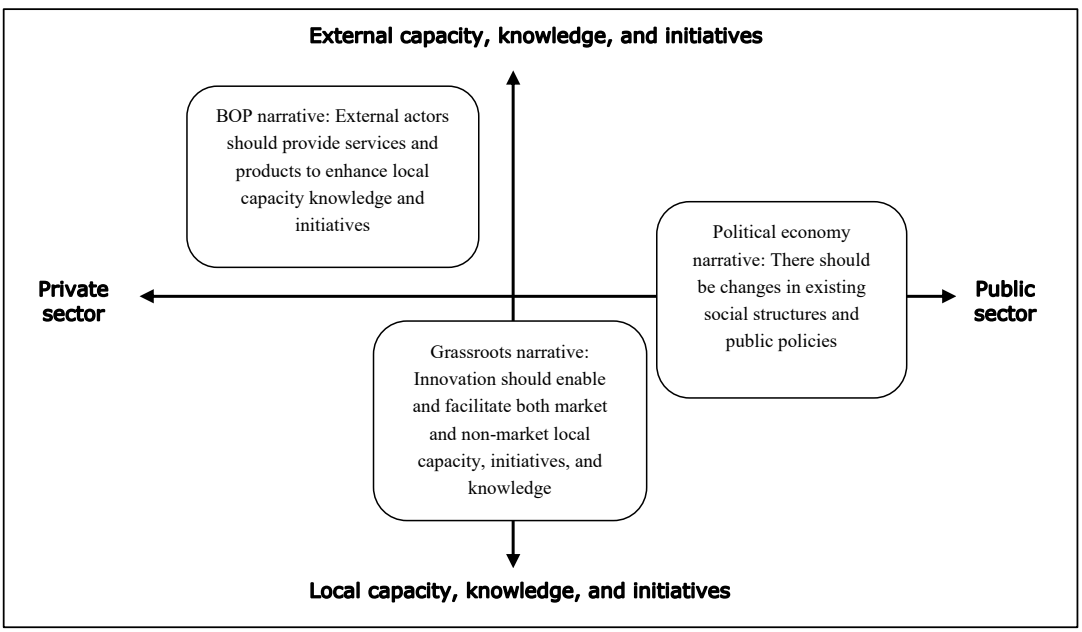
sector on one end and the role of the public sector - including public organisations and individual citizens - on the other end. The second axis (vertical) comprise the value of local initiative, knowledge, and capacity on one end and value of external initiative, knowledge, and capacity on the other. In Figure 3.1 below, we have mapped these two axes in terms of how theoretical narratives construct the problem (Figure 3.1 A) and the solution recommended (Figure 3.1 B).

Figure 3.1. How problems and recommended solutions are defined in literature

A. Problem frames



B. Solution frames



As noted in figures above, the three narratives are somewhat coherent in the sense that the solutions presented mirrors the opposite of how the problem is perceived. The BOP narrative constructs the problem as inadequate or missing local capacity, knowledge and expertise but emphasises solutions provided by external actors. Similarly, the grassroots narrative locates the problem within external capacities, knowledge and expertise that are thought to be exclusive of local contexts. It however emphasises locally initiated solutions and knowledge. In the remainder of this paper, we present our methodology and methods for the analysis of the empirical frames before presenting the findings, followed by a discussion and conclusion sections.

Methodology

Framing and framing analysis

We use framing analysis to unravel how organisations within the Kenyan agricultural sector construct meanings and explanations about the concept of inclusive innovation. For instance a certain issue or event may be interpreted and framed differently by a government agency, research institution or commercial enterprise owing to differences in their backgrounds, objectives and interests (Thornton, Ocasio and Lounsbury, 2012). Framing involves construction of different elements of an issue which may include a problem, cause of the problem and recommended solutions (Entman, 1993). When brought together, these aspects form a broad narrative about the issue or what Campbell and Docherty (2003) refer to as whole story frames. Within these frames, some aspects of the issue or problem may be emphasised while other aspects are downplayed or ignored depending on the objectives and mandate of the organisation that ascribe to the frame (De Bruycker, 2017).

Data collection and analysis

Data was collected through in-depth interviews and participation in various workshops and seminars. Since the aim of the study was to investigate how language in used to frame social phenomena, these data collection methods were useful for exploring how organisations framed the issue of inclusive innovation during interactions with each other and with the researcher. Organisations were sampled based on their involvement in innovative initiatives such as research, training and advisory services for farmers and other actors, new business model development, development and dissemination of technologies and facilitating new social relationships and arrangements. Additionally, they were selected for having a social inclusion objective in the design and implementation of their programs. Sampling was done to achieve maximum variation on the types of organisations present in the sector. Eventually, a total of twenty-nine in-depth interviews were conducted with different organisations between February and July 2018. Table 3.2 below is

a summary of the respondents from the interviews and the range of organisations from which they were drawn. Public agencies interviewed were a training and vocational institute, three government research institutes and two local governments. Civil society organisations represented in the study were three development agency programmes and four NGOs. The private companies included three international companies and nine Kenyan companies while the two universities chosen for the study both had agricultural extension and outreach programmes.

Table 3.2. Overview of interview respondents

	Activities linked to inclusive innovation	Organisation	Project within organisation	Total
Public agencies	Research, training and advisory services, policy making, financing	5	2	7
Civil society organisations	Brokering relationships, training and advisory services, financing	3	4	7
Private companies	Technology development, market linkages, training and advisory services, financing, brokering relationships	9	3	12
Universities	Research, training and advisory services, knowledge dissemination	1	2	3
Total		18	11	29

This data was complemented by notes and observations from six workshops and seminars organised by government agencies, development agencies and private sector alliances which were attended. These included a dairy investor's forum, two seminars on sustainable inclusive business, an annual scientific symposium on animal production, an aquaculture stakeholder meeting, and an inclusive trade workshop.

The elements and axes in the three theoretical narratives of inclusive innovation were used as sensitizing concepts during the coding of the data and to develop a coding scheme (Strauss and Corbin, 1990). The data was coded both deductively and inductively with the assistance of the Atlas.TI data analysis programme. Each paragraph of data was 'decontextualized' from its setting in the first step of analysis (Tesch 1990: 115) by asking questions such as what innovation processes are being refereed to? How is the problem of exclusion in an innovation process being defined and what are being recommended as the solutions? A total of sixty-five different codes and concepts were developed during coding. These concepts were later grouped and clustered to form the whole story frames or narratives. In the next section, we present the frames of inclusive innovation that emerged from our data and later compare these to the theoretical narratives.

Findings

Our data analysis led to the identification of four distinct whole story frames pertaining to inclusive innovation among agricultural practitioners in Kenya: A support frame, a resource frame, a compatibility frame, and a power relations frame.

How organisations in Kenyan agriculture frame inclusive innovation

A support frame

Within this frame, innovation is highlighted as a process that should support different actors in the agricultural sector such as through funding, training, research, and advisory services. Mostly ascribed to by state actors and universities, the support frame constructs the problem of exclusion in the innovation process as the lack of sufficient skills, knowledge, and financial resources to offer necessary support all the actors within the agricultural sector as illustrated by the following quote:

"From around 2002, we have never employed staff. So right now, our numbers have really gone down. And because our numbers have gone down it is becoming a challenge to reach some areas [...] *we had this maize...lethal necrosis disease for maize. It popped up out of nowhere and it sort of like wiped out our success in terms of the varieties that we had developed for maize.* (D12, Government agency program manager)

The reason for exclusion is thought to be large numbers of those who require support due to the prevalence of smallholder farms as indicated below:

", the rural economy is based on agriculture, whether it is productive or not. It is a way of life, let me say so." **(**D12, Government agency program manager**)**

In addition, emphasis is laid on the unique and challenging conditions in some regions such as arid and semi-arid lands which make it difficult to offer support.

Solutions highlighted within this frame include agglomeration of actors that need support into groups as a way of enhancing reach. It also stresses the need for specialised support to separate groups of actors as illustrated below:

[...] those ones were very vulnerable. We tried giving them goats which all died... All they need is hand-outs. So, some were able to develop the skills for business, others could not. It is just like in a classroom set-up. There are those who will grasp the concepts while others will not because of other issues." (D21, County government official)

A resource frame

This frame constructs agriculture as a skill, knowledge and capital intensive 'profession' that requires substantial material and immaterial resources such as capital, knowledge on business and management practises, knowledge on agronomy and soil management as well as marketing skills. Commercial enterprises and some development practitioners mainly ascribe to this frame and inclusion is problematized as the inefficiency created by actors who do not have enough resources to participate in the innovation process. As demonstrated by the quote below, including smallholder dairy farmers in the dairy value chain is framed as a challenge for producing quality milk:

"Of the milk we receive here in Kenya, 60 to 70% is produced by smallholders. And we see that smallholders have tremendous problems in delivering quality milk. [...] *Milk is chilled late, delivered late and the total plate count* [bacterial contamination] *exceed the standard specifications by far."* (D32, Manager of a food company)

In addition, perceptions and attitudes is also considered to be a problem that leads to the exclusion of some actors from the innovation process as demonstrated below:

"The issue with these incentives is that the farmers tend to develop a dependency syndrome...it takes away their ability to think for themselves. Yet commercialization requires one to be an entrepreneur, someone who can think and act on their own with the ability to set up structures that can commercialize their enterprise. Not someone who is dependent on hand outs. That is what is killing the sector." (D21, County government official)

Recommended solutions within this frame narrative highlight the need to provide required resources to those that need it to enable them to participate in the innovation process as well as benefit from innovations developed elsewhere. This may be through training and advisory services, market linkages or providing farm inputs. Inclusion within this frame is based on the logic of enabling as many actors as possible to participate in these markets, if they possess or can acquire the needed expertise, knowledge, and material resources.

A compatibility frame

This frame is mostly ascribed to by NGOs and research institutions. The problem is constructed as incompatibility between the innovation processes pursued by development planners and other organisations and the interests and priorities of farming households and communities. For example, the quote below shows how the approach by development practitioners may not necessarily be prioritised by

farmers:

"...I have had experience with several rural homesteads in Kenya where we are forcing them to be commercial farmers, yet the number one duty of a small farmer is the to provide food for their family. But now we are telling them that they need to focus on selling. I have found this to be a conflict...the making of profit while also focusing on the needs of your family as a farmer." (B22, Social entrepreneurship consultant)

Similarly, some local contexts are highlighted as unsuitable for certain innovations or approaches by agricultural practitioners. There is therefore incompatibility between the new skills, knowledge and technologies provided by organisations and local contexts within which they are implemented leading to the exclusion of the latter from benefiting from or participating in the innovation process.

Reasons for this incompatibility is perceived to be a physical and ideological gap between how agricultural practitioners understand and practise innovation and how their clients or beneficiaries such as farmers understand and practise the same. The quote below for instance demonstrates a perceived incompatibility between research and farmers' needs:

"The university has always been assumed to be a place that is only for scholars, where they [farmers] *do not have much to learn. So, we are trying to open up the space for the farmers. Students come up with several research problems. But do we really consider the farmers when we are coming up with these?* [...] *So that is really the gap."* (D26, University program officer)

The compatibility frame emphasises bridging of the physical and ideological gap between development practitioners and their clients or beneficiaries as a solution to make innovations inclusive. It also highlights the need to understand local contexts and the inclusion beneficiaries and clients in the inception, design, and delivery of agricultural interventions. The practitioner below for example emphasises the need to facilitate interaction between agricultural extension officers and farmers to facilitate shared learning:

"We do not call ourselves a training institution. We offer a learning environment for farmers and also for the agricultural extension officers. Agriculture is very dynamic; the key players are the farmers who have been practicing it for a long time. They are very experienced and have a lot of knowledge...a lot of information. Of course, the extension officers also have skills and information. So, we offer a learning

opportunity for those farmers to be able to interact with agriculture officers and be able to learn." (D20, NGO director)

A power relations frame

According to this frame, innovation, and its prospects of being inclusive is related to issues of power and control. It is predominantly ascribed to by civil society organisations and some state agencies such as local governments. The problem is constructed as the unequal control over the innovation process including unequal access to knowledge, technologies, social arrangements, and financial capital by different actors. For example, the quote below shows how women and youth are considered to be excluded from participating in agricultural production and knowledge creation compared to men and the elderly due to unequal control over land and decision making:

"Women do not own land in the country. The youth also do not own land unless the father as the head of the household subdivides the land to the children or however is around when he gets old or something [...] *so they* [women and youth] *don't even have the power to make decisions over what to plant, what inputs they want to buy, over what they need to do...* (D19, Development agency program manager)

Furthermore, unequal control over resources is said to lead to opportunism by dominant actors, lack of trust and strained relations which restricts the extent to which exchange of knowledge and other resources between dominant and other actors occur. Reasons for exclusion within this frame are said to include pre-existing inequalities is social structures, cultural norms, and financial disparity among actors.

As indicated by the quote below, the power frame highlights solutions that are related to the empowerment of actors that are marginalised from control over resources:

"...when we work with a group, apart from giving them the technical capacity, we also empower them to be able to mobilize resources on their own. For some farmers, we have written grant proposals together with them. We also train them on how to be able to do business plans on their own as an exit strategy of the project." (D4, University programme director)

Synthesis of the empirical frames

Our data has revealed four frames of inclusive innovation prevalent among agricultural organisations in Kenya as summarised in table 3.3. below.

Table 3.3. Frames of inclusive innovation by agricultural organisations in Kenya

	Highlighted problem	Identified cause of exclusion	Recommended Solution	Main proponents
A support frame	Innovation does not to reach or address the challenges of all actors in the agricultural sector	A large number of those who require support Limited capacity of actors that support innovation such as through funding, research, and training.	Agglomeration of excluded actors into groups Specialised support to excluded groups	State agencies Local governments Universities
A resource frame	Some actors lack the resources required to participate in the innovation process	Lack of sufficient material and immaterial resources by some actors Local conditions being unsuitable for innovation	Capacity building of actors with little resource endowments Unconventional business models such as social enterprises	Commercial firms Donor agencies
A compatibility frame	Innovation in the agricultural sector is not compatible with the needs and interests of some actors	Top-down approaches in the design and delivery of agricultural interventions	Including marginalised actors in the design and delivery of new technologies, expertise, and social arrangements in the agricultural sector	NGOs Universities Donor agencies
A power relations frame	Unequal access to resources and control over the innovation process.	Unequal power relations leading to opportunism Lack of trust between different actors thus limiting learning and knowledge sharing	Empowerment of marginalised actors Facilitating linkages and collaborations between actors	Local governments Donor agencies NGOs

There are two main inferences that can be drawn from these empirical frames. First, while there may be implicit alignments to certain frames depending on the type of organisation, organisations do not exclusively ascribe to one frame. For instance, state agencies, including local governments mainly ascribe to a support narrative which is likely because they have the mandate to indiscriminately support all actors within the agricultural sector. However, they also ascribe to a resource as well as power and relationships frame in their construction of problems and solutions for inclusive innovation.

Secondly, who do not find coherence between the way the problem is constructed and the type of solutions that are recommended in the empirical frames. The resource frame highlights the local problem of lack of sufficient resources by farmers and other community-based actors to participate efficiently in input and output markets and the role of the private sector in providing solutions. The support frame in contrast emphasizes the external problem of lack of enough capacity, initiatives, and knowledge to support the innovation process and the role of public actors such as government agencies and research institutions in providing the solution. Across the four empirical frames, problems are emphasised as occurring at the local level such as actors who lack adequate support, resources, knowledge, or power. Recommended solutions on the other hand highlight the role of external knowledge,

capacity, and initiatives in making innovations inclusive. This includes enabling markets and capacity building of local actors by external actors (resource frame), collaboration among external actors through partnerships (support frame), adapting external programs and interventions to respond to the needs and interests of local actors (compatibility frame) and bridging the power gap between both market and non-market external and local actors (power and relationships frame).

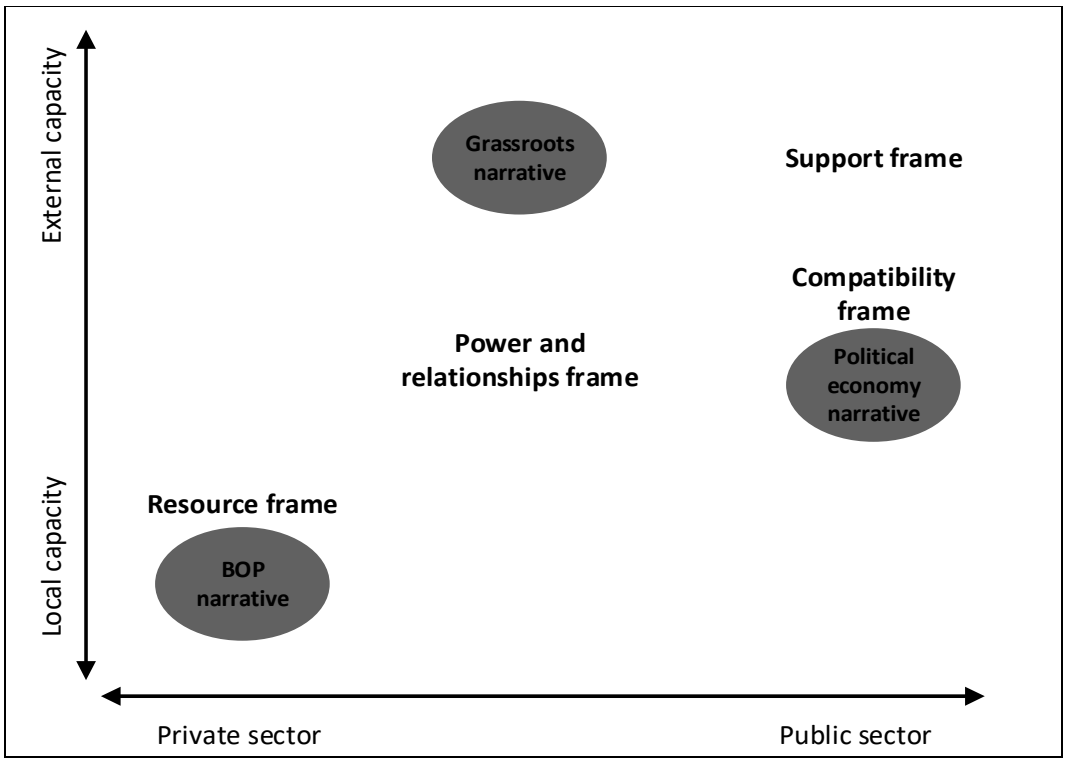
How do the empirical frames compare to existing theoretical narratives about inclusive innovation?

We earlier identified a BOP, grassroots and political economy narratives that are found in literature. Apart from the resource frame which aligns with the BOP narrative, there is a divergence between the theoretical narratives about inclusive innovation and the frames constructed about inclusive innovation by organisations in the Kenyan agricultural sector.

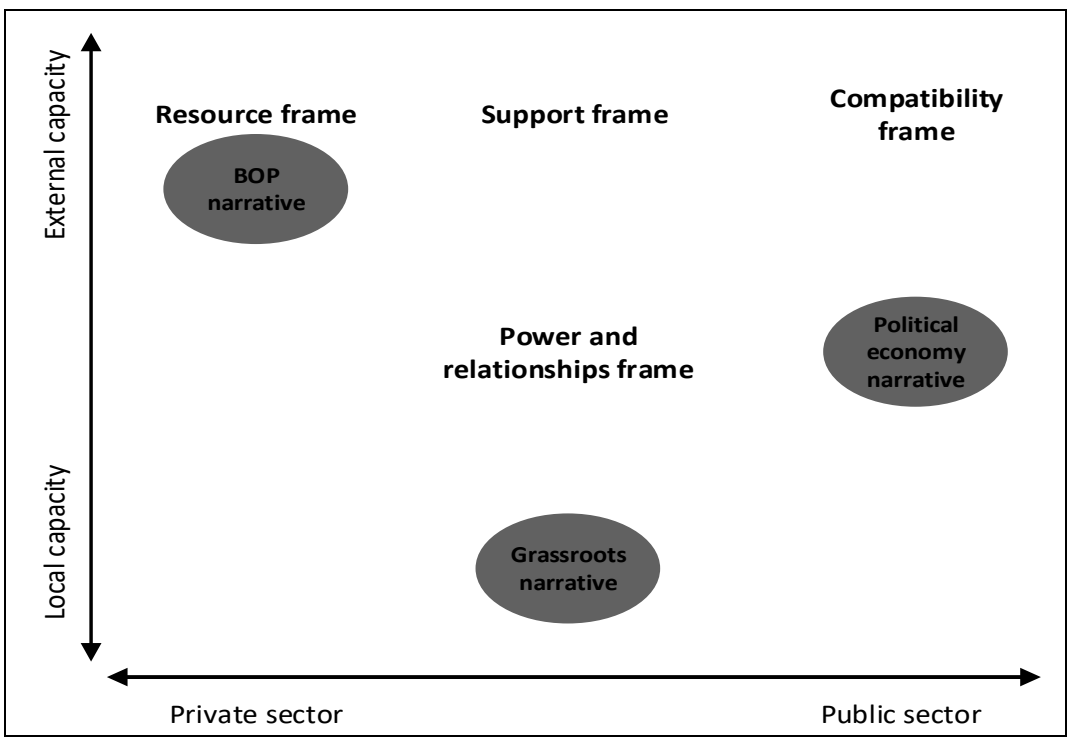
The figures below juxtapose the empirical frames against the theoretical narratives of inclusive innovation regarding how the problem is defined (figure 3.2 A) and the recommended solutions (figure 3.2 B) respectively. Regarding the problem frames, we find the resource frame to be aligned to the BOP narrative where access to input and output markets is emphasised as a problem that leads to exclusion of actors with little resource endowments. The resource frame considers base of the pyramid actors to be farmers, traders and other actors in the agricultural value chain that lack the knowledge, expertise, material resources or financial capital to be able to participate in developing an economically efficient agricultural sector. The compatibility frame is linked to a grassroots narrative where the control of agricultural knowledge, interventions, projects, and business models by dominant actors such as state agencies and research institutions is emphasised. This excludes grassroots actors local in the agricultural sector such as smallholder farmers and food distributors from the innovation process. In contrast to the grassroots narrative, it does not emphasise locally based initiatives and knowledge in making innovation inclusive but instead calls for bridging of the ideological, physical, and material gap between grassroots actors and other actors in the innovation process. The support frame partly aligns to a political economy frame where the civic problem of lack of proper social structures is highlighted. However, it lays more emphasis on the inadequacy of external public actors such as local governments and development practitioners compared to the political economy narrative which highlights both external and local civic problems. The power and relationships frame also partly aligns to the political economy frame in constructing the problem as both external and local. However, its emphasis on relationships between actors as a problem is not aligned to any of the existing theoretical narratives.

Figure 3.2. A juxtaposition of theoretical and empirical frames of inclusive innovation

A. Problem frames



B. Solution frames



While the theoretical narratives highlighted both external and local initiatives, knowledge, and capacity as solutions to making innovation inclusive, we find that organisations in Kenyan agriculture in contrast lay more emphasis on external capacity, knowledge, and initiatives as solutions even though problems at the local level are identified. This could be because they frame solutions based on their roles as practitioners who design and implement interventions.

Discussion

In the next sections, we discuss these findings and their implications for academic research, agricultural policy and practises and future inquiry.

The hybridity of inclusive innovation narratives

Juxtaposing the three theoretical narratives of inclusive innovation with the framing of the concept by different organisations in the Kenyan agricultural sector shows no clear alignment. Instead, the concept of inclusive innovation is framed through a cross-fertilisation of various aspects of the theoretical narratives. The resulting empirical narratives are therefore a hybrid of the existing theoretical narratives in the ways that problems and solutions are constructed. For instance, the support frame by organisations in Kenya draws from the BOP narrative by constructing the problem of exclusion in the innovation process as the limited access to the resources such as finance and knowledge that are required for innovation by certain actors. However, it also draws from the political economy narrative that looks at the broader systemic problems related to exclusion. Resource constraints are therefore not limited to actors at the 'bottom of the economic pyramid' but also those at the 'top of the economic pyramid' such as government agencies and research institutions which lack the capacity to address the challenges at the BOP through innovation.

There is therefore a need to think beyond the problem of inadequate local capacity as proposed by the BOP narrative and reflect on other forms of resource constraints such as those at the top of the economic pyramid. For instance, while narratives about inclusive innovation have focused on empowerment of 'marginalised' actors such as the youth, women, informal sector actors or remote communities, less emphasis has been laid on building the capacity of external actors such as the state or research institutions to be able to be inclusive. This limits the range of workable solutions to an innovation process that is inclusive.

While the existence of different narratives within an innovation process has been well documented (e.g. Gupta *et al.*, 2015; Cabral, 2016; Osei-Amponsah *et al.*, 2018; Pansera and Owen, 2018), their implications for innovation practises and

social inclusion need to be examined. Empirical studies in Gambia has revealed that development actors, including farmers are often aware of the contradictions between various narratives and interests that guide agricultural policy and development (Wadham, Urquhart and Warren, 2019). Usually, actors try to accommodate other existing narratives within their own narratives to avoid conflict (Osei-Amponsah, van Paassen and Klerkx, 2018). We add to this discourse by illustrating that narratives are complete storylines of a problem containing a history of an issue, what caused it and what solutions are proposed and different actors accommodate alternative narratives by weaving it into their own thus creating a hybrid narrative that other actors can identify with at least in part. Organisations may therefore appear to be having the same solution even the though the problems being addressed are different. This creates a false sense of alignment to mandates and objectives between different organisations.

Do existing theoretical narratives of inclusive innovation represent reality?

It has been pointed that the dominant narrative of resource poor actors and the role of economic growth in alleviating this resource scarcity has been inadequate as evidenced by large groups of society that are still excluded from the benefits of economic growth. As a solution, alternative approaches have been called for (Baud, 2016). Over time, these alternative models of growth, innovation and social development have been explored and developed (Godin, 2017; Pansera and Owen, 2018) Our study has revealed that there currently exists at least two main alternative narratives to the economic growth theory (what we call the BOP narrative). One highlights the power relationships between actors and the need to overcome these while the other emphasises grassroots alternatives to orthodox growth theories. However, our empirical investigation reveal that these existing theories do not align with how innovation and social inclusion is conceptualised in reality which calls for a rethinking of the narratives that inform policy and practise of inclusive innovation.

In the case of Kenyan agriculture, there is a significant mismatch between the narratives of inclusive innovation that exist in literature and the ones that exist in practise. The empirical narratives are broader in scope and highlight various aspects of solutions and problems compared to the narratives found in literature. We also find a power and relationships frame which does not fit within any of the existing theoretical narratives in the way the problems and solutions to inclusive innovation are constructed. Existing models of inclusive innovation are usually derived from innovation discourses where issues of unequal power relations are rarely examined (Ros-Tonen *et al.*, 2015; Meagher, 2018). We further reveal that trust and relationships between actors is inhibited by these unequal power relationships which limit the extent to which knowledge or technologies can be shared in inclusive innovation processes.

The (non) universality of inclusive innovation narratives and models

Our study also contributes to the literature that examines the nexus between society and innovation. It has been pointed out that innovation, including new technologies, expertise and social arrangements, emerge in accordance to the social contexts, values and aspirations of the society where it is developed (Bijker and Law, 1992; Klein, Kleinman and Lee Kleinman, 2002). As a result, innovation from one region of the world may not be transferable or relevant to other regions (Macnaghten *et al.*, 2014; Klerkx, Seuneke, *et al.*, 2017; Pfotenhauer and Jasanoff, 2017). Rusca *et al.* (2015) for example have pointed out that generic models of inclusive innovation developed in industrially advanced countries are usually out of touch with realities in less industrialised countries where they are transferred. One of the suggested ways of overcoming this challenge has been the adaptation of such models to local conditions and contexts such as through use of local expertise and resources (Benouniche, Zwarteveen and Kuper, 2014; Cleaver, 2017). Our study shows one of the reasons for the misalignment between models and the social contexts in which they are applied is difference in the narratives about the problems being solved and solutions being recommended. This does not call for an 'inclusive narrative of inclusive innovation' but rather 'an inclusion of other narratives of inclusive innovation.'

Conclusion

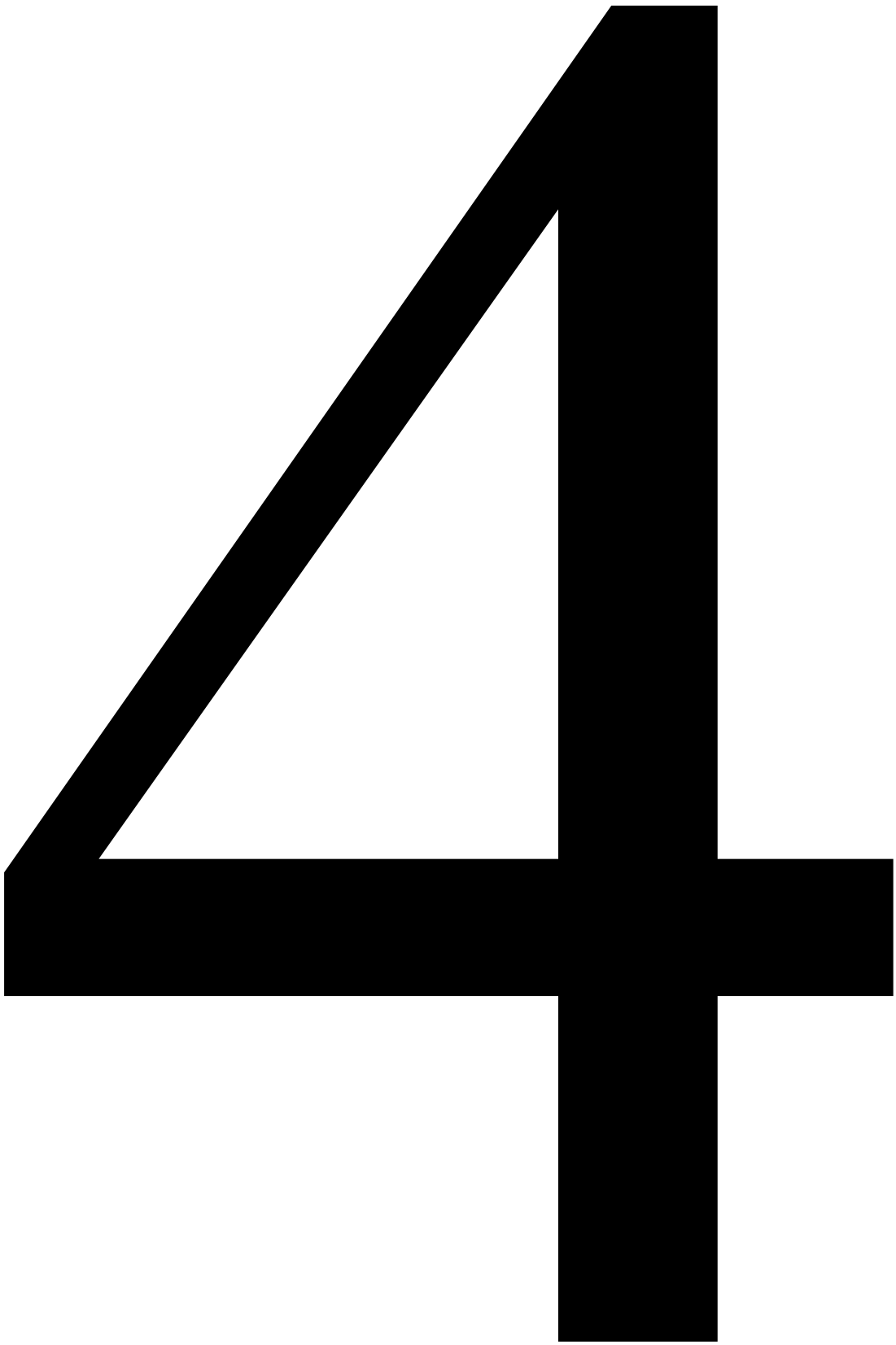
Our objective was to examine the narratives about inclusive innovation that exist in literature and within the Kenyan agricultural sector development. Our analysis has revealed four narratives within the Kenyan agricultural sector which are a complex hybrid of existing theories about innovation and social inclusion. Furthermore, we find that the empirical narratives are more and broader in scope compared to what is found in literature. An elaborated theory of inclusive innovation that links all the different narratives as proposed by some authors (e.g. (Klochikhin, 2012; Gupta, Pouw and Ros-Tonen, 2015) may be challenging given the extensive scope of these narratives. The different narratives of innovation and social inclusion however provide an opportunity to provide a variety of solutions to different problems of social exclusion. The ambiguity surrounding the concept of inclusive innovation is due to different existing narratives and the concept. Rather than trying to clarify the ambiguity, further research could provide insights on how different pathways of inclusive innovation can be pursued simultaneously rather than merging the different narratives into an all-encompassing theory of inclusive innovation.

Development planners, including government agencies, NGO's, commercial enterprises, and research institutions experiment with various approaches to development. These organisations not only pursue different interests and strategic

goals but also work within certain discourses that construct or label certain actors as excluded. A variety of narratives is required in order to broaden the scope of possibilities for inclusive innovation processes especially in countries such as Kenya that are characterised by diversity and uncertainty. For example, new crop varieties could be developed with enough technical capacity and social arrangements to allow farmers to experiment with them. As Illich, (1973:11) points out, "people need new tools to work with rather than tools that 'work' for them".

Limitations and future research

Our study was limited in scope as it focused on organisations involved in development planning and implementation such NGO's, development agencies, universities, government agencies and private businesses. Further inquiry could reveal the narratives of inclusive innovation that exist among 'clients' or 'beneficiaries' of such development programs and how they relate to the theoretical and empirical narratives presented in this study. By using framing analysis, we limit our study to the narratives that people and organisations construct about inclusive innovation, but not the power dynamics and negotiations behind them. Other methods of analysing discourse could further reveal the agendas and interests behind these empirical narratives. We also limit our study to understanding the narratives and frames of inclusive innovation, but not how these translate into certain institutional logics and actions on the ground. Further research could explore how these frames are translated into practise and what elements of inclusive innovation are employed.



Chapter 4

Applying the 'Ladder of Inclusive Innovation' to Assess the Inclusiveness of Agricultural Extension and Advisory Services

This chapter is submitted to World Development as:

Opola, F.O., Leeuwis, C., Klerkx, L. and Kilelu, C.W.
Applying the 'Ladder of Inclusive Innovation'
to Assess the Inclusiveness of Agricultural Extension and Advisory Services

Abstract

Since the introduction of participatory research and development methods in the 1990's, how farmers and other community-based actors can be successfully included in knowledge creation and use remains a key concern. In this article, we use the 'ladder of inclusive innovation,' a concept from innovation studies, to investigate how various forms and levels of social inclusion are attained within agricultural training and advisory services (AEAS) in Kenya. Our main finding is that inclusion in higher levels of the ladder such as including farmers in the design and management of AEAS programmes remains a merely rhetorical since these levels are hardly attained in practise. We therefore conclude that the ladder of inclusive innovation, with the suggested improvements, can be useful as a holistic tool for the assessment of social inclusiveness within innovation related interventions such as AEAS. Within this holistic assessment, the trade-offs made in a quest for social inclusiveness can be explicitly identified and mitigated.

Introduction

Since the inception of agricultural extension in the 1840's as a way to 'extend' science produced in research organisations to farmers and the broader society, the concept has undergone various changes with different configurations and approaches being employed over the years. This include a shift from linear technology push models in the beginning to participatory research and development approaches in the 1980s and 1990s to a systems approach where learning is shared among different actors that is currently being proposed (van den Ban and Hawkins, 1988; Cristóvão, Koutsouris and Kügler, 2012; Cook, Satizábal and Curnow, 2021). A key issue across these periods has been how certain groups of farmers such as those with little endowments are purposefully or inadvertently excluded from accessing, utilising, benefiting from or controlling agricultural extension and advisory services (AEAS). For instance, it has been noted that earlier models of AEAS led to the elite capture by farmers who had the ability and resources to adopt new knowledge, technologies and practises (Leeuwis, 2004; Parkinson, 2009; Hailemichael and Haug, 2020; Cook, Satizábal and Curnow, 2021). Farmers-first and participatory research approaches also emerged in the 1980's to challenge the overemphasis on formal and scientific knowledge in AEAS processes, and have advocated for the inclusion of indigenous forms of agricultural knowledge and practises (Okali, Sumberg and Farrington, 1994; Martin and Sherington, 1997). For instance, methods such as participatory research and participatory rural appraisal were developed as a means of including the analytical capability of 'local people' in problem identification and providing solutions in practises such as agriculture (Chambers, 1995:953).

Demand-driven approaches in AEAS which focussed on understanding the demand or needs of farmers and meeting this identified demand also emerged in the 1990's as a way to include farmers knowledge of the challenges and opportunities in agriculture (Parkinson, 2009; Stein, 2011). More recently, systems perspectives have proposed AEAS as embedded in a broader system comprised of a variety of actors such as farmers, researchers and technology developers as well as institutions such as policies, cultural norms and rules which all influence how AEAS unfolds and is realised (Knickel *et al.*, 2009; Klerkx, van Mierlo and Leeuwis, 2012; Moschitz *et al.*, 2015). Within this system, approaches that examine rules and social structures that exclude the knowledge and practices of marginal actors such as resource constrained farmers in rural communities have been advocated for (Röling *et al.*, 2004; Hounkonnou *et al.*, 2006; Akullo, Maat and Wals, 2018). Bridging of knowledge gaps between different actors , providing platforms that facilitate interactions and joint learning between different actors and employing a range of approaches to cater for different groups of actors are seen as way to make knowledge exchange processes inclusive

(Birner *et al.*, 2009; Kilelu, Klerkx and Leeuwis, 2013; Swaans *et al.*, 2014; Eidt, Pant and Hickey, 2020).

Despite these attempts, some groups of farmers still remain excluded from fully accessing, benefiting from or controlling AEAS due to lack of resources or social networks (Parkinson, 2009; Christoplos, 2010; Landini and Beramendi, 2019; Hailemichael and Haug, 2020; Mdee *et al.*, 2020). This is especially evident in less industrialised countries where majority of the population are engaged in agriculture as farmers (Mdee *et al.*, 2019, 2020). Several reasons have been cited for this. First, it has been argued that the technology-transfer model of agricultural extension is so well established and cost-effective that approaches to include knowledge, experiences and practises of the farmers targeted have been overlooked (Thompson and Scoones, 1994; Minh *et al.*, 2014; Moschitz *et al.*, 2015; Rice *et al.*, 2019). Secondly, it has been revealed that the inclusion of small farmers as an objective of AEAS may be hampered by other interests and agendas of the organisations involved in their design and delivery such as seeking political support in the case of state-sponsored AEAS and profit-seeking in the case of private AEAS (Labarthe and Laurent; Parkinson, 2009; Berhanu and Poulton, 2014; Mdee *et al.*, 2020). Third, unequal power relations and prevailing social structures have limited the extent to which actors such as resource-constrained smallholder farmers, the youth or women can meaningfully participate in or benefit from the AEAS targeted at them (Rice *et al.*, 2019; Kingiri, 2020; Cook, Satizábal and Curnow, 2021).

The extent to which AEAS are inclusive therefore remain unclear and a framework for assessing this is still lacking (Prager, Creaney and Lorenzo-Arribas, 2017). This is an important gap given that there are currently numerous approaches and actors involved in AEAS and social inclusion remains a key objective of these approaches (Birner *et al.*, 2009; Knickel *et al.*, 2009; Christoplos, 2010). A holistic framework for assessing the extent of social inclusion within innovation processes has been expounded upon under the concept of 'ladder of inclusive innovation' in innovation studies (e.g. Heeks *et al.*, 2013; Levidow and Papaioannou, 2017; Onsongo and Schot, 2017; Harsh *et al.*, 2018; Woodson, Alcantara and do Nascimento, 2019; Woodson and Williams, 2020). Our objective in this study is to adapt the ladder of inclusive innovation to AEAS and apply the resulting framework to assess the social inclusivity of AEAS processes. The specific question addressed is how the ladder of inclusive innovation can be translated towards assessing social inclusivity of AEAS and to what extent social inclusivity is attained within AEAS in Kenya.

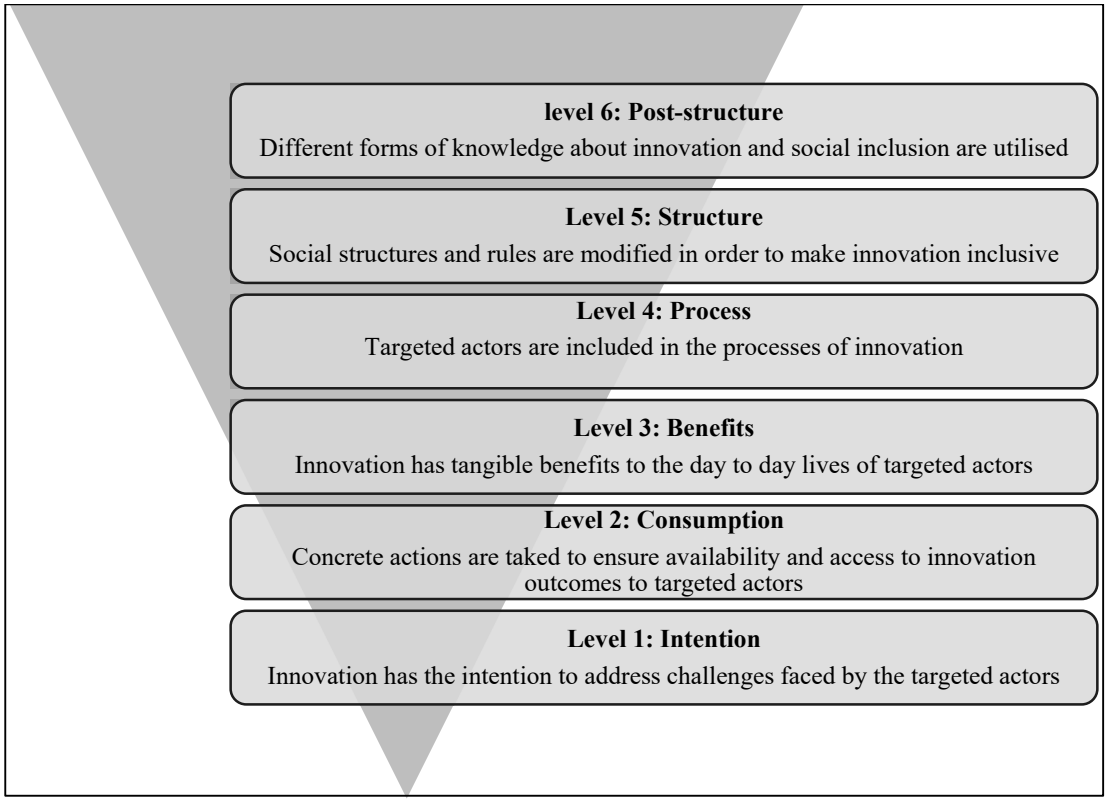
Though the term 'extension' may imply technology transfer, we acknowledge that extension goes beyond technology transfer paradigms and now performs a variety of

functions including advising, communicating new research or technologies, training, education and facilitating networks and linkages. We use the term extension because it is still prevalent among many agricultural practitioners across the world as well as within academic debates (Leeuwis, 2004; Cook, Satizábal and Curnow, 2021). For the remainder of this paper, we use the term agricultural extension and advisory services (AEAS) to refer to training and advising of farmers on various aspects of food production and distribution, communication of science and new knowledge concerning various aspects of food production and distribution to farmers as well as the facilitation of networks that enable knowledge exchange between farmers and other actors (Leeuwis, 2004; Christoplos, 2010). In the next section, we briefly describe the ladder of inclusive innovation and its various levels. we then adapt it to AEAS and develop indicators of inclusive AEAS within each level of the ladder. This is followed by a description of the study cases in Kenya and research methods. We then present the findings followed by a section discussing the broader implications of these findings.

The ladder of inclusive innovation and its relation to AEAS

The ladder of inclusive innovation builds on (Arnstein (1969) ladder of citizen participation which conceptualises the various levels in which participation in urban planning by residents can be achieved. In applying the ladder of citizen participation to innovation studies, Heeks and colleagues (2013) conceptualised six levels in which social inclusion can be achieved within innovation processes as outlined in figure 1 below. At the lowest level, innovation is inclusive when it has the intention of addressing the challenges faced by the targeted actors even if no further step is taken to achieve this aim. At the second level, innovation is inclusive when its outcomes are delivered and used by actors that are perceived to be marginalised and targeted by inclusive innovation interventions. At the third level, inclusive innovation has tangible benefits to the day to day lives of targeted actors. At the fourth level targeted actors are included at active participants in innovation processes while at the fifth level, social structures such as policies are put in place to ensure innovation is inclusive. At the sixth and highest level, innovation is inclusive if it occurs within societies where all actors, including those that are marginalised, participate in production of discourses and knowledge about social inclusion. The ladder of inclusive innovation is outlined in the figure below.

Figure 4.1. Ladder of Inclusive innovation (Heeks et al, 2013)



Adapting from Heeks et al (2013), we make the ladder of inclusive innovation operational to AEAS by highlighting indicators of social inclusion across the various levels in the ladder. We explored existing literature on AEAS to identify a total of seventeen indicators of social inclusion across various steps of the ladder of inclusive innovation and these are outlined in table 4.1 below.

Level 1: Intention

This the most basic level at which social inclusion can be obtained within AEAS programmes. It is based on the premise that aspiring for social inclusion is a valuable endeavour within AEAS processes even if actual opportunities are not created and outcomes are not realised (George, Mcgahan and Prabhu, 2012; Onsongo and Knorringa, 2020). This is because aspirations may create future opportunities for realising social inclusion (Bryden *et al.*, 2017). Within AEAS, intention to be inclusive is indicated by identification of groups of farmers that are excluded from accessing, benefiting from, or controlling AEAS. Resources are mobilised and structures are put in place in order to target these farmers with AEAS (Muyanga and Jayne, 2006; Kingiri, 2020). Within the African agricultural sector for instance, farmers with minimal resources, women and the youth are often identified to be side-lined from benefiting from commercial agriculture and therefore intentionally

targeted with specific provisions in AEAS programmes (African Union Commission, 2014; Kingiri, 2020; Mdee *et al.*, 2020).

Table 4.1. Indicators of social inclusion within AEAS at various levels of the ladder of inclusive innovation

Level	Defining criteria	Assessment questions including qualitative indicators
Intention	AEAS programmes have social inclusion as part of their mission and mandate	Are there guidelines, procedures and policy documents in place that stipulate social inclusion as a key objective within AEAS programmes? Does AEAS identify and select farmers who are socially excluded and inform them about the AEAS program? Have resources such as finance, staff and other facilities been allocated for inclusion of targeted farmers within AEAS programmes?
Consumption	AEAS are provided to share knowledge and technologies with targeted farmers	Are AEAS targeted to specific farmers that are considered marginalised provided at least once? Are AEAS methodologies, including language, costs, and venue, easily accessible and affordable to farmers that are targeted? Is the content and curriculum of AEAS accessible to all the farmers targeted? Is the uptake of AEAS including number or farmers reached evaluated and documented?
Benefits	AEAS have a positive impact on the farmers it targets for inclusion	Are targeted farmers able to implement the practises promoted by AEAS in their farms? Do targeted farmers maintain their engagement with AEAS programmes over time because they find them valuable? Have farmers who were not targeted joined the AEAS programmes due to interest?
Process	Targeted farmers participate in the AEAS programmes through consultation, partnerships, management, and control	Are targeted farmers involved in the design, management, and control of AEAS programmes and agendas? Are targeted farmers directly or indirectly involved in setting up of AEAS methodologies and curriculum? Do AEAS programmes use feedback from targeted farmers to revise and restructure AEAS? Are the knowledge of targeted farmers and other local actors used in AEAS implementation?
Social structure	AEAS occur within rules, norms and social arrangements that are inclusive	Is social inclusion part of the general organisational discourse and strategy within the organizations that host AEAS programmes? Are rules and policy making processes on AEAS inclusive of all actors? Are there systems in place to ensure the social inclusion aspects of AEAS are sustained in the long run?

Level 2: Consumption

At this level, concreate actions are taken to facilitate the availability and uptake of skills and knowledge by the actors that are identified to be excluded. This is indicated by the delivery and utilisation of AEAS provided by private extension service providers, government agencies such as public extension officers, technical and vocational training institutes, public universities, research institutes and civil society organisations to the farmers that they target, employing a combination of different approaches (Muyanga and Jayne, 2006; Birner *et al.*, 2009; Christoplos, 2010; Kilelu, Klerkx and Leeuwis, 2014). Procedures and mechanisms such as subsidised services, inclusive business models or organization of the farmers into groups are

employed to facilitate access to AEAS and ensure learning and knowledge exchange reaches a wide number of farmers (Röling *et al.*, 2004; Birner *et al.*, 2009; Katothya *et al.*, 2020). These organizations also evaluate their programmes periodically to assess the outreach and uptake of AEAS.

Level 3: Benefits

At this level, the benefits and pragmatic value of AEAS to targeted farmers are considered. This is indicated by improvements of the day to day lives of marginalised farmers such as better incomes, ease of manual work or improved nutrition as a result of the AEAS interventions (Christoplos, 2010; Bryden *et al.*, 2017; Jimenez-Soto, 2020; Wangu, Mangnus and van Westen, 2020). The needs of various types and groups of farmers are well articulated, and efforts are made to ensure these needs are met through continues monitoring and evaluation of how AEAS benefit farmers (Almekinders, Thiele and Danial, 2007; Birner *et al.*, 2009; Katothya *et al.*, 2020). AEAS are inclusive when they have a positive impact on the targeted farmers day to day lives within and beyond what was envisioned by AEAS, and the organisations involved. Benefits are indicated by an increased interest by the targeted as well as other farmers over a period of time (Johnson, Dowd and Ridgeway, 2006) an uptake of the knowledge and skills on a trial and continuous basis as well as a sustained relationships with AEAS organisations.

Level 4: Process

This is the first level in which social inclusion within AEAS goes beyond the conceptualisation of marginalised actors as end-users of innovation and includes them in AEAS processes and programmes as co-producers of knowledge and active participants in AEAS programmes. Some agricultural training programmes for instance have experimented with ways of including farmers in the co-production of research and knowledge through action research methods (e.g. Hounkonnou *et al.*, 2006; Nhantumbo *et al.*, 2016). Participatory agricultural research development approaches also advocate for the inclusion of the knowledge and practises possessed my targeted farmers in the design and management of AEAS processes (Almekinders, Thiele and Danial, 2007; Landini, 2016; Landini and Beramendi, 2019; Rice *et al.*, 2019). This can be through directly involving them as designers and implementers of AEAS or indirectly through representation in AEAS management or utilising feedback from targeted farmers. Additionally, the recognition and inclusion of farmers indigenous knowledge and practises in AEAS as well as farmers as AEAS providers to other farmers is acknowledged and facilitated (Kiptot *et al.*, 2006; Karanja, Kamau, Macoloo, Righa, van Veldhuizen, *et al.*, 2017).

Level 5: Social structure

The highest level of achieving social inclusion within AEAS is that of structure and post structure (Levels 5 and 6 in the ladder of inclusive innovation). This includes the underlying social structure composed of rules, knowledge and social relationships that govern how inclusive innovation processes unfold to ensure marginalised actors are included in the process and outcomes of AEAS. In addition, AEAS programmes include other discourses and perspectives on what entails a socially inclusive AEAS process. For instance, the need to make institutions social norms to be gender inclusive may be entrenched within organisational cultures of the AEAS programmes (Kingiri, 2013). At this level, it is argued that social inclusion within AEAS programmes can only be realised when there are proper institutions and social structures put in place to realise it and sustain it in the long term (Akullo, Maat and Wals, 2018; Mdee *et al.*, 2019). Social inclusion is also be entrenched as part organisational discourses and culture within the organisations that host AEAS programmes and frames of knowledge about the inclusivity of AEAS programs that are beyond the organisations and AEAS programmes such as farmers perspectives on inclusive AEAS will be taken into account (Heeks *et al.*, 2013).

Methodology

We employ a multiple case study research design (Merriam, 1998; Yin, 2009) to explore how the ladder of inclusive innovation is operationalised in AEAS programmes and to assess how social inclusion is attained within three cases AEAS programmes in Kenya.

Case selection and description of study cases

Our study focusses on three organisations with structured AEAS programmes within the Uasin Gishu County in Kenya. The county is a high potential agricultural zone in Kenya and a major producer of staple foods, horticultural crops, and dairy products. Majority of farmers in Uasin Gishu have small farms with diverse agricultural practises and minimal application of intensive production techniques (MoALF Kenya 2021c; United Nations, 2019). A big number of such farmers have been identified to be excluded from AEAS processes because they lack sufficient resources to assess and utilise AEAS or due to existing social structures such as norms and policies that have deliberately of inadvertently prevented them from assessing and utilising such programmes (Mdee *et al.*, 2020). We identify three AEAS programmes in Uasin Gishu that are currently involved AEAS delivery and have the aim of reaching out to all types of farmers through a structured extension programme: University of Eldoret, a public agricultural university in the county; the Uasin Gishu County Government Agriculture Department and New Kenya Co-operative Creameries (New KCC), a milk processing company.

The University of Eldoret Community Outreach Programme

The University of Eldoret (UoE) is one of the twenty-two public universities in Kenya and is in Uasin Gishu County. Originally, it was established as a farmers training centre before it was converted into a public teaching and research university. Currently, the university engages in re-establishing its historical links with farmers by including them in the universities research and innovation activities. The University of Eldoret Outreach Centre (UoEOC) was officially opened in September 2017 as an initiative to consolidate the outreach activities of the university. Its establishment was influenced by farmers who demanded frequent contact with the university and facilitated by funding from development agencies. It is a semi-autonomous section of the university with the functions of community engagement through hands-on practical training, business incubation and acting as a contact point between the university and farmers in Western Kenya. It also organises an annual agricultural exhibition where farmers are welcome to observe various agricultural technologies and take part in training on various aspects of food production and distribution.

County Government of Uasin Gishu Agricultural Extension Programme

The Uasin Gishu County Government (UGCG) is one of the forty-seven local administrative units in Kenya and is in the western part of the county. It has a department of agriculture with a structured programme of agricultural extension and advisory services. It also has regional offices with field officers attached to the sub-counties and villages. The department conducts various innovative activities directed at farmers in the region. These include extension and advisory services, dissemination of improved technologies and farming techniques to groups of farmers that they consider vulnerable, developing new social arrangements to reach out to excluded farmers as well as funding of innovative agricultural projects within the county. Though these support programs are targeted to all farmers within the county, there is emphasis on groups of farmers that are marginalised form mainstream innovation trajectories such as women, the youth and resource poor farmers. The county acquires its knowledge through partnerships with government research institutions and public universities. In addition, field extension staff acquire their knowledge from ICT platforms and the internet. The county government also co-ordinates and manages several programmes in partnership with other actors such as the national government, bilateral donor agencies, and international organisations that target specific groups of marginalised farmers.

The New KCC Farmers' Extension Programme (Eldoret factory)

The New Kenya Co-operative Creameries (New KCC) company was established in 1925 as a farmer-owned dairy co-operative for milk processing. It was privatised in 2000 before being acquired by the state in 2003. It is currently registered as a

state-owned company with its headquarters in Nairobi, the country's capital. It is the largest dairy processor in Kenya with branches and factories all over the country. In 2016, the company initiated an innovative extension programme that aimed at involving all farmers in improving milk quality and yields at farm level through training and advisory services. Under this programme, an extension committee that was constituted of farmers, company staff and county government officials was formed to steer the extension programme that targeted all farmers that supplied milk to the company. Key activities within the programme were hiring of community-based dairy farm assistants to be attached to the farming communities to provide support to the farmers and facilitators periodic training seminars for farmers. In addition, the committee has frequent meetings to deliberate on challenges facing farmers.

Data sources and analysis

Our data is derived from participant observations and in-depth interviews that we conducted with key informants from the three cases. The interviews were conducted within a period of 9 months between June 2019 and March 2020. Initial months were spent on field visits and informal interviews to obtain consent, build rapport, and familiarise with the context and actors in the cases of study. This was followed by interviews with purposely selected participants from the organisations with further participants being recruited through snowballing. In addition, we analysed key documents from the programmes.

Eventually, we conducted a total of thirty-eight recorded interviews as outlined in table 4.2 below. In the case of UoE, we interviewed the director, coordinator, project administrator, three field officers from the UoE outreach centre and a researcher from the University. We also conducted interviews with two county government officials involved in UoE activities, a manager of a development agency that collaborated with UoE and four farmers purposely selected to represent diverse levels of engagement with the programme. In the County government of Uasin Gishu case, we conducted three interviews the county director for agriculture, coordinator of the extension programme and a manager of an agricultural development programme. We also interviewed six field based agricultural extension officers and three farmers with varying levels of engagement with the county. In New KCC, we interviewed all the members of the extension programme that included its chairperson, secretary, treasurer, two field outreach officers from the factory, a representative from the county government and manager of a farm input store. In addition, we conducted interviews with two field-based assistants, the manager of an NGO that collaborated with New KCC and three purposefully selected farmers to achieve variation in level of engagement with New KCC. Three programme documents were also included

in the analysis: a fiscal strategy paper and project action plan from the county government and a strategic plan from the University of Eldoret.

We also employed participant observation (Merriam, 1998) where we observed and documented through fieldnotes the design and implementation of various activities within the three cases.. In the UoE, we attended a training conducted at the UoE Outreach Centre on crop management practises, several workshops, and exhibitions at the 2019 annual UoE agribusiness fair and a mushroom production exhibition at the campus. In New KCC, we attended an annual general meeting of one of the main cooperatives that supply the company with milk. Within the Uasin Gishu county government, we attended a workshop conducted by staff from the agriculture department in one of the villages and a training of women groups of farmers on the production, financial and disease management of improved chicken breeds.

Table 4.2. Overview of interview respondents

Programme	Interview Respondents	Total
University of Eldoret Outreach Programme	Director of programme Programme co-ordinator University researcher Three field officers Two County government officials Representative from a development agency Four farmers	**13**
County Government of Uasin Gishu Agriculture Development Programme	Director of the county agriculture department Manager of the county extension and advisory programme Coordinator of agricultural extension Six field extension officers Three farmers	**12**
New KCC Farmers' Extension Programme	Committee chairperson Committee treasure Committee secretary Representative from County Government Two representatives from New KCC Representative from input suppliers Two dairy farm assistants NGO project manager Three farmers	**13**
Total		38

The interviews were transcribed verbatim and uploaded together with the programme documents to the ATLAS.ti data analysis software. Using existing literature on AEAS, we developed qualitative indicators of social inclusion across five levels ranging from intention to include to inclusive social structures. These levels and indicators were employed as a coding scheme for initial coding of the data. While this deductive process was initially employed in order to be sensitive to what to pick out from our data (Strauss and Corbin, 1990), we also used indictive reasoning to elicit indicators of social inclusion from the respondents and observations in our study. We therefore used an abductive process where elements found in literature and those emerging from the data were both elicited (Kennedy and Thornberg, 2018).

For each of the three cases we assessed the seventeen qualitative indicators listed in Table 1, and if an indicator was attained, we awarded a score of 1 point to the case. We also calculated the aggregate score across the cases for each level of the ladder. A further analysis of the emerging concepts across the three cases and across the five levels revealed more features of social inclusion within the AEAS programmes. These formed the themes and forms of social inclusion presented in the next section.

Findings and analysis

Table 4.3 below outlines the indicators attained within and across our three study cases. Within each case, we examine and point out the indicators of social inclusion that were attained at each of the five levels of the ladder of inclusive innovation. We then calculate the average score obtained across all the three cases for each of the five levels. This is presented in the last column.

Table 4.3. Overview of inclusion indicators across the three cases

Level in the ladder	Indicators of social inclusion attained			
	Case 1: The UOE Outreach programme	**Case 2: Uasin Gishu County agricultural extension programme**	**Case 3: New KCC agricultural extension programme**	**Average score**
Intention	Presence of a functioning outreach centre with policies, staff, and farmers training facilities [Indicators **01** and **03**] The centre has funding and support from the university [Indicator **03**] The centre collaborates with the county government to identify needy farmers [indicator **02**]	A vetting committee and procedures are in place to identify and document targeted farmers [Indicator **01** and **02**] County has identified and selected specific small farmers, women and youth that are excluded from AEAS programmes [Indicator **02]** There is a budget, staff and other resources for specific programmes that target marginalised farmers [Indicator **03**]	A farmers' extension programme is in place with funding, extension staff and procedures as well as an extension committee to manage [Indicators **01** and **03**] The company has identified 3,000 small farms that are the target of their extension programme [indicator **02**] The company has employed dairy farm assistants who have been trained on AEAS content and delivery methods [Indicator **03**]	
	3 out of 3 indicators	**3 out of 3 indicators**	**3 out of 3 indicators**	**3/3**
Consumption	The centre has an annual agricultural fair, frequently hosts farmers at the centre for training and is always available for consultation [Indicator **04**] The centres services such as training are subsidised and are conducted in Swahili to make them accessible to all farmers [Indicator **05**]. Farmers are familiar with the centre and can easily contact staff through phone calls and visits [Indicator **05**]	County has satellite offices with extension staff within local farming communities to facilitate interaction with farmers [Indicator **05**] County extension officers are available on call to offer advisory services and frequently conduct training on diverse topics (Indicator **04)** Farmers' trainings are conducted in Swahili language and are subsidised to make it accessible to all farmers [Indicator **05**]	Extension staff are attached to individual farms as farm assistants [Indicators **04** and **05**] Dairy farm assistants have been attached to farmer groups [Indicator **07**] Trainings are conducted in farms to make them understandable and accessible to the farmers (Indicator **06**)	

Table 4.3. Continued.

	2 out of 4 indicators	**2 out of 4 indicators**	**4 out of 4 indicators**	**2.7/4**
Benefits	Some farmers have adopted the new technologies being promoted by the centre [Indicator **08**]	Some farmers have adopted the technologies and expertise being promoted by the county government [Indicator **08**]	Some farmers have adopted the skills and technologies acquired through the extension programme [Indicator **08**]	
	1 out of 3 indicators	**1 out of 3 indicators**	**1 out of 3 indicators**	**1/3**
Process			Farmers are included in the extension committee that manages and implements the programme [Indicator **11**] Farmers participate in deciding the training agendas for the extension programme (Indicator **11**)	
	0 out of 4 indicators	**0 out of 4 indicators**	**1 out of 4 indicators**	**0.5/4**
Social structure	The centre director is a member of the university senate and advocates for more and sustained funding for the centre [Indicator **17**] The centre engages with income generation activities such as grant applications and business ventures to enable it to be financially sustainable [Indicator **17**] The centre's initiatives are driven by a 'taking the university back to farmers' discourse (Indicator **15**)	Farmers participate in county government policy and by-law making processes through village forums [Indicator **16**]		
	2 out of 3 indicators	**1 out of 3 indicators**	**0 out of 3 indicators**	**1/3**
Total score across ladder	**8 out of 17 indicators**	**7 out of 17 indicators**	**9 out of 17 indicators**	**8.2/17**

Evidence of social inclusion within and across the AEAS programmes

The University of Eldoret Outreach Centre (UoEOC) is well established with funding, staff and several farmers training facilities located on-site. The researcher participated in and observed four trainings and demonstrations on various aspects of agricultural production and marketing conducted at the university premises in 2019, including an annual agricultural exhibition that was free to attend for all farmers. The centre attained most of the indicators of social inclusion at the intention and consumption levels (5 out of 7). Similarly, the Uasin Gishu County Government (UGCG) and New KCC both attained most of the indicators at these two levels. UGCG had a vetting committee to identify needy farmers and a department of agriculture with administrators, field officers and field extension staff. New KCC had a farmer's extension programme that was observed to offer continuous and periodic trainings to smallholder farmers in rural areas with little milk yields to

improve the yield and quality of their milk. Across the cases, the researcher observed that trainings and agricultural advice were subsidised and were conducted in either the local language of Kalenjin or in the national language of Kiswahili to enhance accessibility. New KCC attained all the seven indicators in the first two levels owing to its extensive AEAS programme that was designed to reach the maximum number of farmers possible through the attachment of dairy farm assistants to the farms as explained by the programme administrator below:

"We have DFAs [Dairy Farm Assistants], *we are targeting six hundred of them to manage three thousand* [small] *farmers along sixty routes. When I started as DFA, I managed fifty farmers, so the ratio was 1 DFA per fifty farmers. That is where we are heading. So that the DFAs will be able to link each farmer to a health provider, agrovet and then to a milk transporter and a financier. We came up with biogas and these DFAs will be able to guide the farmer to know the importance of biogas."* DP14, Company Extension Co-ordinator.

The average score across the cases regarding the indicators of social inclusion at the intention and consumption levels of the ladder was 5.7 out of 7. In contrast, we find minimal attainment of social inclusion indicators in the next two levels of benefit and process across all the three cases. Even though farmers attended trainings and adopted some of the practises and technologies that were being promoted, there is little evidence of the benefits of the initiatives to farmers' everyday lives. The availability and access to AEAS is therefore not a guarantee of meeting farmer's needs as this depends on other factors such as timing of the AEAS as noted by the government official below:

"When we started, there are seedlings we gave out to farmers, and we checked three months later only to find them where they had been initially kept; they had not been planted yet. That tells you that it was not a need for that farmer. So, we lost a lot of money when we started because of that. We did not address the farmers' immediate problem. The immediate problem was the marketing of maize, yet we were going to them with avocado to tell them to change from maize to avocado [chuckles]. *They felt that was not fair."* DP12, County Government Administrator.

The levels of benefits and process attained an average score of 1.5 out of 7 across the three cases. There was no evidence of farmers participation in the design, management, and control of AEAS programmes and procedures in the cases of UoE and UGCG. Additionally, feedback was not obtained from the farmers regarding how useful training and advisory services were to the farmers they were offered to. In the case of New KCC, targeted farmers participated in the design and management of the

extension program including setting the general training agendas that the program was to cover. However, the content and curriculum of the specific extension and advisory services were exclusively decided by New KCC and there were no follow-ups to evaluate how the useful the trainings were. As demonstrated by the company official below, the gap in attainment of social inclusion indicators across the levels of benefits and process can be attributed to lack of resources to evaluate and restructure their programs.

"...in terms of monitoring and evaluation…that is one of our areas of weaknesses. We never...we do not have that elaborate program to follow up and see whether our approach has worked. So, we cannot quantify and say we did this, and we achieved this. For example, now there are these new projects that have come up, they have done a basic baseline survey and will monitor to gauge the changes over time […] *But for us I think we do not have that."* DP13. Dairy company manager.

Despite the significant gaps in the attainment of social inclusion indicators in the benefits and process levels of the ladder, we find considerable attainment of the indicators of inclusion in the higher level of social structure. UoEOC for instance attained 2 out of 3 indicators regarding social inclusion in the social structure level. This is attributed to the discourse of 'taking the university back to farmers' that is prevalent among the staff of the outreach centre and guides its actions as indicated by the staff member below.

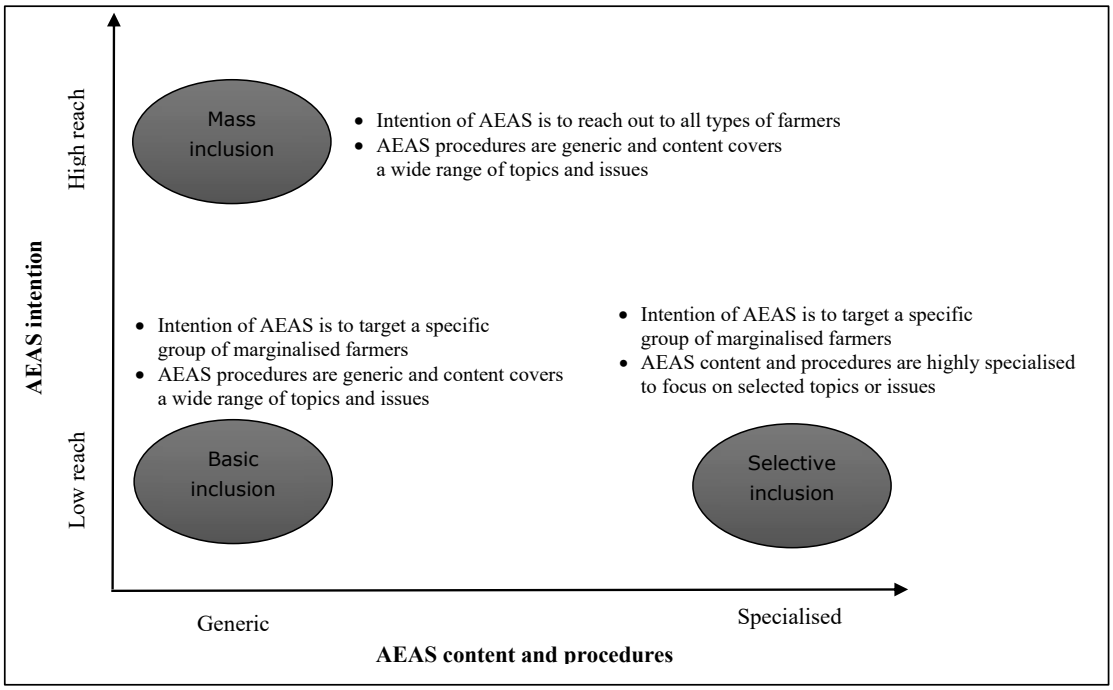
"...so, in our DNA we were meant to be a practical university...a university that is cooperating with farmers and the immediate community. So, come 2010, when we got funding and developed CARP...Community Action Research Project. The idea was that...we wanted to fine tune the technologies that we had developed with the farmers technologies developed by the farmers" DP10, UoEOC staff.

UoEOC also has plans to increase its revenue through commercialising it is services and products to farmers that are willing to pay in order to sustain the activities and functions of the centre. The centre director is also part of the University senate and therefore able to influence policies that impact the outreach centre. Similarly, UGCG is guided by a discourse of making its programmes and processes public, accessible and democratic. The researcher for instance participated in and observed a public 'baraza,' which was a forum conducted at village level to get the input of farmers on a change in county agricultural policy. Despite the significant attainment of inclusivity at this level, the average score across the cases was still low with only a third of the total indicators attained.

Forms of social inclusion across the AEAS programmes

When we closely examine the indicators of social inclusion that are attained across the various levels in the ladder, we find that the programmes in our study have different approaches to accomplishing social inclusion. The intention to include and delivery of AEAS to intended beneficiaries (consumption levels) are the most important levels for these programs to realise social inclusion. Analysis of the indicators attained by our respondents within these two levels reveals three forms of social inclusion as outlined in figure 4.2 below.

Figure 4.2. Forms of social inclusion across the study cases



First, AEAS may have the intention of including as many farmers as possible while having generic content and procedures in its delivery or outreach approach. We label this as 'mass inclusion' and was found across all the three cases. Secondly, AEAS may have the intention of including a specific group of farmers that are marginalised such as the youth but offer them generic content and procedures of AEAS. We label this as 'basic inclusion' which we also see in all the three cases under study. Finally, AEAS may have the intention of including a specific group of farmers such as the youth or women and at the same time have content and procedures that are tailor made to this specific group. We call this 'selective inclusion' which is seen in the UoEOC and UGCG cases. We further explain these three forms of inclusion in the succeeding text.

Mass inclusion

This type of inclusion was common in all the three cases under our study. The AEAS programmes had the intention of reaching a wide group of farmers as stipulated in their mission and objectives. Being non-profit making public organisations, both UoEOC and UG County government had the mandate to offer public services and were therefore under obligation to offer AEAS to all farmers in the region. New KCC was under no such obligation being a profit-making enterprise. However, it has periodic shortages in milk supply and therefore developed the farmers extension programme as a solution to reach out to as many farmers as possible and boost milk supply. All the three cases employed procedures that were generic such as offering services at subsidised costs to ensure accessibility to all types of farmers. Trainings were also observed to cover a broad range of topics and conducted in easily accessible venues such as milk collection or maize harvest collection centres in the villages and towns. While this type of inclusion made AEAS accessible and available to a large group of farmers, its drawback was that there were fewer tangible benefits beyond accessibility and access as demonstrated by the quote below.

"...sometimes have gone there [the university outreach centre] *and you find that a chicken farmer, a livestock farmer, and one involved in crops are all lumped together such that during training, they just skim-through the programmes. But if the university could deal with different zones; the farmers in this one area for example, first they could come and conduct research on the area and advise us on the best crops suitable for our soils or identify another area suitable for other agricultural activities."* DP31, Small-scale farmer.

Basic inclusion

This form of inclusion is also seen across the three cases. The programmes or specific projects within the programmes have the intention to target a specific group of farmers that are considered to be at risk of exclusion from AEAS such as women groups, the youth, or farmers within a specific area. The UGCG fiscal policy for the year 2020 for instance demonstrates the intention to focus its resources on particular groups of farmers as shown below.

"The County government will therefore focus resources on increasing agricultural productivity and production, value addition and empowerment programmes mainly targeting the youth, women and people with disabilities." DP32, UG Fiscal Strategy Paper, 2020.

Furthermore, the county also has a vetting committee in place to insure the most vulnerable farmers within these selected groups are identified and documented. AEAS

programmes therefore intend to be as specific as possible in selecting marginalising farmers. As demonstrated below by a quote from a New KCC staff, these specific groups of actors are targeted for certain reasons determined by the programmes.

'...we realized that bacterial contamination comes mostly from these smaller farmers who cannot process milk...who do not have the vehicles to rush the milk to the coolers." DP10, KCC program officer.

However, while specific groups have been identified with the intention of including them in the benefits and processes of AEAS, we find little evidence of AEAS procedures and content that have been tailor made for the identified groups of actors. For instance, the researcher participated in farmers training across all the three cases which were observed to offer general courses on farm management and covered a wide variety of topics even though the trainings had been organised for a specific group of farmers such as women groups. As shown by the quote below, this approach is due to lack of sufficient prior knowledge on the challenges and opportunities facing the specific groups of farmers targeted.

"If I am allocated the Tarakwa route for example, I will find out what the challenges are. So, I actually had to do a survey and got to know why the milk supply drops in certain months while it is high in certain months. So, I discovered the feeding problems...normally when the farmers use their land for crop cultivation their animals struggle. There is scarcity of water during the dry season. We discovered that the milk does not get to the coolers...why? We discovered that there is a challenge with roads and there is the challenge of prices... there are brokers who buy at a higher price than KCC." DP9, New KCC Dairy Farm Assistant

Selective inclusion

A few AEAS projects or interventions within our cases have the intention of targeting a specific group of farmers while at the same time having training agendas, curriculum or advisory services that have been tailor made for this specific group. UoEOC for example considers the youth be excluded from agricultural production and offers trainings, demonstrations, and advice on mushroom production as a 'clean' form of agriculture that the youth would be interested in as demonstrated below.

"...we actually have two youths who are practising what we taught them in the previous academic year. One of them went into production of organic fruits […] *The other went into mushroom production and he has been able to make a good fortune. I think currently he is doing the second or the third harvest of the mushrooms. Those are some of the examples where the youth have been able to put training into*

practical use in the agricultural sector. It is some of the 'clean' opportunities that we have tried out with the youth I would say." DP27, University project officer.

Similarly, UG County government has identified indigenous chicken as form of agricultural practise that women have control over compared to other agricultural practises such as dairy production that is mostly controlled by men and promotes indigenous chicken production to groups of women through trainings on disease control and management as demonstrated below.

"...we as Kalenjin women most of the time do not own land, cows, or sheep. So, what you can claim to be yours is the chicken. The chicken is yours because even if you sell it, your husband will not inquire why you sold the chicken. But if you sell off the cow you will not even be allowed to stay in that home, you will go back to your people (chuckles). *So, you see the Inua Mama Na Kuku [uplift women through chicken production] idea by the county is the best because it can take your children to school."* DP16, farmer.

Due to is high focus both in the intended beneficiaries and the approach to AEAS delivery, selective inclusion runs the risk of exclusion as it allocates resources to one groups of actors and these resources are not accessible or useful to any other group. However, the rationale is to target the most marginalised thus achieve equity in the distribution and access to AEAS by targeting and empowering the most marginalised.

Summary and synthesis of the findings

Table 4.4 below displays a summary of our findings. 4.4 A is an overview of all the indictors that were attained across all cases and across all levels of the ladder of inclusive innovation while 4.4 B is an overview of the forms of social inclusion employed by each of our study cases.

Table 4.4. Indicators and forms of social inclusion within and across study cases

A. Overview of social inclusion indicators attained within the study cases

Level in ladder	Indicators of social inclusion	Study cases		
		UoE Out.	County Govt.	New KCC
Intention	Are there guidelines, procedures and policy documents in place that stipulate social inclusion as a key objective within AEAS programmes?	☒	☒	☒
	Does AEAS identify and select farmers who are socially excluded?	☒	☒	☒
	Have resources such as finance, staff and other facilities been allocated for inclusion of targeted farmers within AEAS programmes?	☒	☒	☒
Consumption	Are AEAS targeted to specific farmers that are considered marginalised conducted at least once?	☒	☒	☒
	Are AEAS methodologies, including language, costs, and venue, easily accessible and affordable to farmers that are targeted?	☒	☒	☒
	Is the content and curriculum of AEAS accessible to all the farmers targeted?	☐	☐	☒
	Is the uptake of AEAS including number or farmers reached evaluated and documented?	☐	☐	☒
Benefits	Are targeted farmers able to implement the practises promoted by AEAS in their farms?	☒	☒	☒
	Do targeted farmers maintain their engagement with AEAS programmes over time because they find them valuable?	☐	☐	☐
	Have farmers who were not targeted joined the AEAS programmes due to interest?	☐	☐	☐
Process	Are targeted farmers involved in the design, management, and control of AEAS programmes and agendas?	☐	☐	☒
	Are targeted farmers directly or indirectly involved in setting up of AEAS methodologies and curriculum?	☐	☐	☐
	Do AEAS programmes use feedback from targeted farmers to revise and restructure AEAS?	☐	☐	☐
	Are the knowledge of targeted farmers and other local actors used in AEAS implementation?	☐	☐	☒
Social structure	Do discourses and missions of AEAS organisations feature social inclusion as a guiding principle?	☒	☐	☐
	Are rules and policy making processes on AEAS inclusive of all actors?	☐	☒	☐
	Are there systems in place to ensure the social inclusion aspects of AEAS are sustained in the long run?	☒	☐	☐

B. Social inclusion strategies employed by different AEAS providers

	UoE Outreach Centre	UG County Government	New KCC
Mass inclusion	☒	☒	☒
Basic inclusion	☒	☒	☒
Selective inclusion	☒	☒	☐

Overall, we find a strong emphasis on the first two levels of intention and consumption compared to the later three levels across all cases. The first two levels had an average score of 5.7 out of 7 across all the three cases compared to the last three levels which had an average score of 2.5 out of 10 (25% of the indicators). Social inclusion within the programs therefore mainly relate to intentions to include such as having well established and structured programs with staff and facilities with minimal emphasis on evaluating the benefits of the programs or including farmers in the design, management, and control of AEAS programs. This gap may be due to the relatively new establishment of the UOEOC thus insufficient time to evaluate the benefits and a new governance structure for the UG County extension program, which was under control of the national government before 2012. Despite this significant gap in benefits and process levels of inclusion, we find that some programs such as UOEOC and the UG county government have interventions to have farmers included in AEAS programs through change in existing policies and social structures, which is the highest level of inclusion according to the ladder. We also find that all the three cases simultaneously employ different forms of inclusion such as mass, basic selective inclusion. Selective inclusion was only employed by UoEOC and UG County because they were non-profit public institutions that had the flexibility to experiment with forms of AEAS that were not guaranteed to generate revenue for organisations providing AEAS. In the next section, we discuss the broader implications of these findings.
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Discussion

We started by pointing out that though AEAS programmes and approaches have undergone several changes over the years to make them socially inclusive, certain groups of farmers largely remain excluded from the access, benefits, and control of AEAS. We therefore adapted the ladder of inclusive innovation to AEAS and developed a holistic framework for assessing the social inclusivity of AEAS. We then applied it to investigate how inclusive AEAS programmes in Kenya are. Two key issues can be derived based on the findings. First, AEAS programmes have good intentions and procedures for being socially inclusive but achieving higher levels of inclusion remain a challenge. Secondly, the ladder of inclusive innovation has the potential to be a suitable tool to analyse social inclusivity within AEAS processes.

The good intentions and hard realities of realising social inclusion within AEAS

Since the 1970's, including farmers in the design and implementation of AEAS programs has been a key rhetoric among agriculture scholars and practitioners especially in less industrialised countries such as Kenya (Mohan and Stokke, 2000;

Faure, Desjeux and Gasselin, 2012). A key development among these approaches was the bottom-up or farmers led approaches that advocated for inclusion of farmers knowledge and practises in AEAS programs (Chambers, 1994; Thompson and Scoones, 1994; Osumba, Recha and Oroma, 2021). The concepts of farmer field schools and participatory rural appraisal presented practical frameworks for how bottom-up and farmer-led processes of AEAS can be actualised (van de Fliert, 1993; Chambers, 1994). Our findings indicate that this form of inclusion remains a mere rhetoric as practises of AEAS in the programmes under our study are based on an understanding of social inclusion that is based on the transfer of resources such as knowledge to targeted farmers rather than including them in the design and control of AEAS. While these programmes targeted specific farmers and had resources and procedures in place to delivery AEAS to the selected farmers, attempts to evaluate the benefits of AEAS and to include the farmers in the management and control of the AEAS programmes was largely missing.

A number of reasons have been cited for the lack of realisation of process and social structure based inclusion in AEAS programs. Mdee *et al.* (2020) for instance finds a gap between policy commitments on normative agendas such as inclusive agricultural development programs and the capacity of local institutions to deliver. Other scholars (e.g. Minh *et al.*, 2014; Moschitz *et al.*, 2015) have suggested that attaining the higher levels of social inclusion such as including farmers in the design and the restructuring of AEAS programs to make the processes participatory are too costly to attain especially in the context of less industrialised countries. Additionally, power and politics are usually at play within AEAS programs and outcomes of processes such as making AEAS inclusive may embody the interests of elite actors within such programmes (Hailemichael and Haug, 2020; Mdee *et al.*, 2020). Our study has demonstrated that because of these challenges in attaining higher levels of social inclusion, AEAS programmes 'settle' for several types of social inclusion at the lower levels of consumption and delivery of AEAS. This explains the continued prevalence of the gap between rhetoric and practice in inclusive AEAS programmes. Theories on AEAS design and participatory approaches could therefore benefit from perspectives from innovation studies to examine new and innovative ways that facilitate AEAS processes to 'climb' to higher levels of social inclusion. This necessitates innovation to make AEAS programmes socially inclusive.

Assessing the inclusiveness of AEAS programmes

One of the key issues regarding social inclusion within AEAS programmes is lack of suitable frameworks and tools to assess such processes (Knickel *et al.*, 2009; Prager, Creaney and Lorenzo-Arribas, 2017). In this study, we have demonstrated that the ladder of inclusive AEAS as well as the indicators within each level can be a suitable

tool for evaluating the extent to which AEAS such as a farmers training programme can be inclusive. Three key issues however emerge in relation to the ladder. First, we find that the ladder is not linear and various levels can be attained concurrently. Within the programmes in our study, indicators at social-structure level such changing policies to ensure AEAS programmes are sustainable could be attained even though inclusion in process was missing. Secondly, we find that there may be a trade-off between the types of inclusion achieved between intention and consumption levels. For instance, AEAS may select a specific group of farmers in the intention level but then employ generic approaches at consumption level in attempts to deliver AEAS to as many farmers as possible. This may lead to exclusion at the consumption level even though there was an intention to include. We therefore suggest an additional indicator at consumption level: Are all the farmers targeted at intention level able to access and use AEAS? This will ensure that inclusion is sufficiently addressed at this level. Finally, we find that the ladder of inclusive innovation offers a broader concept of social inclusion compared to what is offered by AEAS literature. We did not find any explicit indicators in AEAS literature that addressed post-structural elements of inclusion such as the inclusion of farmers knowledge or perspective on what concepts such as participation or social inclusion means. The ladder of inclusive AEAS could therefore be broadened to include these aspects.

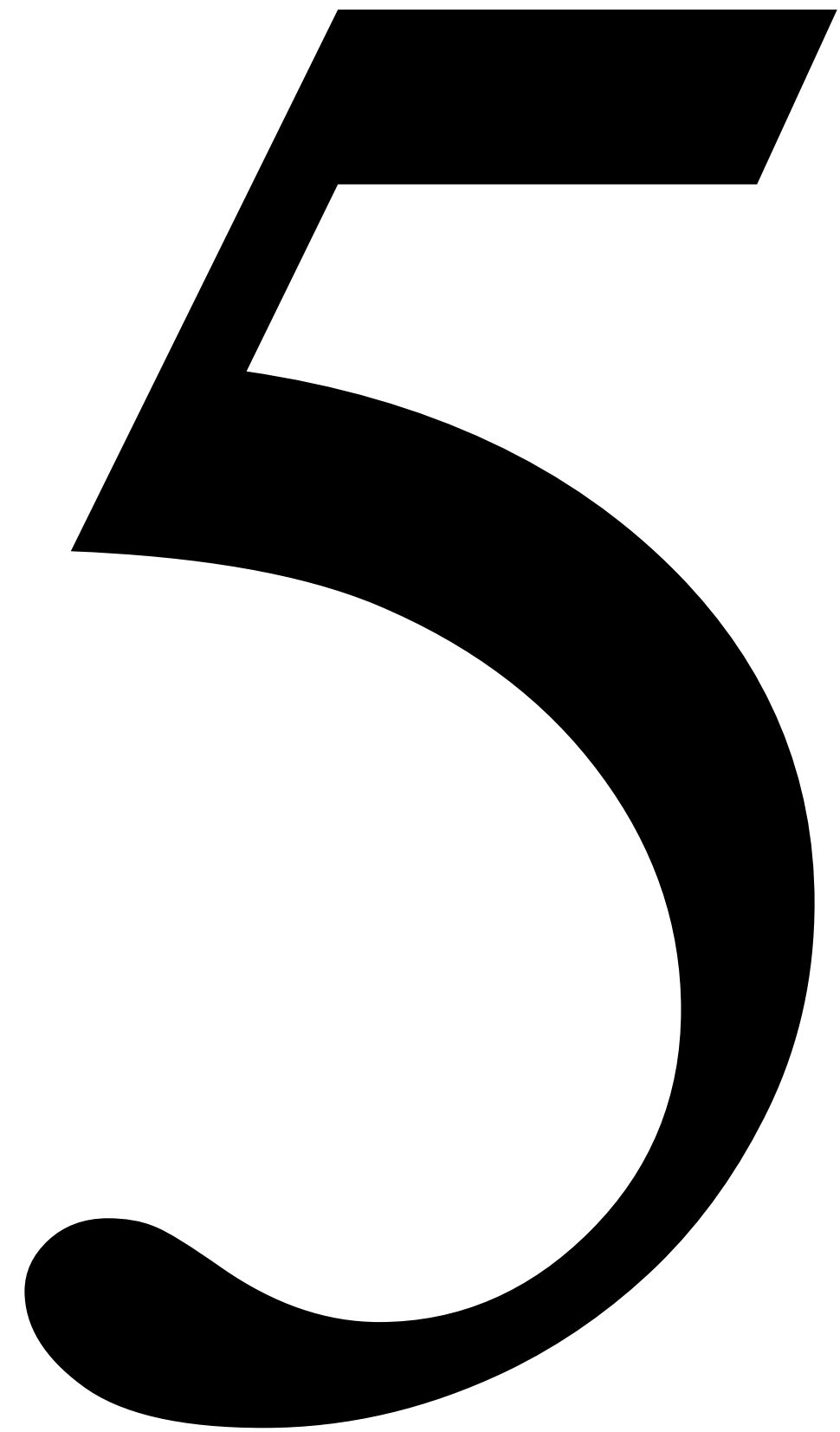
The practical implication of this finding is that levels and forms of social inclusion can be attained and evaluated across various levels in the ladder depending on the outcomes being pursued. As Birner *et al.* (2009) have pointed out, an agricultural innovation system is composed of a variety of actors with different backgrounds and interests. Farmers are also not a homogenous group and diverse types of farmers have diverse needs. Moreover, the needs and interests of these farmers evolve over time based on contexts such as change in seasons (Kilelu, Klerkx and Leeuwis, 2014; Klerkx, Petter Stræte, *et al.*, 2017). Since one-size-fits all solutions are inappropriate in the context of multiple actors, problems and solutions (Opola *et al.*, 2021), attaining inclusive AEAS can therefore focus on specific contexts and adopt approaches that are best suited to those specific contexts or actors (Birner *et al.*, 2009; Klerkx, Petter Stræte, *et al.*, 2017). However, our analysis has demonstrated that such an approach leads to a trade-off as focussing on one type of inclusion or one group of actors leads to the exclusion of another. The ladder of inclusive AEAS, with the suggested modifications, can be a valuable tool to assess inclusion or exclusion of actors such as farmers at various levels of innovation processes. Priorities and choices can therefore be explicitly made regarding which farmers are to be included or excluded from innovation processes and how the consequences of these choices will be dealt with.

Limitations to the study

Our study had a couple of limitations. First, while we developed qualitative indicators of social inclusion across the ladder, numerical indicators of social inclusion such as number of farmers targeted or reached by AEAS programmes was beyond the scope of this study. This requires attention to further enhance the ladder instrument that we have developed. Secondly, while we find that higher levels or social inclusion are mainly not attained in the AEAS programmes under this study, we did not unravel the reasons why these levels are not attained. Further research could explore these issues.

Conclusion

The objective of our study was to unravel how to assess inclusivity within AEAS. To this end, we tailored the ladder of inclusive innovation to AEAS, and used it to explore the extent to which AEAS programmes are inclusive. We find that in practice, higher levels of social inclusion are difficult to attain possibly due to cost and existing political and social structures. We also find that the ladder of inclusive AEAS, with a few modifications can be a valuable tool to assess the extent to which AEAS programmes can be socially inclusive for distinct groups of marginalised actors since different approaches and forms of inclusion are pursued concurrently. We therefore suggest the application of the ladder as a tool to assess the different AEAS programmes on ex-ante or ex-post basis within a country or region to distinguish separate groups of farmers that can be or are excluded from AEAS processes and assess the forms and levels of inclusion that can be attained within these programmes.



Chapter 5

Examining the Legitimacy of Inclusive Innovation Processes: Perspectives from Smallholder Farmers in Uasin Gishu, Kenya

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Abstract

In recent decades, the concept of inclusive innovation has been used to refer to how innovation can include actors that are considered marginalised from its processes and outcomes. Contrary to the expert-driven approaches prevalent in evaluating the legitimacy of such processes, this paper examines the legitimacy of inclusive innovation from the perspective of smallholder farmers in rural Kenya that are targeted with various agricultural innovation interventions because they are resource constrained. Findings indicate that procedural aspects of legitimacy, such as including farmers as co-innovators and including their knowledge and skills in agricultural innovation processes are an important criterion used by targeted farmers to accord legitimacy to such interventions. We also find that such interventions need to be stable over time in order to be legitimate to the intended beneficiaries. We therefore recommended assessment methods focussed on the perspectives of the targeted actors in evaluating the legitimacy of inclusive innovation.

Introduction

In recent decades, the concept of inclusive innovation has been used to refer to how new or improved knowledge, technologies and social arrangements can be aligned to the needs and opportunities of sections of the population that are considered to be excluded from participating and benefiting from innovation processes (van Gorp, 2007; Foster and Heeks, 2013; Chataway, Hanlin and Kaplinsky, 2014). A number of perspectives and approaches therefore exist that experiment with and aim to address the problem of social exclusion from innovation processes (Opola *et al.*, 2021). First, business-oriented approaches advocate for the development and deployment of affordable services and technologies, and other products that are appropriate to low income and resource -constrained groups of people such as poor rural households or informal sector residents, through what have been referred to as frugal or bottom of the pyramid innovation processes (Prahalad, Di Benedetto and Nakata, 2012; Onsongo and Knorringa, 2020). Secondly, other approaches emphasize the participation of marginalised actors in innovation processes by recognising and including their knowledge, skills and technologies in innovation processes (Fressoli *et al.*, 2014; Smith, Fressoli and Thomas, 2014; Karanja, Kamau, Macoloo, Righa, van Veldhuizen, *et al.*, 2017). Finally, some theories and approaches, especially from disciplines such as political economy and critical agrarian studies have called for a re-examination of the rules and social structures that lead to the exclusion of groups of people from the benefits and processes of innovation (Arora and Romijn, 2012; Crivits *et al.*, 2014; Papaioannou, 2014; Mdee *et al.*, 2020).

Common among these different approaches and initiatives is the focus on a specific group of people that are considered to be excluded from innovation processes due to distinct reasons. In the context of less industrialised countries, these groups of marginalised actors have included workers in the informal sector such as artisans, food distributors and traders who lack access to resources and networks need to innovative or benefit from outcomes of innovation. (Arza and van Zwanenberg, 2014; Cozzens and Sutz, 2014). In agriculture, smallholder farmers with minimal resources and pastoralists in semi-arid areas are also considered to be marginalised from mainstream agricultural innovation processes and various initiatives have been developed to enable them participate and benefit from innovation (Mwangi and Rutten, 2012; Mdee *et al.*, 2019). In addition, certain population sub-groups such as women, the youth and small scale food producers and distributors who have little influence or authority over institutions and resources are likely to be excluded from participating and benefiting from innovation processes in rural and urban areas due to the accompanying power dynamics (Dolan and Rajak, 2016; Jiménez, 2018; Vossenberg, 2018).

A key issue across the literature on inclusive innovation is how power manifests across networks of actors involved in innovation processes. (Arora and Romijn, 2012; Papaioannou, 2014; Eidt, Pant and Hickey, 2020; Mdee *et al.*, 2020). Various studies have shown that innovation processes such as research and knowledge exchange are dominated by the agendas and interests of influential actors (Swaans *et al.*, 2013; Sengupta, 2016; Eidt, Pant and Hickey, 2020). Since marginalised actors such as small-scale farmers in rural areas are likely be excluded not only from innovation processes themselves but also from the power structures that control such processes, approaches to inclusive innovation risk being unsustainable in the long term despite their noble intentions. This is because these initiatives are likely to embody the interests of organisations such as state agencies, development agencies or research institutions that promote them. (Ribeiro *et al.*, 2018; Mdee *et al.*, 2020). As a result, the assessment of successful inclusive innovation processes are likely to be centred on criteria developed by the organisations that promote it (Ribeiro *et al.*, 2018). The criteria that the groups that are targeted with inclusive innovation initiatives use to evaluate the successes or appropriateness of such interventions remain largely unknown in inclusive innovation literature (Geels and Verhees, 2011; Uddin *et al.*, 2014). This later criteria concern how legitimate these interventions are to the targeted actors and is important in the assessment of the success of inclusive innovation since these actors are likely to cooperate and share knowledge with organisations and processes that they perceive to be desirable and appropriate (Geels and Verhees, 2011).

Little is therefore known about the values, norms and interests through which the targets of inclusive innovation processes assess the legitimacy of such initiatives (Cozzens and Sutz, 2014; Woodhouse *et al.*, 2017; Ribeiro *et al.*, 2018). In this paper, we use the case of innovation initiatives directed at smallholder farmers in rural Kenya to investigate the criteria which groups of people that are targeted with inclusive innovation initiatives use to assess the suitability of such innovation processes and outcomes. To achieve this aim, we employ the concept of legitimacy to examine the appropriateness of inclusive innovation to its 'audience'[1], a term which Suchman (1995) uses to refer to a group of people who are usually the target of an organisation's interventions. We use the term 'target' instead of 'audience' of inclusive innovation in the rest of this paper to refer to smallholder farmers that are the intended beneficiaries of inclusive innovation initiatives by organisations such as universities, agricultural research institutes and agricultural enterprises and civil society organisations. Our aim is to address the following question:

- What criteria do targets of inclusive innovation initiatives use to assess the legitimacy of such initiatives?

1 While Suchman uses the term 'audience', this creates a contradiction in inclusive innovation literature since it implies an excluded group of people.

In the next section, we further explain the concept of legitimacy and its relevance to inclusive innovation literature as well as develop a framework to for our study. This is followed by a section outlining our research methodology. We then present our findings before ending with a discussion of these findings and a conclusion.

Theoretical perspective: Three dimensions of legitimacy

Suchman (1995:574) defines legitimacy as *"a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions."* Three main aspects of legitimacy can be identified in regard to how a society evaluates the appropriateness of an organisation's actions: Moral legitimacy, cognitive legitimacy and pragmatic legitimacy (Suchman, 1995).

Moral legitimacy

Audiences subject organisations and their initiatives to a moral judgement based on the history of interactions between the organisation and the audience (Suchman, 1995). This judgement may be positive, negative or neutral and is based on the conformance to certain norms and values among the audience such as fairness, justice, integrity and competence (Suchman, 1995; Johnson, Dowd and Ridgeway, 2006; Harris-Lovett *et al.*, 2015). In innovation processes, moral legitimacy can be separated into different forms including personal, procedural and consequential legitimacy (Harris-Lovett *et al.*, 2015). Personal legitimacy is accorded based on the integrity and trustworthiness of the organisation itself and its personnel (Harris-Lovett *et al.*, 2015). Procedural legitimacy is based on an evaluation of the procedures and methods employed by the organisations and is accorded after interaction with the organisations. For instance, people may value the right to participate in decision making processes even if they don't use this right to achieve desired outcomes (Johnson, Dowd and Ridgeway, 2006; Jäske, 2019). Finally, consequential legitimacy is based on the consequences of an organisation's actions or initiatives and can only be observed and accorded after a significant period of interaction between the organisation and its processes and the actors that are targeted (Uddin *et al.*, 2014).

Cognitive legitimacy

Innovation initiatives by organizations have cognitive legitimacy when they are well known and understood by the audience (van Oers, Boon and Moors, 2018). The dominant innovation trajectory in most countries is capital and skill intensive (Pansera and Martinez, 2017). Targets of inclusive innovation initiatives may therefore find innovations promoted by certain organizations to be incompatible with the knowledge, resources and experiences that they possess and therefore lack

legitimacy (Chataway, Hanlin and Kaplinsky, 2014; Woodhouse *et al.*, 2017). For example, it has been pointed out that globally, research and development activities are mainly conceived and managed in industrialised counties and therefore the concept and aspects of predominant forms of innovation are ambiguous when applied in the context of less industrialised countries (Pansera and Martinez, 2017). Initiatives to promote certain innovations to audiences such as smallholder farmers in rural areas may therefore face an impasse when the language, skills and resources required for the innovation to be implemented is incomprehensible. As a result, the innovation is deemed to be inappropriate by the audience (Ribeiro *et al.*, 2018).

Pragmatic legitimacy

This is based on the audiences' assessment of the benefits that can be derived from the innovations being promoted by different organisations (Harris-Lovett *et al.*, 2015). Over time, the audience of innovation familiarise themselves with it and are able to observe and assess its costs as well as its benefits to them (Johnson, Dowd and Ridgeway, 2006). Pragmatic legitimacy can be observed or experienced in two ways (Suchman, 1995): first, benefits such as material of financial gains are directly observed or realised after engagement and interaction of audiences with the innovations being promoted. In the context of agricultural innovation for example, new modes of production such as conservation agriculture may lack legitimacy if they result in undesirable changes in the everyday lived experiences of the farmers involved such as more labour requirements compared to conventional agricultural practises (Jimenez-Soto, 2020). Secondly, benefits may be symbolic rather than directly observed. For example, through participation in the innovation initiatives through representatives appointed by the targets of inclusive innovation, the later can expect to benefit from the innovation process even though they cannot immediately or directly observe or experience it (Suchman, 1995).

Methodology

We employ a case study research design to investigate the criteria that farmers in Uasin Gishu County, Kenya use to assess the legitimacy of various agricultural development interventions targeted at them. Our case is limited to farmers that are targeted by various agricultural innovations promoted by organisations such as the Uasin Gishu County Government, research and knowledge institutions and private service providers. We first outline the agricultural landscape of Uasin Gishu and highlight the types of agricultural innovations that are promoted through various programmes in this region. We then present our sources of data and data analysis methods.

Inclusive innovation initiatives for smallholder farmers in Uasin Gishu, Kenya

Uasin Gishu is a region in Western Kenya often referred to as the 'bread basket' of country due to the high food production in the region compared to the rest of the country (County Government of Uasin Gishu, 2013; Clare, Simiyu and Elizabeth, 2019; Wildermuth, 2021). The major crops cultivated in the region have traditionally been wheat, maize, beans, sorghum, millet, and vegetables while new crops such as passion fruit, avocado and coffee have been recently introduced in the region. The county is also a major producer of milk (County Government of Uasin Gishu, 2020). Majority of farmers in Uasin Gishu produce both crops and livestock products in smallholder farming systems with minimal application of new agricultural technologies and skills such as agricultural mechanisation and new breeding techniques (MoALF Kenya, 2017).

Over the years, Uasin Gishu has been a major site in Kenya for promoting the adoption and use of new agricultural technologies and skills such as agricultural mechanisation, new breeding techniques and novel production methods (County Government of Uasin Gishu, 2013, 2020). Organisations such as the local government and other state agencies, universities, private business enterprises and development agencies have promoted new or improved technologies and social arrangements in the region. Some of these initiatives have specifically targeted specific groups of smallholder farmers such as women, youth and elderly farmers with little resource endowments and developed various ways of including them in the benefits and processes of agricultural innovation (MoALF Kenya, 2021c; County Government of Uasin Gishu, 2020). The main approach to achieve this objective has been the transfer and promotion of new technologies and skills to the targeted farmers in the region through methods such as training and agricultural extension (MoALF Kenya, 2021c). This study therefore focusses on how these targeted farmers in Uasin Gishu County assess the legitimacy of the inclusive innovation initiatives promoted and implemented by various organisations in the region.

Data sources and analysis

We purposefully selected twenty-nine farmers in Uasin Gishu that were targets of inclusive innovation initiatives by three organisations in Uasin Gishu County: The Uasin Gishu County Government (UGCG), The University of Eldoret Outreach Centre (UoEOC) and New Kenya Co-operative Creameries (New KCC). The list of farmers recruited and the programmes that they were affiliated to are presented in the table below.

Table 5.1. Overview of the interview respondents and the programmes they were affiliated to

Respondent	Programme affiliated to	Details of the respondent
DF1	New KCC	Female; Elderly; Member of co-operative
DF2	New KCC	Male; Youth, Member of co-operative
DF3	New KCC	Female; Youth; Member of Co-operative
DF4	New KCC	Male; Youth; Member of co-operative
DF5	New KCC	Male; Elderly; Individual farmer
DF6	New KCC	Male; Elderly; Member of co-operative
DF7	New KCC	Male; Youth; Member of co-operative
DF8	New KCC	Male; Elderly; Chairperson of co-operative
DF9	New KCC	Female; Youth; Chairperson of farmers' association
DF10	New KCC	Male; Elderly; Treasure of co-operative
DF11	UGCG	Male; Elderly; Individual farmer
DF12	UGCG	Female; Youth; Member of farmer association
DF13	UGCG	Male; Youth; Member of a producer association
DF14	UGCG	Male; Elderly; Manager of a village-based processor
DF15	UGCG	Male; Elderly; Individual farmer
DF16	UGCG	Male; Elderly, Individual farmer
DF17	UGCG	Female; Youth; Individual farmer
DF18	UGCG	Male; Elderly; Individual farmer
DF19	UGCG	Male; Youth; Member of famers' association
DF20	UGCG	Male; Youth; Individual farmer
DF21	UGCG	Female; Youth; Individual farmer
DF22	UoEOC	Male; Youth; Individual farmer and extension officer
DF23	UoEOC	Male; Elderly; Individual farmer
DF24	UoEOC	Male; Elderly; Individual farmer
DF25	UoEOC	Male; Youth; Individual farmer
DF26	UoEOC	Female; Youth; Individual farmer
DF27	UoEOC	Male; Youth; Individual farmer
DF28	UoEOC	Male; Elderly; Individual farmer
DF29	UoEOC	Male; Youth; Individual farmer

Our participants were sampled for maximum variation in terms of social status, gender, and age. The interviews were conducted over a period of 9 months between June 2019 and March 2020. The researcher was based in Uasin Gishu County during this time to enable interaction with farmers and other actors involved in agricultural innovation processes in the county. Initial months were spent on field visits and informal interviews to obtain consent, build rapport, and familiarise with the context and actors within the study area. This was followed by interviews and non-participant observation of farmers at their farms as well as in various knowledge sharing platforms. Participant observation (Merriam, 1998) was employed to observe and document through event logs and field notes the interaction between farmers and other actors in 2 agricultural exhibitions, 4 farmers training sessions, 2 demonstration stations for farmers by the organisations promoting and facilitating inclusive innovation and an annual general

meeting of a farmers dairy co-operative. In the farms, non-participant observation was employed and entailed walks through the farms visited to document the adoption and appropriateness of various skills and technologies promoted to the farmers.

The interviews were transcribed verbatim and uploaded to the ATLAS.ti data analysis software. The aspects of moral, cognitive and pragmatic legitimacy (Suchman, 1995) were used as sensitising concepts while coding the data to unravel how the participants assessed the legitimacy of the inclusion innovation initiatives. These concepts were later refined to develop emerging themes of how legitimacy in constructed by the audiences of inclusive innovation processes. In the section below, we present how farmers in Uasin Gishu assess the moral, cognitive, and pragmatic legitimacy of the interventions.

Findings

Table 5.2 below outlines what were elicited as the various dimensions of the three types of legitimacy by farmers in Uasin Gishu that were targets of various agricultural research, knowledge exchange and technology deployment initiatives. We further explain these dimensions in the subsequent text.

Table 5.2. How targeted farmers assess the legitimacy of inclusive innovation

Moral legitimacy	Ownership and influence over inclusive innovation initiatives Competence of the organisations involved Credibility and trust of the organisations involved and its procedures Geographical proximity between the organisations and farmers Frequency of interaction between the organisations and farmers
Cognitive legitimacy	Familiarity with the 'site' for knowledge and technology exchange Accessibility of the 'site' for knowledge and technology exchange Complexity and ease of use of the promoted innovation Familiarity of the farmers with the innovations promoted Suitability of the procedures and methods employed
Pragmatic legitimacy	Affordability and effort required to participate in the promoted innovation Alignment of the innovation to farmers needs and interests Flexibility of the innovation to allow adaptation Timeliness of the innovation Scope of the innovation Novelty of the innovation

Moral legitimacy

Farmers in Uasin Gishu elicited several dimensions of moral legitimacy that they accorded to the organisations that promoted inclusive innovation as well as the procedures that they employed. This included the degree to which they had ownership and influence over the initiatives directed at them, the credibility and competence of the organisations that facilitated the innovations and communication as well as proximity between the targeted farmers and the organisations involved.

Ownership and influence over inclusive innovation initiatives

Respondents in this study valued being included in the design and implementation of innovations such as plant breeding as well as having influence over how the innovations were managed. This showed that ownership of the innovation process was an important criterion that farmers used to accord moral legitimacy to the innovation process. As the farmer quoted below demonstrates, being consulted, and included in agricultural innovations right from inception was a crucial factor that led to the acceptance of the innovation.

"It is like baking a cake and after it has done you divide it among people. Suppose you baked it in a bad way, do you think those people will eat the cake simply because it was your intention that you feed them? No! Participate with them. Do it together and at the end of the day they will say we did it, this is ours […] come and live with these farmers, see what they do, how they do it, why they do it, you know… all those things and then from there you can initiate yours gradually." DF16.

The importance of influence over the inclusive innovation processes was also demonstrated by the desire for farmers to contribute to the overall agenda of the initiatives as the quote below shows.

"The training agenda should not be dictated by one side because it must be a partnership…it must come from both the farmers and the county government...It is like the case of a patient and a doctor. If the patient does not communicate what is ailing them to the doctor properly, the doctor may not be able to address them. So, it must be both." DF15.

Influence over the processes created stability over the processes since farmers felt that they could control the outcome compared to situations where they lacked influence. The later scenario created uncertainty over the processes and therefore a reluctance by farmers to positively evaluate the organisations involved as well as the innovations promoted. Absence of procedural legitimacy within inclusive innovation initiatives therefore led to uncertainty among the targeted farmers.

Geographical proximity and communication between farmers and organisations

Lack of constant communication and gap in physical interactions between farmers and the organisations led to a negative evaluation of the organisations and therefore absence of legitimacy. The farmers valued availability of staff and their presence in the local communities as this enabled them to trust the organisations as well as their procedures. As the farmer below indicates, having a programme for the elderly is not sufficient if the farmers cannot see and personally communicate to the administrators of the programme.

"Who will I go to? Who will approach? [...] You cannot go to the organisation's offices and see the leader. When you get there, you are directed to stand in a long queue… 'what do you want old man?' They talk about assisting the elderly...but you know as the elderly we come from a certain place where things are done in a certain manner. You cannot keep going there every morning. You lose interest and tell yourself to just work on the farm as long as God helps you and you get some food." DF11.

This indicates that farmers value symbolic gestures such as personalised communication even when they might not necessarily result in tangible benefits. Phenomena that targeted farmers could observe such as the ability to hold discussions with senior staff of the organisations that promote inclusive innovation or the presence of the organisations' staff within the farming communities gave the targeted farmers trust and assurance that the organisations were working in their best interests.

Credibility and competence of the organisations that promote innovation

The organisations and their actions were also observed by the farmers over time and evaluated either positively or negatively based on how credible or competent they were. Organisations were assessed based on whether they have competent staff, sufficient resources or whether they had a history of implementing programmes in a fair and just way. The quote below for instance shows that farmers negatively evaluated certain organisations because they had a history of poor management of agricultural projects.

'But now...the problem with O3 *is that they they just 'party'at the top and do not scrutinise the plight of farmers. They purchased maize from farmers at 3200 shillings per bag from taxpayers money. But that maize eventually got rotten and had to be destroyed. Experts said that it had been infected with aflatoxins*[...] *So where are we going? Do you get my point? Such are the things that are letting us down. It is* O3 *that is failing us together with the politicians.* DF11.

Non-participant observation in respondents' farms further revealed that technologies promoted to farmers such as new seed varieties were adopted on a trial basis because they did not trust that the organisations promoting it had the knowledge and expertise to supply decent quality seeds. Not only were the organisations themselves but also their actions were morally evaluated for legitimacy. Among the respondents, fairness and justice was an important criterion for assessing the credibility of an organisation's actions. The farmer below for instance found it unfair for organisation 01 to discriminate against farmers with few resources.

"Where I would like them to improve on is that they should not neglect the farmers with few cows […] The farmers with big farms have land where they can plant grass and other pastures. But the small-scale farmers should also be trained on how to acquire animal feeds to improve milk production. DF3.

It is therefore shown that the historical background of organisations, including its time of operation and interactions with farmers is a key factor that led to how legitimate the organisation and its action are to the farmers in this study. This is because it gives farmers the opportunity to morally evaluate the organisations and its actions. Legitimacy is therefore acquired over time and new organisations are likely to lack legitimacy due to lack of time to be assessed for credibility and competence.

Cognitive Legitimacy

In relation to the dimension of cognitive legitimacy, aspects such as the 'space' where interactions took place, the risks and uncertainties involved in the agricultural innovations being promoted as well as the suitability of the procedures employed all influence the degree to which the innovations were understandable to the farmers and therefore appropriate.

Familiarity and accessibility of the 'site' for knowledge and technology exchange

The cognitive legitimacy of the skills and technologies being promoted depended on accessibility of the 'site' where interactions between organisations promoting the innovation and the farmers being targeted took place. Respondents found innovative initiatives such as trainings that were conducted on their own farms or in places that they were familiar with to be legitimate because they could observe and experiment with the skills of technologies and therefore reduced complexity of the trainings. As a result, these trainings could be easily understood. As explained below, learning by seeing and doing was more valuable that other forms of learning such as seminars where farmers did not have much practical interaction with the skills and technologies being promoted.

"...previously there were institutions called farmer field schools…I wish they could come to the farmer groups and put up some model farms purely sponsored and managed by the county government officers and the farmers or farmers groups. So that when we are talking about passion fruit for example, there exists a model farm that can serve as a learning school for others. You know seeing is believing…those who are slow in learning through words can see. When we say a passion fruit plant produces a certain number of fruits or it matures after a certain period, we will be seeing that." DF16.

Additionally, respondents recommended interactions with people they can easily identify with and relate to during innovation processes. The farmer below expresses how sharing knowledge is more valuable when it is between peers compared to between farmers with different farm sizes of level of intensity.

"Once we went to Ndaragwa and that is where I felt challenged because the farmer, we went to visit is somebody we know. The farmers here at Plateau are mostly foreigners, but this was someone we know, and we saw his transition from what he used to have before compared to now…he took us around the farm showing how the animals are fed, he also took us to his milking shed and showed us the actual milking. If you look at his cows, they are the same as the ones we have, the only difference is what he feeds his and what we feed ours." DF6

These findings indicate that cognitive legitimacy depends on how familiar farmers are with the site where innovations such as knowledge exchange takes place. This is in turn influenced by the length of time the site has been in existence as well as its ease of access to farmers targeted by inclusive innovation initiatives. Farmers prefer spaces and processes where they are comfortable to interact and where sufficient time is available to observe and evaluate new technologies or skills being promoted.

Complexity and ease of use of the innovations being promoted

Respondents did not have a full knowledge of the whole food production and distribution system and were therefore subjected to risks and uncertainty caused by adopting the new technologies, expertise or social arrangements introduced to them as part of inclusive innovation initiatives. In addition, they were worrisome of unexpected future events which may disrupt any new practises adopted. For the innovation to appropriate therefore, farmers expressed the need to understand the whole aspect of the innovation being promoted including the risks involved, legal regulations and distribution requirements and not just the skill, technology or social arrangements being introduced as solutions to the challenges they face. The farmer below explains how an improved variety of avocado was not appropriate for farmers targeted due to the uncertainty involved in its marketing compared to agricultural practises with which he was familiar.

"We decided to embrace it [avocado] *because it is a new variety, and we should not be struggling with maize every season since birth. So, we decided to change. I am not saying that they* [UG County government] *have done something bad…but yesterday I was asking myself that if personally I cannot go to China, how will my produce get there? Suppose our produce is ready to export and everything is on lockdown, what are we supposed to do?* DF15

This indicates that farmers find new skills of technologies to be legitimate when there are few risks involved because of their complexity. A key factor in making innovation inclusive is therefore providing adequate information concerning the new skill or technology to reduce risks.

Suitability of the methods and procedures employed

The methods and procedures used in innovation processes such as agricultural extension is significant in determining whether the process is legitimate. In knowledge exchange for example, methods used included farmers seminars with the classroom style type of teaching, demonstrations in prototype farms and actual farm settings, observation of new technologies or techniques, use of ICT and linkages to other actors who can provide the required knowledge. There was observed a preference for demonstrations and trainings conducted in local languages as well as practical knowledge sharing methods with opportunities to interact with other actors including fellow farmers and which enable them to observe evaluate the suitability of new technologies or skills being offered to their farms. The farmer below describes how hands-on trainings on farms are more appropriate methods of sharing new technologies compared to seminars or workshops.

"[…] when they are talking about various irrigation technologies, let them come and demonstrate these technologies where the farmers are and not take them to town, to the show ground and tell them to go and see the irrigation systems. It is like you want some technologies to be adopted and you take the farmers to some advanced places so that they may learn from there, so that they can tap it, or they can scale it down. It cannot work! Empower them from their own backyards, from what they know…that is where this organisation is lagging." DF26.

Participant observation in farmers training seminars also revealed that language used was a key factor in making trainings on new agricultural technologies such as grafting to be legitimate, with farmers preferring the use of local languages and terms rather than English or 'scientific' language. This indicate that cognitive legitimacy can be attained when methods employed address the 'cognitive gap' that exists between 'scientific' knowledge and indigenous knowledge such as difference in language used to describe technical terms.

Pragmatic legitimacy

Dimensions of pragmatic legitimacy elicited by the respondents included affordability and effort required to participate in the innovation as well as alignment of the innovation to what the farmers' needs and interests.

Affordability and effort required to participate in the promoted innovations

Some respondents prioritised initiatives that were affordable or free, had insignificant impact in changing their daily routines, and required less investments in time and other resources. This is demonstrated by observed high level of participation in events within the initiatives that were easily accessible and available to targeted farmers. Participation in meetings such as training sessions organised by organisations promoting inclusive innovation required significant resources such as time and transportation to the venues from the targeted farmers. These farmers therefore assessed the benefits from the innovations compared to the cost and effort required to participate. Monetary and non-monetary costs such as time, planning, financial costs, and effort required to take part in or benefit from innovation processes may lead to an innovation to be considered illegitimate. The farmer below for instance laments on the costs and effort involved in putting knowledge acquired from a research institute into practice.

"...concerning fish production, birds were a major problem as pests. When someone approaches, they will fly away so that means it requires constant supervision and where will you get the funds for such? That is one of the reasons the project has stalled. Also, water. You must pump it to get enough and that needs a machine... So, they [The University] *have helped us to have that knowledge but to put into practice has been a challenge"* DF23.

The geographical proximity of the organizations that engage in or facilitate inclusive innovation processes and their farmer audiences also influence how appropriate the knowledge and technologies will be since it lowered the cost of access. For instance, the presence of agricultural extension agents in the farming communities where they could be easily reached made the skills and technologies being promoted by the organization to be more valuable. Apart from legitimacy accorded due to direct benefits or loses, innovations are considered valuable and appropriate when they are thought to lead to future benefits. Trainings for instance are not only valued because they lead to exchange but also because they expand farmers networks through linkages with other farmers and actors in the innovation system.

Alignment of the innovation to farmers' needs and interests

Farmers considered the innovations to be aligned to their interests when they could address the day-to-day challenges that they faced, were delivered on time, had flexibility to allow the farmers to experiment with it, was comprehensive and offered something new compared to what they are used to. While various organisations attempted to include farmers in the benefits of agricultural innovation such as through training farmers on new crop and animal production techniques, farmers evaluated these processes over time and were able to determine whether they are

useful to their day-to-day needs. In addition, their lived experiences on the farm enable them to ascertain whether new knowledge or technologies will be useful to them. For instance, the farmer below explains how a new chicken variety introduced and promoted to them was a legitimate choice of innovation by the organisation involved.

"...we as Kalenjin women most of the time do not own land, cows, or sheep. So, what you can claim to be yours is the chicken. The chicken is yours because even if you sell it, your husband will not inquire why you sold the chicken. But if you sell off the cow you will not even be allowed to stay in that home, you will go back to your people (chuckles). So, you see the Inua Mama Na Kuku [uplift women through chicken production] *idea by the County Government is the best because it can take your children to school."* DF12

However, a different farmer from the same group laments how the programme did not address the problem of low agricultural income that the group hoped it would address and instead ended up disintegrating the group as demonstrated below.

"...they call the project 'Inua mama na kuku' [uplift mothers through chicken production] *but for us in fact we made a loss of 111,000 shillings from those chicken […]. If they would have made follow ups, then the project would have raised the women's living standards as it is named […]. Before the county government noticed us, we were a highly active group. Attendance was 100%. But lack of follow-ups resulted in this current situation. we even ended up calling it 'Ua mama na kuku'* [kill mothers through chicken production]*."* DF17.

Farmers also pointed out that their needs evolve over time and seasons and agricultural innovation had practical value to them when it could address their needs at a particular time. They therefore valued skills or knowledge that were comprehensive to cover all aspects of agriculture that they engaged and that they could experiment with over time to adapt to their own settings. Seasonal fluctuations were also observed within specific practises such as high milk production during the rainy season and a low production during the dry season. Unexpected calamities such as locust and fall armyworm invasion also made initiatives that addressed these challenges to be appropriate at that particular time. Farmers therefore found innovations promoted to be legitimate and appropriate when they were delivered at a time when it was most needed. As demonstrated by the farmer below, initiatives are most valuable when they can address the immediate challenge being faced.

"I normally cooperate with the co-called extension officers...In my work I seek the assistance of the agricultural officers in my area [...] last year we had the armyworm problem...they invaded the farm and ate the maize crop. So, the officers came to my farm to support and to advise me. They even supplied me with almost a litter of the pesticide ...I cannot remember what its name was." DF29

Farmers also found the novelty of the innovation compared to what they possessed to be useful in solving their day-to-day challenges. New or improved technologies and skills were legitimate when they were found to be up to date and could address the knowledge or technology gaps that the targeted farmers have, in a better manner than what they already have or are aware of. The farmer below for example explains how he would find new technologies useful if they would be able to make production processes automated.

"I would like for things to become automated. Like self-adjustment of the temperatures in the room, identification of diseases and prediction of growth because you need to find market a day before the mushrooms become perishable…Automation would be especially useful because most of the time when I take care of the mushrooms, I cannot notice every error." DF25.

These findings indicate that pragmatic legitimacy, like the other forms of legitimacy, require time to be accorded. Additionally, its assessment is malleable over time since it can be accorded at the inception of an inclusive innovation initiative and later withdrawn when it fails to meet the needs and expectations of the targeted farmers.

Discussion

Our objective was to elicit the criteria that farmers as targets of inclusive innovation initiatives use to assess the legitimacy of these initiatives. Our findings demonstrate that across all the form of legitimacy identified by Suchman (1995), time was one of the key factors that was used to assesses and accord legitimacy. The respondents needed time to evaluate the morality and ethics of the organisations involved and its actions (moral legitimacy) time to understand and apply the promoted innovations (cognitive legitimacy) and time to evaluate the usefulness of the innovation (pragmatic legitimacy). We also find that farmers attach importance to aspects related to procedural elements of legitimacy such as inclusion in managing the initiatives prompted and participating in the development of the innovations. Finally, our findings indicate that 'intimacy' in inclusive innovation processes such as close geographical proximity and close interaction between an organisation's senior management and farmers is an important dimension of legitimacy since it creates

trust and therefore reduces or eliminates uncertainty over the innovations introduced. In the section below, we further discuss the implications of these findings.

The need for continuity in inclusive innovation processes?

Innovation concerns change in existing technologies, expertise and social structures and therefore depicts a dynamic environment with uncertainty (Godin, 2017). Similarly, inclusive innovation has seen a number of approaches being promoted and experimented with over time by different organisations over time (Pansera and Owen, 2018; Opola *et al.*, 2021). This study has however demonstrated that a level of stability is required for such processes to be considered legitimate to the group of marginalised actors that are targeted. This is because the latter group of actors require time to interact with the technology and organisations promoting it to establish whether they are appropriate, understandable, or useful. This presents contradiction regarding how inclusive innovation can be understood and realised. On the one hand, organisations are constantly changing and adopting their approaches in order to best suit the ever changing needs and interests of the group of actors that they target (Córdoba, Jansen and González, 2014; Kilelu, Klerkx and Leeuwis, 2014; Rusca *et al.*, 2015; McKague and Oliver, 2016). On the other hand, targeted actors require stability, such as minimal change in programme structures, governance regimes and the types of knowledge and technologies being promoted, to assess and accord legitimacy to inclusive innovation processes and initiatives.

While stability was an important criterion for legitimacy, we have also found that the assessment of legitimacy by targeted actors can shift over time. For instance, while farmers may find an organisation to be untrustworthy at a particular time, it may find it legitimate at a different point in time for instance during a locust invention when the same organisation are able to provide solutions to the challenges that farmers face at that particular time. Legitimacy is therefore not a one-time assessment of an organisation and its initiatives but can be conferred and withdrawn over time as the needs and interests of intended beneficiaries of inclusive innovation change over time. Stability is therefore an essential element in making inclusive innovation legitimate, but the criteria for its assessment by the targeted actors is not constant over time. It have been shown elsewhere that innovation processes such as development programmes that promote new agricultural practises to specific groups of farmers can strategically incorporate specific changes in order to appeal to different audiences across time while paradoxically maintaining the same overall objectives (Córdoba, Jansen and González, 2014; Martínez-Cruz, Almekinders and Camacho-Villa, 2019). We show in this study that these miniature changes make it difficult for the farmers to assess the legitimacy of such programmes, and therefore lead to the programmes being considered illegitimate by these farmers.

'Do it together!': The value of procedural legitimacy

The innovations targeted at the farmers in our study mainly focused on 'expert' driven approaches where the organisations were 'producers' of the innovation and the farmers were 'users.' Inclusion therefore mostly entailed delivery of skills and technologies to the farmers and assessing their benefit to the targeted farmers. However, beyond benefits, we find that the farmers in this study also value and legitimise process dimensions of inclusion. These latter aspects has been referred to as 'procedural legitimacy' in literature (Brownsword and Goodwin, 2012:248) Regarding moral legitimacy for example, farmers value that farmers value having influence over innovation processes as this facilitates trust and credibility. Similarly, procedures employed in innovation processes such as the 'sites' chosen for interaction with farmers and suitability of the language and methods used to communicate are important criteria which farmers use to accord cognitive legitimacy. Concerning pragmatic legitimacy, farmers value innovation processes where the geographical proximity as well social relationships between the farmers and the organisations involved is continuous and based on close contact thus making the organisation and its initiatives dependable in addressing the farmers' needs.

Regarding inclusive innovation, authors such as Papaioannou (2014) argue that the end justifies the means and that innovations are inclusive when they have practical benefits to its assumed beneficiaries, regardless of the process and procedures employed. However, our findings indicate that how legitimate such initiatives are is based not only on their outcomes but also on the procedures and methods employed. We therefore echo Heeks *et al.*'s (2013) suggestion that inclusive innovation can be realised not just based on the aspects such as benefits of the innovation outcomes to the targeted actors but also on broader aspects such as inclusion in the design of the inclusive innovation programmes and initiatives. For the case of farmers in Uasin Gishu, agricultural innovations are legitimate not just in terms of pragmatic benefits but also in terms of participation which gives the farmers a sense of ownership. These farmers therefore not only value social inclusion through pragmatic benefits of innovation outcomes but also higher levels of inclusion such as through participating the design, procedures and management of innovation which give them a sense of ownership and control over the process.

This finding seems to contradict an ethnographic study done by Parkinson (2009) in Uganda which revealed that targeted farmers do not value ownership over innovation processes such as agricultural extension. However, when closely examined, we find that the service providers in the Ugandan case failed in some dimensions of moral legitimacy as the targeted farmers felt they were funding the lifestyles of the service providers by subscribing to the offered services. They therefore did not see

value in being included in the extension processes (Parkinson, 2009) As we have demonstrated in this study, each of the three aspects of legitimacy has several dimensions and the failure to attain one dimension may lead to a failure to attain the other dimensions. For instance, when organisations promoting inclusive innovation lack credibility to their targeted actors, ownership and influence over the processes will became undesirable to the same actors even though this is important to them. The various forms of legitimacy are therefore mutually inclusive since attaining one form of legitimacy to the targeted actors is a prerequisite to attaining the other forms and dimensions.

Conclusion

We started by claiming that there is lack of sufficient criteria for the assessment of inclusive innovation by the targeted actors such as smallholder farmers in rural areas. We have demonstrated in this study that legitimacy with its various dimensions can be one important criterion by which the intended beneficiaries assess inclusive innovation initiatives. The theoretical implication of our study is that we suggest time as a crucial factor in inclusive innovation processes since it determines how legitimate innovation processes and outcomes are to actors that are targeted to be included in them. While inclusive innovation involves change, this change needs to occur within structures that are stable over time for them to be legitimate to the targeted actors. Our study also has two practical implications. First, agricultural development projects which employ inclusive innovation as a means to development need to pay attention to stability of programme staff, social structures, and the kind of initiatives they promote over a long time. Well established programmes such as universities are therefore better suited for inclusive innovation compared to programmes which have specific time periods or are under specified governance regimes. Secondly, while including targeted actors in innovation processes in a noble and legitimate objective, this is unlikely to be attained in practise if the initiatives do put measures in place to acquire moral legitimacy to the intended beneficiaries, which emerged as an important criterion in this study. This can for instance be attained through informal interactions between administrative staff of the organisations involved and the targeted actors they intend to include in innovation processes and outcomes. The organisations in our study mainly used ‘expert’ driven approaches to inclusive innovation where emphasis was on transferring benefits to the targeted farmers rather than including them in innovation processes. The legitimacy of broader approaches to inclusion such as including farmers knowledge and initiatives in agricultural innovation could therefore be unravelled further through additional research.

6

Chapter 6

General discussion
and conclusions

Introduction

In the introduction chapter of this thesis, I explained how inclusive innovation has emerged as a concept that denotes an alternative to 'mainstream' innovation processes driven by economic growth that creates winners and losers and therefore intentionally or unintentionally marginalises some individuals and organisations from its processes and benefits. In the context of less industrialised countries such as Kenya, individuals and organisations who are marginalised include sections of food producers who have minimal access and control over economic, social, natural and political resources needed to participate in and benefit from innovation (Klingler-Vidra and Glennie, 2020; Kumar, 2020; Doussard and Clark, 2021). Given that inclusive innovation still suffers from conceptual ambiguity as well as a lack of consensus on how it can be operationalised in practise or its processes assessed, this provided the knowledge and empirical gap for the thesis. I set out to investigate how inclusive innovation is conceptualised and operationalised across the spheres of academia, public and private organisations, and local communities. Within this main objective, the following four research questions were addressed, using the Kenyan agricultural sector as an empirical setting:

I. What is the history and current landscape of the Kenyan agricultural innovation system and how does it relate to social inclusion and exclusion?
II. How is inclusive innovation framed in theory and by various agricultural practitioners in Kenya and how do the two relate?
III. How and to what extent is social inclusion attained within agricultural extension and advisory services in Kenya?
IV. What criteria do targets of inclusive innovation initiatives use to assess the legitimacy of such initiatives?

In the next sections of this chapter, I outline the main findings of this thesis from each of the four research questions that I set out to address. I then present a synthesis and cross-cutting conclusions from the chapters. This is followed by broad implications of the thesis for inclusive innovation theory, policies, and practises. The chapter ends with a discussion on the limitations of the thesis and final reflections.

Main findings

In Chapter 2 of the thesis, I reviewed the historical background of planned agricultural development in pre-colonial and post-colonial Kenya and how this has shaped the understanding and approaches to inclusive innovation. A key issue in Kenya's history was the marginalisation of small farms in rural areas because of the annexing of

productive agricultural land to be exclusively used for production of colonial crops by European settlers. Later, events such as economic depression and drought led to a shift in state-led support to focus on smallholder rural farmers, who were previously marginalised from access and utilisation of agricultural research, education, extension, and other forms of state facilitated innovation processes. However, the social inclusion approach adopted after independence was based on commercialisation of smallholder agriculture in rural areas through programmes such as land privatisation, contract farming and irrigation schemes that were initiated by the colonial government. Mgendi et al. (2019) point out that while this approach led to a rapid growth of the agricultural economy in Kenya compared to neighbouring Tanzania, it created winners and losers among smallholder farming communities where the rural elite who had better political, social and economic resources progressed while majority of farmers with minimal access to these resources were excluded from the process and benefits of agricultural innovation and development. These developments in the structure and function of Kenya's agricultural innovation system set the stage for later developments in Kenya where smallholder farmers in rural areas have been the main targets in attempts to make agricultural innovation inclusive. I also find that within the innovation system, a focus on a specific issue such as social inclusion in innovation processes does not only emerge through planned change but can also emerge serendipitously in response to shocks or unplanned events.

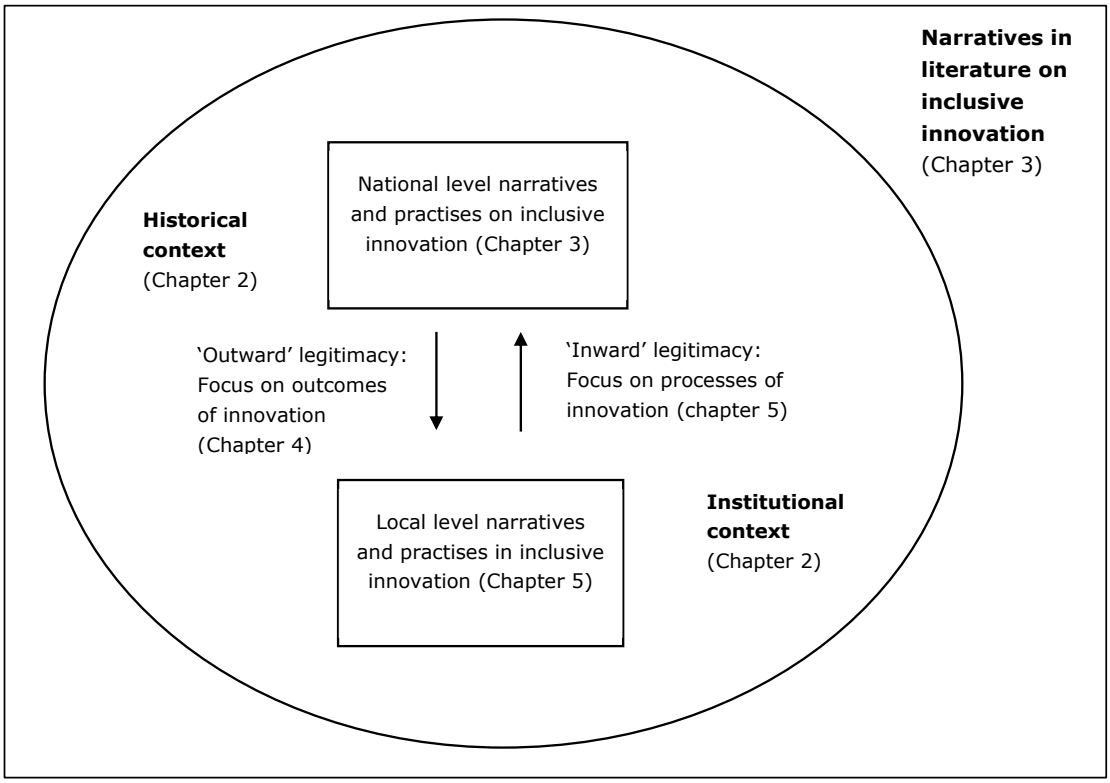
Chapter 3 of the thesis examined various narratives that exist about inclusive innovation. First, we find that three district narratives exist in literature from various disciplines. First, a bottom of the pyramid narrative emphasises the problem of exclusion from commodity, financial and other markers and promotes market-based approaches to realising social inclusion in innovation processes. Second, a grassroots narrative problematises the exclusion of indigenous forms of knowledge, technologies and initiatives from 'mainstream' or 'formal' innovation processes and call for a recognition of the indigenous processes of innovation. Finally, a political economy narrative highlights unequal control and authority over resources and social structures as a cause of exclusion in innovation processes and advocates for broad based changes in social structures to make innovation inclusive. When these theoretical narratives are compared to how various actors in the Kenyan agricultural sector frame inclusive innovation, we find that these actors do not fully ascribe to any of the three narratives that exist in literature. Instead, problems and solutions regarding the issue of inclusive innovation is constructed using concepts borrowed from a variety of the theoretical narratives. The four narratives that we find regarding how inclusive innovation is framed by actors within the Kenyan agricultural sector are broader in scope and emphasises more aspects of social inclusion or exclusion compared to the framing of the concept in literature.

In Chapter 4, we develop an operational framework for assessing social inclusion within agricultural extension and advisory services (AEAS) building on the ladder of inclusive innovation, a concept from innovation research. We then apply it to analyse the levels and forms of social inclusion in three cases of AEAS in Kenya. Across these programmes, we find a skewed focus on lower levels of social inclusion such as the intention to include and the delivery of AEAS to the farmers that are assumed to be excluded. Higher levels of inclusion such as assessing the usefulness of AEAS, including targeted farmers in the design, delivery, and control of AEAS programmes and changing existing social structures such as policies and legislations to include the knowledge and voice of farmers in discussions about socially inclusive AEAS are mainly missing. This is despite a rhetoric of farmers participation in agricultural innovation processes such as research, extension and technology dissemination that has existed for over three decades (Neef and Neubert, 2011; Córdoba, Jansen and González, 2014). This may be explained by the fact that higher levels of socially inclusion are too costly to implement especially in the context of less industrialised countries as revealed by Minh *et al.* (2014) . We also find that the focus on intention and outreach of AEAS in social inclusion approaches results in three main approaches to social inclusion: a) mass inclusion which focusses on delivery AEAS to a large group of farmers with generic content, b) basic inclusion which focusses on delivering AEAS to a selected group of farmers such as women groups with generic content and c) selective inclusion which focuses on delivering AEAS to a selected group of farmers such as the youth with specialised content. The form of social inclusion pursued involves a trade-off between achieving depth of terms of intensity of the content of AEAS and breadth in terms number of farmers reached.

Finally, we investigate how farmers in Uasin Gishu, Kenya who have been the target of various interventions that promote inclusive agricultural research and innovation accord legitimacy to such interventions in Chapter 5. We find that procedural elements of legitimacy such as participation, control and ownership over the programmes is a key factor that leads to how farmers in Uasin Gishu accord legitimacy to inclusive innovation interventions. We therefore demonstrate that innovations are inclusive not only when they have practical benefits to the day to day lives of the intended beneficiaries but also when the procedures employed are inclusive. Additionally, we demonstrate that according to farmers in Uasin Gishu, legitimacy is a malleable concept that can be given or withdrawn depending on time and circumstances. This study reveals that a 'society looking inward' perspective on inclusive innovation, in this case how farmers assess the benefits of innovative interventions by different organisations, is not aligned with the 'organisation looking outward' perspective i.e., how different organisations legitimise their intentions to their intended beneficiaries.

In figure 6.1 below, I outline the connections between the main findings from the four separate studies presented in chapters 2 to 5. In chapter 3, we found that narratives in academic literature about inclusive innovation based on different logics such as social justice, autonomy of grassroots communities, participation by 'local' actors or provision of goods and services to consumers at 'the bottom of the economic pyramid' influence how the concept of inclusive innovation is understood and practised by different organisations in Kenya. Additionally, these narratives and practises are influenced by Kenya's historical developments in agricultural innovation and development as well as the current institutional set-up of laws and policies as demonstrated in chapter 2. In the 1950's, the plan for intensification of smallholder agriculture by the colonial government set the stage for the path in which agricultural research, innovation and development was to follow in the subsequent years. Resource-constrained smallholder farmers in the rural areas who lacked access to land, finance and other resources and services required for commercial agriculture were excluded from this path of innovation and development. The current institutional context for inclusive agricultural innovation and development in Kenya is therefore focussed on how sub-groups of farmers in rural areas and pastoral communities who are excluded from the benefits and processes of agricultural innovation can be included. Programmes and practises within the sector such as agricultural extension and advisory services are therefore focussed on how research and innovation can be legitimatised 'outwards' towards targets of beneficiaries such as smallholder farmers as demonstrated in chapter 4. This has different criteria from 'inward legitimacy,' which is how the said beneficiaries assess the usefulness of the programmes targeted to them as shown in chapter 5.

Figure 6.1. Outline of the connections between different chapters



These findings can be summarised into three main conclusions concerning how inclusive innovation is understood and practised. First, I find discrepancies in how inclusive innovation is understood and realised across different spheres. At the sphere of academic literature, there exists three district narratives about the issue in academia. However, a hybrid form of this narratives exists among agricultural practitioners in Kenya thus creating fuzziness as demonstrated in the third chapter. At local community spheres, both agricultural practitioners and farming communities have clear understandings of what inclusive innovation entails, though the understanding by practitioners is different from that by farming communities as shown in chapter 4 and 5. Secondly, I find that in operationalising inclusive innovation through concrete programmes such as agricultural extension and advisory services, there is a skewed focus on the transfer of knowledge and resources to excluded groups of people as chapter 4 shows. In contrast, process, and social structure elements of inclusion, such as participation and influence over AEAS programmes are largely ignored, even though beneficiaries of inclusive innovation interventions find the later aspects to be important as shown in chapter 5. Finally, I find that the ladder of inclusive innovation can provide useful criteria and a holistic framework for assessing and evaluating inclusive innovation as demonstrated in chapter 4. However, the ladder lacks a 'society looking inward' perspective where intended beneficiaries of inclusive innovation such as small farmers in rural areas can be included in the assessment

of inclusive innovation processes. In the section below, I discuss the implications of these findings for existing theories on inclusive innovation and for policy and practise on innovation and social inclusion.

Discussion and conclusions

The starting point of this thesis was that inclusive innovation remains a fuzzy concept that has a flexible interpretation depending on the needs and interests of those describing or using it. Four main conclusions can be drawn from the key findings in this study regarding how the concept of inclusive innovation is understood and realised in practise. First, the differences in how the concept is understood and realised across different spheres makes in a challenge to attain and assess concrete processes and outcomes of inclusive innovation. Secondly, the agency of marginalised individuals and organisations who are the target of inclusive innovation initiatives have a significant role to play in processes of making innovation inclusive. Third, different approaches to inclusive innovation allude to different forms of justice. Finally, the inclusiveness of innovation processes should be assessed based not only on how inclusive the innovation is but also on how innovation in programme structures and elements can lead to inclusivity. I further explain these conclusions below.

Inclusive innovation: Clarity or fuzziness?

Levidow and Papaioannou (2018) claim that the concept of inclusive innovation has two opposing normative assumptions regarding how the problems and remedies of social exclusion from innovation processes are framed. On the one hand a 'liberal-individualist' camp promotes a market-based understanding of inclusive innovation and the inclusion of individuals and organisations that are either excluded from access to resources required for innovation or from the products of innovation due to lack of sufficient resources. (Levidow and Papaioannou, 2017:212). Its understanding of social inclusion is therefore the fair (re)distribution of goods and services within an innovation system (Prahalad, 2005; Pisoni, Michelini and Martignoni, 2018). In contrast, a 'social-collective' camp opposes the narrow focus of the later camp and advocates for transformations beyond distribution of goods and services. (Levidow and Papaioannou, 2017: 212). It calls for a critical examining of the social structures, including policies and cultural norms that lead to exclusion of some actors from innovation processes (Arora and Romijn, 2012; Poole, Chitundu and Msoni, 2013; Mdee *et al.*, 2020). In chapter 3, we find a third normative assumption in literature that is not explicitly described among the two opposing camps: A 'grassroots camp'. This emphasises the agency of Indigenous or 'local people' in innovation processes, regardless of whether such knowledge and practises are liberal-individualist or social-collective. Tensions exist between these three normative assumptions as

different actors have divergent backgrounds and interests. As a response to these tensions, we find that various organisations involved in making innovation inclusive do not fully ascribe to any 'camp' but instead frame the issue based on concepts borrowed from various camps, thus creating a hybridity of different narratives. This further heightens the conceptual ambiguity of the concept.

However, when concrete practises related to inclusive innovation such as efforts to include smallholder farmers in the process and benefits of agricultural extension and advisory services are closely examined, as we did in Chapter 4, we find clarity in the problems and solutions to social exclusion in innovation processes. We find that organisations in Kenya mostly ascribe to the liberal individualist view or the BOP narrative of delivery and distribution of AEAS services to farmers while narratives concerning social-collectivist or grassroots logics are largely missing in practise within these programmes, even though they are present in the organisational rhetoric about social inclusion. The path dependency created after independence, where Kenya continued privatisation of key resources used for agricultural innovation such as land as demonstrated in chapter 2 is a possible explanation for the dominance of this liberal-individualist narrative in practise. In chapter 5, we also find clarity in the way smallholder farmers as targets of inclusive innovation interventions assess social inclusiveness of such processes. According to farmers in Uasin Gishu, the legitimacy of agricultural research and innovation programmes promoted by actors such as the state, universities and local governments is accorded majorly based on the ownership and control that the farmers have over these programmes. This finding corroborates to previous studies that have argued that innovation processes such as agricultural extension are acceptable to intended beneficiaries only when the later can feel a sense of ownership and control over the processes (Parkinson, 2009; Patnaik and Bhowmick, 2020).

This thesis therefore demonstrates that fuzziness concerning inclusive innovation mainly exists at a conceptual or narrative level among both among scholars and agricultural development practitioners. When actual practises and perspectives on the issues on the ground are examined, I find significant clarity on what inclusive innovation means and entails both by agricultural practitioners implementing the programmes in targeted communities as well as by the targeted actors themselves as demonstrated in chapters 4 and 5. Additionally, I find a disconnect between how the concept is approached in practise by agricultural practitioners on the one hand, who use a BOP logic, and the aspects of social inclusion that farmers value most, which are related to the grassroots logic that emphasises their agency. While holistic frameworks that capture various forms and levels of social inclusion have been proposed (e.g by Heeks *et al.*, 2013), I find two bottlenecks to such an ambitious

framework. First, there is a mismatch across various levels in the ladder concerning the problems being addressed and the solutions being recommended. Secondly, there is significant clarity on how lower levels of social inclusion such as delivery of services and products to intended beneficiaries can be achieved. In contrast, higher levels such as change in social structures to make innovation inclusive is characterised by conceptual ambiguity which makes it a challenge to attain tangible indicators of social inclusion.

Agency of the 'marginalised' in inclusive innovation

It has been pointed out that despite a rhetoric of grassroots-based and participatory innovation processes being widespread in literature, a top-down and linear model of innovation remains prevalent (Minh *et al.*, 2014; Papaioannou, 2014). The models of inclusive innovation being proposed therefore remain 'expert' driven with acts such as innovation being performed on 'the marginalised.' For instance, farmers in rural areas may be thought to be excluded from 'scientific' knowledge which is normally given precedence over 'local' or 'indigenous' knowledge (London, Anupindi and Sheth, 2010). Similarly, the Global North is considered to be a powerhouse of research and innovation because over 98% of global research and development is carried out in these regions of the world (Chataway, Hanlin and Kaplinsky, 2014). Knowledge and theories about concepts such as inclusive innovation processes also mainly emerge from these regions (Koch, 2020). Smallholder farmers in rural areas or in 'developing' countries are therefore highlighted as the excluded from innovation processes such as research and development, and inclusion targets how these excluded actors can be incorporated in innovation processes and benefits. Chapter 3 of this thesis has confirmed that this expert-driven approach is still prevalent as a normative assumption that drives attempts to make innovation inclusive in the context of Kenyan agriculture.

As has been pointed out, earlier by scholars of the appropriate technology movement and the Sussex Manifesto (Schumacher, 1973; Ely and Bell, 2009), and later by scholars of decolonisation and degrowth debates (e.g. Escobar, 1995), such an approach frames innovation as a drive towards to specific direction of growth and development and those who are excluded from this trajectory are urged or assisted to 'catch-up' (Schumacher, 1973; Escobar, 1995; Ely and Bell, 2009; Fu, Pietrobelli and Soete, 2011; Pansera and Owen, 2016; Samerski, 2018; Silva, 2020; Cummings, Munthali and Shapland, 2021). The agency of those who are assumed to be excluded in such processes is therefore ignored or downplayed. While I acknowledge that there exist inequality with regard to access and control over wealth and other resources, and redistribution is indeed a key aspect of making innovation inclusive, chapters 4 and 5 of this thesis demonstrates that inclusive innovation goes beyond transfer of

knowledge and resources, and requires 'higher' levels of inclusion such as change is existing governance structures and inclusion of different frames of knowledge concerning what innovation and social inclusion entails. In other words, inclusive innovation goes beyond creating and distributing new knowledge, technologies and skills for a certain 'group' and involves innovation to make the innovation process itself inclusive. This will involve acknowledging the knowledge, technologies, and practises of various actors in different spheres as legitimate.

At least in rhetoric, new models of inclusive innovation that acknowledge local agency and forms of practises and knowledge are being proposed (Heeks, Foster and Nugroho, 2014; Silva, 2020). In business and management literature, its being recognised that 'intimate' engagements with individuals and organisations at the bottom of the economic pyramid have more effective outcomes compared to arms-length market relationships (Simanis and Hart, 2011). Broader frameworks of understanding social inclusion that go beyond providing goods and services and focus on addressing structural inequalities have also been proposed (Mortazavi *et al.*, 2021). In innovation studies, co-creation of knowledge between different actors and facilitation of interactions between actors with different types of knowledge within an innovation system has also garnered interest (Hall *et al.*, 2003; Hounkonnou *et al.*, 2006; Kilelu, Klerkx and Leeuwis, 2013; Swaans *et al.*, 2014; Fielke *et al.*, 2018). However, this thesis has shown that bottom-up models of innovation remain rhetorical. On the ground, approaches to inclusive innovation are still based on top-down models even though 'beneficiaries' of such initiatives legitimise bottom-up approaches as demonstrated in chapter 5.

Distributive versus procedural justice in inclusive innovation processes

As stated in the introduction chapter of this thesis, the issue of including marginalised actors in innovation processes brings with it issues of justice. Different approaches of inclusive innovation allude to various forms of social justice by those promoting it including distributive, contributive, procedural justice and relational justice (Papaioannou, 2014; Timmermann, 2020b). Based on the findings, I propose that inclusive innovation links to either of two types of justice: distributive or procedural. Distributive justice is based on the fair distribution of resources such as income and wealth. Such an approach lays emphasis on social exclusion rather than social inclusion in innovation processes and therefore constructs a group of people that are excluded from innovation processes (Papaioannou, 2014). It's normative assumption presents two opposing sides with one side being 'innovators' and the other being 'recipients' of inclusive innovation with the innovators providing solutions to recipients rather than addressing the existing structures such as rules and social relationships that create inequality (Silva, 2020). This is the main form of social justice

being promoted by inclusive innovation initiatives within the Kenyan agricultural sector through various programmes such as state sponsored agricultural research and development. We therefore find a gap in procedural aspects of social justice such as inclusion in the design of inclusive agricultural innovation programmes.

In inclusive innovation literature, procedural justice relates to various levels of participation in innovation processes. In agricultural research and development for example, participation ranges from the targeted group of actors being informed and consulted at lower ends of participation, to being included as partners in research and knowledge creation at a mid-level to higher levels of participation such as managing and controlling programmes and processes (Chambers, 1994; Rosen and Painter, 2019; Eidt, Pant and Hickey, 2020). Our study of levels of inclusive innovation in chapter 4 demonstrates that procedural justice goes beyond participatory elements. For example, participation in research or technology development goes beyond using or promoting the knowledge or epistemologies of marginalised actors in such processes, but also about including their knowledge or world views about what constitutes an inclusive innovation process. It relates to issues of epistemic justice and addresses the question of whose knowledge about inclusive innovation counts as valuable (Medvecky, 2017; Koch, 2020; Ludwig and Boogaard, 2021). This is a key concern since a gap exists between the knowledge based on distributive forms of justice prevalent in programmes that promote inclusive innovation and the knowledge based on procedural forms of justice alluded to by actors that are targeted by such processes as demonstrated across the studies in this thesis.

With income inequality remaining a key concern within and across countries (Williams and Woodson, 2019; Cozzens, 2021) inclusive innovation literature and approaches need to pay attention to how resources can be redistributed. However, this thesis has demonstrated that achieving procedural forms of justice are equally important not only because they are desirable to targeted actors but also because they are a prerequisite to attaining legitimate forms of distributive justice in inclusive innovation processes. A question that arises from this conclusion is therefore how both distributive and procedural elements of justice, inclusive epistemic justice can be assessed in inclusive innovation processes.

Assessing the inclusiveness of innovation processes

Molina-Maturano et al. (2020) point out that there is lack of sufficient tools or frameworks to ‘measure’ the social inclusiveness or exclusiveness of innovation processes. One of the reasons for this is the increased emphasis on procedural elements of justice in innovation processes compared to the currently predominant linear models based on distributive justice that are relatively easier to assess. (Papaioannou, 2014;

Hoffecker, 2021). In agriculture for instance, impact assessment methods in agricultural development programmes have been criticised for their inability to capture broader issues concerning agricultural innovation such as implications of changing social relationships as result of such programmes. (Hall *et al.*, 2003). Similarly, participatory research methods and the inclusion of farmers as active participants in agricultural research and development interventions have been promoted and experimented with since the 1980's as ways through which the needs of targeted farmers can be assessed. (Chambers, 1994; Thompson and Scoones, 1994; Hounkonnou *et al.*, 2006). The aspects of procedural justice being advocated for are not only more challenging to access but also costly and time-consuming (Minh *et al.*, 2014; Papaioannou, 2014).

In chapter 4 of this thesis, we adapt the Heeks *et al.* (2013) holistic framework that conceptualises different levels and aspects of inclusive innovation to develop and assess indicators of inclusiveness in innovation processes. Based on this analysis, I conclude that procedural aspects of inclusiveness can indeed be assessed since social relationships and structures between and among various actors involved in innovation processes are documented and can be observed. The assessment of such aspects of inclusion is therefore not overly ambitious as indicated by some scholars (e.g. Papaioannou, 2014; Hoffecker, 2021) but can be assessed through methods such as observation and in-depth interviews that yield insights into 'informal' types of relationships and practises that are part of innovation processes which are difficult to assess using other methods. The ladder of inclusive innovation therefore offers a broader framework through which various levels, indicators, and forms of social inclusion, as well as the logics of social justice that drive inclusive innovation processes can be assessed or evaluated. I also concur with the suggestion by Birner *et al.* (2009) that frameworks and analysis of inclusive innovation processes need to refrain from a one-size fits all approaches and adopt those that fit particular situations at particular times. This is not just because different actors have different narratives about inclusive innovation as demonstrated in chapter 3 but also because distinct levels or elements of inclusive innovation are not linear and can be attained concurrently as shown in chapter 4.

Recommendations for inclusive innovation theory, policies, and practice

There are two implications that can be drawn from this thesis for the theory, policy and practise on innovation and social inclusion. The first implication concerns the promise of inclusive innovation as a tool to achieve equitable participation, access, and benefits to innovation, as well as the potential pitfalls that can arise from such processes. The second implication concerns science technology and innovation policy for less industrialised countries such as Kenya which are agrarian based.

The promise and potential pitfalls of inclusive innovation

There has been increased interest in applying innovation as tool for achieving social and economic equality in countries and regions across the globe. The African Union for instance promotes innovation is sectors such as health, education, energy, and agriculture within its member states in order to facilitate equitable access to basic services and opportunities. Similarly, the United Nations has had an increased interest in promoting innovation as a tool for reaching goals such as universal health or education as well as social inclusivity. For instance, the words science, technology or innovation are mentioned only 3 times in the Millennium Declaration document by the United Nations compared to the more recent Transforming our Lives SDGs document where they are mentioned 70 times (Silva, 2020). Social inclusivity also has 10 times more prominence in the later UN sustainable development goals compared to the former millennium development goals (Heeks, Foster and Nugroho, 2014). However, an analysis by Mdee *et al.* (2020) finds little evidence of a sustained and coherent policy and practise on inclusive agricultural transformation and development in East African countries. As it has been shown in Chapter three of this thesis, there is a mismatch between theories and narratives about universal or national goals and aspirations regarding egalitarian aspirations such as social inclusivity in innovation processes and what is actually achieved or desired on the ground. Inclusive innovation therefore stands the risk of being merely a rhetorical concept that many actors ascribe to, but few actualise.

I therefore propose a bottom-up process of assessments inclusive innovation where intended beneficiaries of inclusive innovation processes play an active role in evaluating such processes. Such an approach likely to yield a better understanding of legitimate inclusive innovation processes that are specific to the local contexts of the actors targeted. This provides an opportunity to identify the appropriate approaches to inclusive innovation that are legitimate for specific contexts rather than a one size fits all approach that are difficult to implement. Systems approaches are therefore promising as a framework for achieving inclusive innovation by adopting different types of inclusion within different settings that are context specific within the broader system (Pigford, Hickey and Klerkx, 2018). However, unequal access to and influence over resources exist within agricultural innovation systems (Mdee *et al.*, 2020). This context specific inclusive innovation processes should therefore be accompanied by bottom-up processes of evaluation where actors that are identified to be excluded from innovation processes play a key role in evaluating its usefulness and legitimacy.

The ladder of inclusive innovation is a promising framework that can be refined and applied for a holistic assessment of the inclusive innovation processes. Since this thesis

has found that indicators that relate to procedural forms of justice are important yet largely missing in inclusive innovation approaches and practises, researchers could pay attention to these forms of indicators in the ladder. The qualitative indicators of social inclusion presented in chapter 4 provide potentially useful indicators and assessments of procedural elements of justice in inclusive innovation processes. I therefore enhance the ladder of inclusive innovation by adding not only explicit indicators of social inclusion across all the levels but also adding indicators alluding to higher levels of inclusion that are related to procedural elements of justice that are currently missing in inclusive innovation literature as well as other literature such as agricultural extension. The ladder is therefore made more explicit and holistic by the addition of these qualitative indicators.

Chapter 2 of this thesis showed how smallholder farmers in the rural areas of Kenya have been resilient amidst external shocks such as drought, economic depression and systemic exclusion from state-sponsored agricultural research and development programmes. Other studies have also demonstrated the innovativeness of small-holder farmers to overcome challenges such as changing climate and management of pests and diseases (Reij and Waters-Bayer, 2014; Mwangi and Rutten, 2012; Karanja, Kamau, Macoloo, Righa, van Veldhuizen, *et al.*, 2017; Woodhouse *et al.*, 2017). Small farms in rural areas therefore have knowledge and capabilities to contribute to challenges that face the agricultural sector, especially within countries in Africa where such small farms remain the dominant means of food production (Gatzweiler and Von Braun, 2016). Such farmers usually rely on informal networks and rules with other farmers, with state extension agents and other community based individuals and organisations to learn and share knowledge (McKague and Oliver, 2016). From a procedural justice perspective, inclusive innovation can focus on how new social arrangements or knowledge can be harnessed to enhance informal interactions between individuals and organisations at community level. These ‘informal innovations’ are likely to be legitimate to the farmers compared to formal forms of multi-stakeholder arrangements where farmers do not feel a sense of ownership of control.

The current structure of agricultural innovation in less industrialised countries such as Kenya is still driven by a linear model where focus is on how new technologies or skills can be transferred to targeted farmers as demonstrated in chapter 4. However, these countries also acknowledge process and structural forms of inclusive innovation, at least in theory. For instance, narratives about inclusive innovation by agricultural development programmes in Kenya are not just about providing resources such as knowledge to resource constrained farmers but also include how unequal social structures can be eliminated and how farmers knowledge can

be acknowledged and appreciated as shown in chapter 3. This therefore suggests that opportunities exist for inclusive innovation processes where farmers in rural areas are not just targets of inclusive innovation but can also contribute not only their knowledge and experiences to agricultural innovation but also their theories or narratives of how social inclusion can be realised within innovation processes. Some authors have suggested that such bottom up innovation processes can be too costly to realise in practise (e.g. Minh *et al.*, 2014). However, the analysis in chapter 5 of this thesis suggests that farmers and other local actors value ownership and control over innovation process. Innovations to create spaces for farmers to innovate can be less costly as it will majorly use the knowledge and resources that farmers already possess. A challenge for such initiatives will be how the intellectual property of such farmers are safeguarded from exploitation.

Currently, most governments, especially in less industrialised countries, look to harness the opportunities offered by the fourth industrial revolution such as digital technologies to provide solutions to current and future challenges. While these technologies offer prospects for solution inclusion in terms of providing faster and better solutions to people living in marginalised areas such as remote rural areas, they also have the tendency or potential to marginalise others who are do not have the skills or resources to utilise them (McCampbell *et al.*, 2021). It has been shown in this thesis as well as elsewhere (e.g. Papaioannou, 2014) that approaches to inclusion based on distributive justice such the transfer or delivery of agricultural advisory services to targeted farmers do not address procedural forms of justice such as how the existing structures that govern innovation processes can be made more inclusive. I therefore propose the 'innovation' of innovation processes as a key aspect of inclusive innovation. The issue therefore goes beyond how innovation can be made inclusive through solutions such as information and communication technology or new expertise but how social inclusion can be attained through innovation processes.

Implications for Kenya's policies on science, technology, and innovation

After independence in1963, Kenya continued along a path of neoliberal economic policies with an emphasis on developing local industries and rapid economic growth through privatisation of resources such as land. As demonstrated in chapter 2 of this thesis and elsewhere (e.g. Obama, 1965; Anthony, 1988), while this approach achieved its desired objectives of rapid economic growth, it had the effect of marginalising a large group of individuals and organisations who did not have sufficient resources or social capital to participate in innovation. Currently, a broad range of narratives exist that go beyond the neo-liberal agenda envisioned after independence (Opola *et al.*, 2021) and as noted in chapter 3, a coherent one-size fits all policy on social inclusion with regard to science, technology and innovation is

challenging to attain in countries such as Kenya where different narratives about the issue exist. However, I have demonstrated that narratives exist majorly as a rhetoric while practises are still embedded in contradictory paradigms that do not align with the existing rhetoric. There is therefore the risk that policies for social inclusion on important sectors such as health, education of agriculture will remain 'lip service' while practises seldom change. In the case of inclusive innovation in Kenya, there is the risk that policies on research and innovation that are based on well-intentioned normative principles such as social inclusion will remain merely rhetorical while socially exclusive practises initiated many decades ago remain rampant in practise. We have shown in chapter 5 that the criteria which beneficiaries use to assess the usefulness of welfare initiatives such as social inclusion differ from the criteria which are used to design and implement such initiatives. Such a bottom-up process of evaluation can therefore provide new insights on the usefulness of policies for inclusive innovation for 'marginalised spaces' in Kenya such as pastoral regions, remote rural areas, and the informal sector.

Limitations of the thesis and future research

Despite our efforts to examine inclusive innovation perspectives and processes, a number of questions remain unexplored that can be a subject to further inquiry. Cozzens and Kaplinsky (2009) point out that there are two aspects of inequality within innovation processes. First, vertical inequality is as a result of unequal distribution of wealth or control over resources. Secondly, horizontal forms of inequality majorly occur within sub-groups of people where individuals and organisations are excluded due to attributes such as gender, age, or ethnicity. In this thesis, I examine social inclusion and exclusion within innovation processes from a vertical inequality perspective and therefore focus on sections of smallholder farmers in Kenya as groups of people who are marginalised from innovation processes due to lack of wealth or control over existing social structures. This is because historically, this group of people have been the most excluded from state-led agricultural innovation processes in Kenya. I acknowledge that horizontal forms of inequality also exist within these smallholder farming systems. For instance, within rural farming communities, women or the youth may be excluded from owning land and other resources required to participate in agricultural. However, this horizontal forms of inclusion or exclusion were beyond the scope of this thesis. Future inquiry could focus on how inclusive innovation with respects to specific groups of actors such as women, the youth, the elderly or certain ethnic groups can be conceptualised and realised. I also limit this study to smallholder farmers in rural areas as groups of actors excluded from innovation processes. Forms of inclusion or exclusion could be extended to and investigated within other groups of actors such as food distributors in

urban areas, workers in the informal sector, farm labourers or pastoral communities.

While we suggest a preliminary framework for bottom-up process of evaluating inclusive innovation processes and explore how farmers as beneficiaries assess inclusive innovation processes in chapters 4 and 5, a refined framework and detailed approach of how such a process can be conducted in practice is beyond this thesis. I point out that farmers in rural areas value relational forms of justice such as ownership and control over innovation processes in addition to practical benefits of such processes. However, questions remain about what variables or indicators can be used in bottom-up assessments of inclusive innovation processes, including what indicators successful ownership and control over innovation processes. In chapter 3 of the thesis, we examined how different actors frame the issue of inclusive innovation. However, this was limited to 'agricultural practitioners' such as state agencies, private agricultural enterprises, universities, and development agencies. How farmers and other local actors frame inclusive innovation, including how the problem of social exclusion is constructed and what solutions are recommended by these 'local' actors could therefore be a subject of future inquiry.

There are also three methodological limitations in this study. First, my positionality and world views may have influenced the study. As a European-based researcher conducting a study in Kenya, and as a Luo native conducting research in a predominantly Kalenjin region, my observations and interviews may have been influenced by this 'space' created between me and the respondents in my study. Additionally, growing up around smallholder farms gave be a sense of belonging towards smallholder farming systems. While I had measures to ensure credibility and rigor in this study, my empathy towards smallholder farming systems may have led to more time spent on their farms compared to other sites of the research such as government offices or university premises. Secondly, my research design dictated that I focus on a small sample size and select a specific context for the study, in this case the Kenyan agricultural sector and Uasin Gishu County agricultural development programs, respectively. While this approach enabled me to conduct a detailed study and analysis of various aspects of inclusive innovation related to food production in Kenya, the drawback is that I may not generalise the study to other contexts. I am therefore not able to transfer my findings to contexts such as other agricultural sub-sectors like food distribution, other sectors such as energy or health or other geographical locations. However, inferences can be drawn for other contexts based on this study.

Finally, qualitative inquiry need extended periods of time in study areas to observe, probe and interpret social phenomena (Tesch, 1990). While a significant period of

time was dedicated to field work, the variety of respondents in the study was relatively large and more time with the respective respondents such as county government extension service officers, farming communities or private service providers would have yielded more insights, for instance on how seasonal variations in agricultural practises or changes in governance regimes influence how inclusive innovation is framed, practised and accorded legitimacy. Additional time would have also enabled me to perform member checks of my analysis and findings by presenting them and acquiring feedback from my study participants.

Final reflections

Two key questions are posed in literature on inclusive innovation. One concerns whether an innovation can be inclusive. It regards innovation as a capital and skill intensive process where inclusivity is a challenge to attain (e.g. Arora and Romijn, 2012; Poole, Chitundu and Msoni, 2013; Mdee *et al.*, 2020). A second question concerns how innovation can be made inclusive. This later perspective is a more optimistic view that considers it possible to attain social inclusion through innovation processes and the challenge is to find how that can be achieved (e.g. Heeks, Foster and Nugroho, 2014; Papaioannou, 2014). In this thesis, I have demonstrated that the concept of inclusive innovation is characterised by fuzziness both in theoretical literature and as a rhetoric within various organisations and agricultural practitioners in Kenya. This fuzziness therefore provides an opportunity for a new conceptualisation of inclusive innovation processes. One that is based on a 'society looking inward perspective' and is therefore aligned not only to the needs of 'beneficiaries' of inclusive innovation processes but also their knowledge and perspectives of what inclusive innovation means. It also provides an opportunity for an inclusive innovation process where innovation is not focussed on providing solutions but can be used to create opportunities for 'beneficiaries' to create and actualise their own solutions.

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About the Author

Felix Ouko Opola was born in Maseno, a small town in the western part of Kenya, in 1986. He went to Ebulako Primary School and Maseno High School, completing the latter in 2004. After obtaining his bachelor's degree in Food Science and Post-harvest Technology at the Jomo Kenyatta University of Agriculture and Technology in 2010, he worked as a quality control assistant for a food processing company in Nairobi for 2 years. In 2012, he was offered a European Union scholarship for a joint master's degree programme in sustainable agricultural development at the University College Cork in Ireland and the University of Copenhagen in Denmark. After completing his masters, he came back to Kenya in 2015 where he undertook two internships. The first was with Care International in Kenya where he engaged in participatory research and development activities with farmers in Kirinyaga and Nyandarua countries. The second was with the Stockholm Environment Institute in Nairobi where he was tasked with policy analysis of agricultural development programmes in Kenya and Zambia. In 2017, he started a PhD program at the Knowledge, Technology and Innovation group, Wageningen University, where he was based until 2022. His research interests include understanding the importance and implications of innovation for marginalised people and spaces, such as the 'informal sector' and rural farming communities.

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Wageningen School of Social Sciences (WASS)
Completed Training and Supervision Plan

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
WASS Introduction Course	WASS	2017	1.0
Writing a PhD Research Proposal	WUR	2018	6.0
Change, Inter-human Processes and Communication, CPT 32806	WUR	2017	6.0
Qualitative Data Analysis	WASS	2017	2.5
Research Methodology: From Topic to Proposal	WASS	2017	4.0
ECPR Summer School on Qualitative Research Methods	Central European University, Budapest	2018	2.0
B) General research related competences			
Journal of Peasant Studies Write-shop on Critical Agrarian Studies (Online)	Journal of Peasant Studies/University of the Western Cape	2020	4.0
STEPS Summer School on Pathways to Sustainability	Institute of Development Studies, University of Sussex	2018	4.0
Means-End Chains and Laddering	WASS	2017	1.0
Analysing Discourse: Theories, Methods, and Techniques, CPT-56306	WASS	2018	6.0
'Inclusive innovation: Contrasting theoretical framings with the framing by Agricultural Practitioners in Kenya'	4th Africalics Conference on Innovation and Transformative Capacities for Growth and Sustainable Development in Africa, University of Dar Es Salaam	2019	1.0
'Resilient and Transformative Agricultural Innovation Systems'	17th Globelics International Conference on Innovation and Competence Building (Online), Globelics/National University of Costa Rica	2021	1.0
C) Career related competences/personal development			
Career Perspectives	WGS	2021	1.6
Brain Training	WGS	2017	0.3
Introduction to Collaborative Design of Sustainable Projects	WASS	2017	0.2
Writing a policy brief for the Netherlands Embassy in Kenya	3R Kenya project/African Centre for Technology Studies	2020	1.0
Total			**41.6**

*One credit according to ECTS is on average equivalent to 28 hours of study load

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