

Sustainable business models

- Community-based NTFP enterprises in Kenya

Hållbara affärsmodeller för kooperativa NTFP verksamheter i Kenya

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Abstract

In Kenya, community-based enterprises built around non-timber forest products (NTFPs) are crucial for enhancing rural livelihoods and encouraging sustainable resource management. While NTFPs has received attention in research, little is known about the underlying business models that underpin these local NTFP enterprises and how they relate to sustainability. This study investigates the operations of two community-based NTFP groups in Kenya, focusing on tamarind and apiculture, their perceptions of their business models, and the sustainability implications of their enterprises. An explorative qualitative abductive approach inspired by participatory research was employed, involving local participants in both data collection and analysis. Focus group discussions (FGDs) were conducted with both groups, followed by joint co-analysis sessions. The sustainable business model (SBM) framework guided this exploration, aiding in the description of their business models and sustainability implications. Key success factors, challenges, opportunities, and ambitions were identified. The findings reveal that partnerships, training, and adaptability are important aspects of their enterprises. Numerous challenges emerged, including navigating unfair markets, limited access to financing, and issues surrounding corruption. Both groups articulated ambitious aspirations, such as expanding their operations, enhancing value-adding processes, and reaching international markets. They underscored the significance of product quality, customer trust, and social value, which includes income for households and gender inclusivity. These NTFPs demonstrate promising potential for sustainable development, particularly regarding social benefits, along with some environmental advantages, and they indicate connections to several Sustainable Development Goals (SDGs). The study further illustrates how the SBM framework can be used to support reflection and learning in informal contexts. It presents recommendations for development initiatives and highlights issues that need to be addressed in policy frameworks.

Keywords: Apiculture, beekeeping, honey, sustainable livelihoods, tamarind.

Sammanfattning

Kooperativa företag som bygger på icke-träbaserade skogsprodukter har blivit en viktig del av landsbygdsutvecklingen i Kenya. De bidrar inte bara till lokal försörjning utan också till en mer hållbar användning av naturresurser. Trots detta finns det begränsad kunskap om hur dessa företag faktiskt fungerar, särskilt när det gäller deras affärsmodeller och kopplingen till hållbar utveckling.

Den här studien utforskar förståelsen för hur två lokala grupper i Kenya, en som arbetar med tamarind och en med biodling, organiserar sina verksamheter. Studien fokuserar både på hur grupperna själva uppfattar sina affärsmodeller och vilka hållbarhetsaspekter som blir synliga i deras arbete.

En kvalitativ och utforskande ansats antogs, där lokala deltagare medverkade i både datainsamling och analys. Fokusgruppsdiskussioner och gemensamma analysmöten genomfördes med båda grupperna. Studien tog stöd i ett ramverk för hållbara affärsmodeller (SBM) för att strukturera analysen.

Resultaten visar att faktorer som partnerskap, kompetensutveckling och anpassningsförmåga är centrala för gruppernas utveckling. Samtidigt framkom flera hinder, till exempel begränsad tillgång till kapital, korruption och svårigheter att konkurrera på rättvisa marknader. Trots detta uttrycker grupperna starka framtidsvisioner, såsom att nå internationella marknader och öka förädlingsgraden på sina produkter.

Slutsatsen är att dessa lokala företag har stor potential att bidra till hållbar utveckling, framför allt socialt men även miljömässigt. Möjligtvis kan likande verksamheter, i liknande kontexter också bidra till hållbar utveckling. Studien visar också att SBM-ramverket kan fungera som ett stöd för reflektion och lärande i informella sammanhang likt detta. Utifrån resultaten ges rekommendationer för utvecklingsarbete och belyser problem som bör adresseras i policyutformning.

Nyckelord: Biodling, honung, hållbar försörjning, tamarind.

Preface

Kenya has always interested me, not only for its rich biodiversity and astonishing landscapes but also for its people and the various forms of local entrepreneurship that emerge in this region. Exploring these aspects up close has been both humbling and inspiring. It has been a learning journey shaped by many individuals, both in Kenya and Sweden, who generously contributed their time, knowledge, and support.

I would like to sincerely thank Prof. Anders Roos at SLU for his encouraging supervision and for helping me shape this work. A warm thanks also goes to my assistant supervisor, Dr. Chemuku Wekesa at KEFRI, for his kind support and guidance throughout the research process, as well as to Steve Mbora and Caroh Manya at KEFRI for their continuous support during the fieldwork and their great efforts as moderators during the sessions.

Special thanks also to the Chawia Forest Tekida Group and the Miche Community Group, whose participation and insights formed the heart of this study. I deeply appreciate the time and energy they contributed during the focus group discussions and co-analysis sessions. Last but not least, I want to acknowledge Östad Stiftelse, which funded the project, for which I am truly grateful.

Uppsala, May 2025 Martin Elgh

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Abbreviations

BMC	Business Model Canvas	Page
CDA	Coast Development Authority	31
FGD	Focus Group Discussion	15
ICIPE	International Centre of Insect Physiology and Ecology	25
Kcal	Kilocalorie	11
KEFRI	Kenya Forestry Research Institute	18
KES	Kenyan Shillings	18
NGO	Non-Governmental Organization	12
NTFP	Non-timber Forest Products	11
SBM	Sustainable Business Model	11
SDG	Sustainable Development Goal	12

1 Introduction

This chapter introduces the topic and outlines the motivation for the study. It presents the background to non-timber forest products (NTFPs), defines the research problem and aim, and explains the focus on community-based groups in Kenya. The chapter ends by outlining the research questions and delimitations.

1.1 Problem background

NTFPs refer to products, other than timber, that derive from forests for human use (Shackleton et al. 2011). NTFPs can play a crucial role for the rural communities in low-income countries, often in the informal economy, by offering income, food, and other ecosystem services. Government institutions, researchers, and development actors frequently highlight their potential for addressing poverty and supporting local resilience. Shackleton and De Vos (2022) estimate that NTFP has 2.88 billion users in rural regions of the Global South. However, while NTFPs are widely celebrated for their perceived benefits, less is known about the underlying business models that support these enterprises or how they contribute to sustainability in practice. This thesis explores, among other things, that gap by analyzing community-based NTFPs enterprises in rural Kenya through the lens of sustainable business model (SBM) framework.

Tamarind and honey are two prevalent NTFPs found in Kenya as well as in other African countries. They are highly valued both for local use and commercial sale. Tamarind (*Tamarindus indica*) is a fruiting tree that grows both in the wild and is cultivated in various tropical regions (Buyinza et al. 2010). In Uganda, studies indicate that it can produce an average of 127 kg of fruit per tree annually, with some reports suggesting yields of over 200 kg (Kidaha et al. 2017; Simon 2019). Tamarind thrives in semi-arid areas, playing a crucial role in local food security by providing nutritious fruits, even during droughts when agricultural yields may fall short. The fruits offer health benefits as they contain essential amino acids and vitamins (Kuru 2014). The fruits are energy-rich with 239 Kcal per 100g. They can be used to produce beverages, as a condiment in dishes, as an ingredient in food, or consumed raw. Ebifa-Othieno et al. (2017) reported that apart from its contribution to food security, the tamarind tree also offers additional benefits, such as shade, windbreaks, fodder for livestock, forage, and wood for fuel and timber. Thus, it is a highly versatile tree species.

Honey, on the other hand, is a well-known, natural product used worldwide. In Kenya, it is common to find beekeepers producing honey in forest environments (Sagwa 2021). Honey has several documented health benefits and is commonly regarded as a healthier alternative to sugar as a sweetener (Scepankova et al. 2017). Furthermore, honey plays a pivotal role in environmental consideration as bees pollinate a wide array of plants (Sagwa 2021). In Kenya, honey production can significantly improve local livelihoods, providing much-needed income for rural dwellers and contributing to reduced poverty. Therefore, honey and tamarind are two different NTFPs that show great potential to rural communities for enhancing livelihoods, improving food security, and promoting environmental sustainability (Kidaha et al. 2017; Sagwa 2021).

In recent decades, sustainability has become a global priority, transforming how businesses, governments, and communities measure success and progress (Lüdeke-Freund et al. 2018). As environmental degradation, social inequalities, and economic instability continue, there is increasing awareness that traditional business models must change to tackle broader societal

and ecological challenges. United Nations (2015) launched the 17 Sustainable Development Goals (**SDG**) as a universal call to action, aiming to achieve a more equitable and sustainable future by 2030. These goals create a unified framework to guide initiatives across various sectors and levels, highlighting the interconnectedness of environmental, social, and economic well-being. A majority of the global workforce is engaged in the informal sector, which often encounters considerable developmental challenges (ILO 2024). In this informal setting, it is critical to evaluate the effects of NTFP enterprises on the SDGs, particularly given the considerable sustainable development challenges facing many areas in Sub-Saharan Africa. Aligning business practices with the SDGs is not only ethically sound, but it can also foster resilience, innovation, and long-term value for local communities. This thesis adopts this perspective by integrating sustainability into the business model concept to analyze, in collaboration with local producers, their business practices and opportunities.

1.2 Problem

NTFPs like tamarind and honey are vital economic assets for numerous rural communities in Kenya (Kidaha et al. 2017; Sagwa 2021). They generate income, support livelihoods, and offer environmental benefits. Activities related to tamarind and apiculture can reduce poverty in the region and strengthen local communities, which often face high unemployment and low income levels. However, little attention has been paid to the business models of NTFP producers, who frequently encounter significant challenges that impede their subsistence and prosperity (Belcher & Schreckenberg 2007). Therefore, analyzing these enterprises is vital to identify improvement opportunities that can boost income production. This analysis will offer insights into economic efficiency, sustainability impacts, and key factors that influence sustainable development. Such evaluations can be beneficial for non-governmental organizations (NGO), government agencies, extension services, and policymakers.

To guide such efforts, it is necessary to build on existing research while also identifying what has been overlooked. This section outlines the theoretical gap that this study addresses. Although NTFPs have been widely researched in various aspects, there has been relatively little focus on the business models that underpin these enterprises. Existing literature tends to concentrate on the NTFPs role in rural livelihoods, food security, forest conservation, commercialization outcomes, value chains, and ecological impacts, while overlooking how producers actually organize their activities and generate value. At the same time, contributions from IPCC (2023) stress the importance of inclusive and locally led sustainability transitions. This highlights the relevance of participatory research approaches that allow producers to co-interpret their practices and challenges.

Belcher and Schreckenberg (2007) point out that many NTFP initiatives are shaped by development narratives that do not always reflect the local realities producers face. They problematize that NTFP commercialization is often assumed to be beneficial even though a sufficient understanding of the NTFP business models is lacking. Nakanyete et al. (2025) study NTFP value chains in Namibia and point out the importance of NTFP, as well as some of the challenges. Shackleton and De Vos (2022) further highlight the scale of NTFP reliance globally, yet structured studies on the internal business dynamics of these enterprises are still rare. The business models in combination with their sustainability implications remain a neglected dimension in most NTFP research.

Some progress has been made. Makkarennu et al. (2021) studied the business model underpinning an NTFP enterprise in Indonesia. Although the study provides useful insights into

informal enterprise settings, it does not directly address sustainability nor contain participatory elements. Another relevant study is Mutta et al. (2021), which explored sustainable business models for informal charcoal producers in Kenya. Their study shows that business model thinking exists in the informal contexts they examined, and they employed a framework that incorporates sustainability. This thesis builds on these efforts by applying a sustainability-oriented business model lens to two NTFP cases, tamarind and apiculture, analyzing their business models in collaboration with the producers and reflecting on their sustainability implications.

1.3 Aim

This study aims to explore sustainable business models within community-based NTFP enterprises in Kenya. Emphasis is placed on producers' perspectives to identify key performance factors for sustainable business management and future aspirations in collaboration with community groups. The following research questions will be taken into consideration:

- Which factors are most crucial for the sustainable business management of community-based tamarind and honey production?
- How do tamarind and honey production contribute to sustainability indicators?
- How can the aspirations and experiences of the groups be understood through the sustainable business model framework?

Due to the lack of previous research, this study is exploratory, striving to understand the key components of business models among these NTFPs. The study does not seek generalization. However, depending on the similarities in context, transferability might be possible. For more information regarding the community groups, see chapter 4, *Empirical background*.

2 Theory

This chapter presents the theoretical foundation of the study. It begins by introducing key concepts related to sustainable development and business models, including the SDGs, the Sustainable Business Model (SBM) framework, and the Business Model Canvas (BMC). The chapter concludes with a conceptual framework used for data collection and analysis.

2.1 Sustainable development

This thesis adopts the widely recognized definition of sustainable development from Brundtland (1987: 41): "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." While broad, this definition remains relevant in the context of this study as it highlights not only immediate ecological and social concerns, but also the importance of long-term thinking.

2.1.1 Sustainable Development Goals

To operationalize sustainable development, the United Nations (2015) launched the SDGs. These 17 goals cover a wide range of objectives, from poverty reduction and gender equality to climate action and responsible consumption. Together, they capture the quotation from Brundtland. For an overview of the goals, see Figure 1.



Figure 1. Sustainable Development Goals (United Nations 2015).

In this thesis, the SDGs are not used directly during data collection or the co-analysis session. Rather, they are employed as a contextualizing framework for reflecting on the sustainability implications of the studied business models. In this way, the SDGs serve as a reference point for understanding how local business practices may relate to global sustainability ambitions, even if they are not framed as such by the community groups themselves.

2.2 Sustainable business models

SBM provides a framework for understanding how organizations create, deliver, and capture value while addressing environmental and social concerns (Bocken et al. 2014). Unlike traditional business models, which primarily focus on economic viability, SBMs integrate sustainability into their structure and purpose. This involves considering not only how a business operates financially, but also how it contributes to or affects its wider social and ecological context.

In this study, the SBM framework supports the exploration of the internal logic of communitybased NTFP enterprises. By applying the SBM lens, it becomes possible to examine how the business models are connected to sustainability.

2.2.1 Business model canvas

The Business Model Canvas (**BMC**), first developed by Osterwalder (2004) and later refined by Osterwalder and Pigneur (2010), offers a practical framework for visualizing and analyzing the different components of a business. It includes nine building blocks: customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure. The BMC does not aim to capture all operational details but serves to represent how a business fits together to create, deliver, and capture value (Osterwalder et al. 2005). Its widespread adoption across different industries and contexts may be due to its clarity, adaptability, and communicative strength. These features also make it suitable for participatory research where adaptability is needed to cater to real-world actualities (Vaughn & Jacquez 2020).

2.3 Conceptual framework

The SBM described above serves as both a tool for data collection and a structure for analysis. The focus group discussion (**FGD**) discussion guide was designed around the components of the SBM, and the framework was used during the co-analysis sessions to reflect on how each group viewed its business model. During the analysis phase, the SBM structure also informed how empirical findings were organized and interpreted.

Moreover, the conceptual framework presented in this study (see Figure 2) draws inspiration from previous work. The visual model is primarily influenced by the BMC, with the extension of incorporating sustainability implications. The reasoning behind the model is based on earlier studies and literature reviews by (Bocken et al. 2014; Lüdeke-Freund et al. 2018).

The sustainability considerations are drawn from the group's perspectives and are simply grouped in the results. Later in the discussion chapter, connections are drawn to SDGs to reflect on the wider implications of the group's activities. In this way, the framework combines structured business model analysis with attention to sustainability, as defined both globally and in the context of local community-based enterprises.



Figure 2. The sustainable business model framework.

The SBM framework primarily draws inspiration from Osterwalder and Pigneur (2010) but includes extensions to address sustainability aspects. It consists of ten components, nine of which are identical to the BMC, while the tenth component, sustainability implications, is additional. The illustration above serves as a template for analyzing a business according to the SBM framework. It was used during the co-analysis sessions; therefore, the content within the components was adapted to fit their realities. Consequently, this illustration should be viewed as an example of how business models can be described and analyzed in the context of this study. Moreover, the examples are not an exhaustive exposition but rather serve as guidance.

3 Method

This chapter outlines the methodological approach of the study. It describes the research design, literature review, selection of case groups, data collection techniques, and analytical process. It also addresses quality assurance, ethical considerations, and reflects on the participatory elements that shaped the study.

3.1 Method introduced

This thesis is conducted using a qualitative method and an abductive approach. This implies that the case was explored to gain insights that can be used to understand the broader phenomenon; however, no statistical analysis was conducted, and no generalizations should be drawn. According to Bryman and Bell (2017), exploratory studies should generally utilize a qualitative method. This justifies the selection of a qualitative method for this exploratory study. The abductive approach means that the work moved back and forth between theory and empirical material, as Bryman and Bell (2017) describe, rather than following a strictly linear path. The abductive approach allowed for openness during the research process and enabled adjustments based on what was encountered in the field. It also facilitated the development and refinement of the conceptual framework in response to the participants' experiences. The study was guided by an interpretive perspective, striving to explore how the participants themselves understand and make sense of their business models and sustainability work in their local context.

Furthermore, the research is influenced by a participatory approach. Bergold and Thomas (2012) state that participatory studies strive to include the people whose life-worlds are being studied in the research process. This study strived to involve the community groups in the research process by facilitating inclusive and engaging collaborative sessions. This collaboration occurred during data collection and parts of the analysis. The idea behind using a participatory approach was to make the research relevant and useful not only for academic purposes but also for the community groups involved. Working together in this way brings science and practice closer and influences how knowledge is created. A participatory approach rests on the view that knowledge is something we build together through interaction, rather than something the researcher extracts alone. It also reflects the belief that people are experts in their own lives and that their perspectives are key to understanding the realities this thesis focuses on.

3.2 Literature review

A literature review was performed to establish a conceptual framework and an appropriate research design for this study. Previous literature was also reviewed to gain insights into NTFP enterprises' role in sustainability and draw inspiration from similar contexts. Relevant literature was identified using the databases Google Scholar, Web of Science, and Scopus. Relevant search terms were combined with Boolean operators to limit or widen the search when necessary. The selection focused on sources that contributed to understanding how business model frameworks can be applied in informal and rural settings, how participatory approaches can be used in research with community groups, the role of NTFPs, and how to incorporate sustainability in business model research.

3.3 Unit of analysis

The unit of analysis consisted of two community-based groups engaged in NTFP enterprises. More precisely, one group was involved in apiculture within and adjacent to a forest environment, and the other collected and processed tamarind fruit for commercial purposes. The two groups were selected for the study due to their extensive activity duration, surpassing ten years. This duration suggested they likely possessed sufficient insights into the business models driving their operations and key performance factors. Additionally, it was expected that their business models had potential for enhancement. Their enterprises also showed considerable promise for sustainability efforts. Finally, Kenya Forestry Research Institute (**KEFRI**) has an established contact with these groups, and therefore, collaboration was expected to be good.

3.4 Technique of data collection

Focus group discussions (FGDs) were chosen as a data collection method because they allow for collective meaning-making and the expression of shared and divergent views within the group. As Bryman and Bell (2017) explicate, FGDs are particularly useful when the goal is to generate depth and insight rather than statistical representation. The discussions were guided by the SBM framework previously presented, allowing the group to reflect on: Value propositions, customer segments, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure. As well as the business models' impact on sustainability, key performance factors, challenges, and possibilities. However, the discussion guide was catered to fit the local setting, meaning the questions were straightforward (see Appendix 1). A few SDGs were identified to enable the sustainability implications to relate to the SDGs, and questions in the discussion guide were framed to address those.

The recruitment of participants was based on the previously mentioned groups. Each FGD included ten participants, who all received 500 Kenyan shillings (**KES**) as transport reimbursement for participating. All participants in the two FGDs were acquainted with one another beforehand, as they were involved in the NTFP groups. Wibeck (2010) addresses the issue with existing groups for FGDs. Preexisting groups can both carry strength, in the sense that no one in the group feels scared to speak up. Hence, the environment will be more relaxed. The downside to preexisting groups is that interesting topics may not be discussed because group members take certain things for granted and feel they are not essential to mention during the group discussion. Another disadvantage of preexisting groups is that participants may know each other so well that they indirectly refer to certain conditions, which could be difficult for the researcher to understand.

During the FGDs, one of the group members was selected as a secretary for the meeting. That secretary took notes on a flipchart, allowing all participants to follow the discussion in text. For each question, the group had to devise an answer to be noted on the flipchart. If there were no consensus, the secretary was allowed to note the contradictory answers. The FGDs were facilitated by the moderator, who ensured all questions in the discussion guide were addressed. Otherwise, the group was free to address closely related topics, reflect on, and contrast the discussion. This was to encourage engagement in the data collection, in line with the participatory research approach described by Bergold and Thomas (2012).

However, considering all these benefits and drawbacks, the decision to conduct FGDs based on preexisting groups was justified because the study strove to collaborate with the community

groups. Furthermore, the method inspired by a participatory research approach influenced the decision to collaborate with preexisting groups because the intention behind choosing this method was to facilitate genuine, real-world impact, as Vaughn and Jacquez (2020) describe.

Bryman and Bell (2017) emphasize the moderator's role, stating that the need for balanced moderation is to create a space for all participants' voices, not just dominant ones. This was facilitated by the moderator, a native Kenyan with a higher education degree, who was fluent in both Swahili and English. While most group members had good proficiency in English, the discussion was conducted in Swahili to ensure that all participants felt comfortable and could express their messages more freely. Notes on the flipchart were recorded in English, and the discussion was translated into English.

Before the FGDs took place, the participants were briefly introduced to the purpose of the study and the discussion guide. Enabling them to understand and relate to their activities. Otherwise, no further or more explicit commentary of the SBM was conducted. Wibeck (2010) discusses the importance of the moderator not having too much impact on the participants in the group discussion. If this is the case, the group risks incorporating the moderator's conception into their discussion. Therefore, the SBM framework was not explicitly accounted for at the beginning of the FGD. In summary, the moderator's role was to encourage open dialogue and foster active engagement without imposing too much predefined framing or dominating the discussion.

3.5 Analysis

The analysis mainly consisted of a co-analysis session with the same groups and participants. During the co-analysis, all participants received 500 KES as transport reimbursement. The moderator opened the meeting, outlined its objective, and thoroughly introduced the SBM framework. A co-analysis guide had been prepared beforehand to facilitate the session (see Appendix 2). A large version of the SBM framework was used as a visual tool to support discussion. All participants also received a printed version in A4 size. Some clarifying questions were asked at the beginning of the session to verify answers from the FGD. The groups were then encouraged to reflect on the SBM frameworks' applicability to their lived realities.

Although a fully participatory research method was not adopted, the study was inspired by its core principles, particularly inclusivity, co-reflection, and mutual learning as accounted for in Vaughn and Jacquez (2020). To facilitate the process and save time, the researcher initially grouped the data according to the components of the SBM framework. These preliminary findings were then presented during the validation and co-analysis session, on the flipchart and on printed copies in A4 size, where participants were encouraged to reflect on the findings.

During the co-analysis, the groups discussed sustainability implications, key performance factors, challenges, and future aspirations. The SBM served as a structured tool to guide the conversation, allowing the participants to align the discussion with their lived experiences and ambitions. This collaborative exercise promoted shared meaning-making and encouraged dialogue around potential improvements and sustainability outcomes. While the final summary and synthesis were conducted by the researcher, the process allowed local perspectives to meaningfully inform different stages of the analysis and ensured that findings were grounded in participant insights.

Lastly, the SBM framework functioned as an analytical lens to explore how business model components such as value creation, key activities, and partnerships aligned with sustainability considerations and sustainable development. At the same time, the analysis remained open to themes that emerged beyond the predefined categories of the framework. Participant insights were considered central to the meaning-making process, and emerging themes were allowed to shape and extend the analytical structure.

3.6 Quality assurance and ethical aspects

The quality of this study is assessed through the concepts of trustworthiness, authenticity, and reflexivity explained by Bryman and Bell (2017). These criteria are commonly used in qualitative research to evaluate whether findings are well-founded and meaningful. Trustworthiness was supported in several ways. To strengthen credibility, the analysis stayed close to what participants said and aimed to reflect their perspectives without overstepping the data. Involving the groups in the co-analysis helped ensure this. There was also a clear link between the material and the SBM framework used to structure the analysis. While the findings are not generalizable in a statistical sense, they may still be transferable to similar contexts, particularly those involving community-based NTFP enterprises in informal settings. Dependability was addressed by carefully documenting how the discussions were conducted and how the data were analyzed.

In terms of authenticity, the study sought to represent different voices within the groups, allowing participants to engage in the process equally. Each discussion group comprised members of different genders, ages, and backgrounds, with ten participants invited to every session. Efforts were made to encourage everyone to take part, and the co-analysis phase provided space for further reflection. This supported the study's authenticity and created value for the participants, as the sessions offered an opportunity to discuss their work and consider possible improvements. As Bryman and Bell (2017) note, authenticity in qualitative research includes whether the study helps participants better understand their own situation, which was one of the intentions behind the participatory elements.

A reflexive approach was applied throughout the process. I was aware that my background and role as a researcher could influence both how the participants responded and how the findings were interpreted. To manage this, local moderators facilitated the group sessions, and care was taken to create a space where everyone felt comfortable to speak. Reflexivity also involved ongoing reflection on how the data was understood and interpreted. By involving participants in the interpretation of their own experiences, the study reduced the risk of producing one-sided conclusions and helped ensure that the findings remained grounded in the participants' perspectives.

To uphold high ethical standards, all participants received clear and detailed information prior to the first session regarding the research's purpose, methods, and their rights, including the ability to withdraw at any time and request data removal. All participants were required to sign a consent form that outlined the purpose of the study, their rights, and how the data and pictures would be published, utilized, and stored. Additionally, because the study focuses on rural community-based groups in Kenya, which are often marginalized, several measures were taken throughout the research process to maintain ethical integrity. One such measure was the participatory approach, involving the voices of the individuals whose life-worlds are being studied in the research process. Another such measure was the native Kenyan moderators, who moderated the sessions with the community groups. Those moderators also distributed reimbursement to the participants to avoid unequal dynamics, potentially leading to unintended power implications or perceptions.

4 Empirical background

This chapter provides the empirical background of the study. It begins with an overview of Kenya's socio-economic and environmental context, followed by a description of NTFPs. The chapter ends by introducing the two case groups, one focused on tamarind and the other on apiculture.

4.1 The Kenyan context

Kenya is a developing country with a diverse landscape primarily composed of arid and semiarid regions, although some areas in the western parts are more fertile (Hongo Ominde et al. 2025). The republic comprises approximately 50 million inhabitants, with a wide array of ethnic groups. Kenya was founded in 1963 when it gained independence from the United Kingdom. Since its independence, Kenya has been poorly developed due to several factors, including colonial heritage, governmental corruption, and mismanagement. Because of a relatively low level of industrialization, rural communities often depend on natural resources for their livelihoods. While the country has made some progress in terms of development, challenges such as unemployment, environmental degradation, food insecurity, and climate change remain persistent, particularly in rural areas (World Bank 2025). In response, sustainable development initiatives have been implemented, with both governmental and non-governmental actors promoting initiatives to address such issues.

4.2 Non-timber forest products

NTFPs can be defined as "all biological materials other than timber which are extracted from forests for human use" (Beer & McDermott 1989:3). These products are particularly important in rural areas where livelihoods often rely on direct access to natural resources (Shackleton et al. 2011). While NTFPs are frequently informal and under-reported in economic data, they play a significant role in subsistence and income generation, especially for smallholder households and community-based groups (Shackleton et al. 2007).

NTFPs have been recognized for their potential to support sustainable development by linking environmental conservation with local economic benefits (Shackleton et al. 2011). NTFPs can offer flexible income opportunities with relatively low capital requirements and can be managed collectively at the community level. Their integration into informal rural economies makes them relevant to broader sustainability discussions, particularly where formal employment or infrastructure is limited.

In this thesis, NTFPs are approached not only as products but as part of broader systems of community organization, as well as informal entrepreneurship in developing countries. This framing supports a more nuanced understanding of how sustainable business practices can emerge within informal, small-scale settings outside formal markets.

4.3 Tamarind group

The tamarind group is based in Mbololo village, located in Taita-Taveta County, just outside the town of Voi, at the foot of the Taita Hills. The surrounding environment is semi-arid, where access to natural shade and tree cover is valued. The group was established ten years ago and now includes 30 members. It is registered as a group but not as a company, which indicates the informal nature of their enterprise. Originally operating as a community-based tree nursery, the group later evolved into a tamarind-focused enterprise. Out of the 30 members, 15 are actively engaged in the tamarind activities. See Figure 3 for a picture from the FGD.



Figure 3. Picture from the focus group discussion with the tamarind group, locally known as the Miche group. The two people on the left side are the moderators from the Kenya Forestry Research Institute. The researcher is the man in the middle of the picture holding a tamarind seedling.

The tamarind group has more members than those in the photo above. Ten participants were invited to the FGD. The photo was taken during the rainy season; other times, the environment is drier. In the background of the photo to the right, there is a tamarind tree. See Figure 4 for a tamarind fruit.



Figure 4. Photo of tamarind fruits taken in April 2025 in Kenya. The fruits in this picture are still unripe.

Tamarind harvesting is conducted seasonally, with fruits typically maturing around August to September. However, not all fruits ripen simultaneously, which allows for successive harvesting. The group uses casual laborers to harvest tamarind, both from wild trees and planted trees. Some group members grow tamarind on their own farms, while others buy fruit from local farmers, often purchase while the fruit is still on the tree, and paying by the sack once harvested. After harvest, the fruit is transported to the group's site for packaging and preparation for sale. Occasionally, they produce tamarind juice, which is sold during certain occasions.

The tamarind group's activities extend beyond tamarind sales and reflect a broader engagement in both economic and environmental efforts. Although the tamarind venture is an important income source, it is not a full-time occupation. Most members are also involved in subsistence farming or small-scale business. The group is modestly organized, with a chairperson, treasurer, and secretary coordinating operations. Beyond their core business, the group participates in tree planting campaigns, often in collaboration with local schools, county government, and local administration. The tree is valued not only for its good taste and medicinal properties, but also for providing shade, controlling soil erosion, and offering aesthetic and environmental benefits in an otherwise dry landscape.

4.4 Apiculture group

The apiculture group is also situated in Taita-Taveta County. However, they are unfamiliar with the tamarind group due to the distance separating the groups. The group resides in the Taita

Hills, a region noted for its cooler and wetter climate compared to the surrounding lowlands. While the area occasionally experiences minor droughts, it generally benefits from consistent rainfall, which supports both agriculture and apiculture. The group places behives in diverse environments, including farmland and forest edges, taking advantage of the region's biodiversity and floral resources. See Figure 5 for a photo from the FGD.



Figure 5. Focus group discussion with the apiculture group.

The above photo was captured during the FGD with the apiculture group, which included ten participants, some of whom are visible in the picture. The man in the center is one of the two moderators. In the background, the lush greenery and many trees are evident, as the group is situated near the Chawia forest.

Founded in 2002 by the NGO, International Centre of Insect Physiology and Ecology (**ICIPE**), the group initially consisted of 20 members engaged in apiculture. Today, only 10 members remain. The group have relatively modern apicultural techniques, managing a total of 44 hives and operating a processing facility where honey is processed, branded, and packed for sale. This facility is located on the premises of a nearby university, where it is also used for teaching purposes. The infrastructure is permanent and was donated by the same ICIPE.

The apiculture group operates informally but has still managed to organize itself and develop its activities in both collective and individual ways. Although the group lacks a highly formal structure, it has a chairman and coordinates shared hive management. They are not registered as a company, only as a group, which demonstrates the informal nature of their enterprise. Some members have begun acquiring personal hives, complementing the group's collective hives. While they are not officially certified for supermarket distribution, the group has developed a label for their processed honey (see Figure 6). In addition to honey, they occasionally produce and sell beeswax and propolis. Most group members are also engaged in subsistence farming, as the apiculture enterprise does not fully support their livelihoods. Moreover, the region lacks formal employment opportunities.



Figure 6. The apiculture group's processed honey.

The apiculture group's processed honey is processed in their facility. The group received support from Nature Kenya to organize the labels. This jar is 500g and sells for a price of 500 KES.

5 Results

This chapter presents and analyses the study's findings based on the SBM framework. The results are structured around key themes according to the SBM framework. Challenges, possibilities, key performance factors, and aspirations are also presented. The chapter concludes with a synthesis that highlights the main insights from the chapter.

5.1 Sustainable Business Model

The results presented in this chapter are based on data collected through FGDs and co-analysis sessions with each group. After conducting the initial FGDs, a first level of interpretation was carried out, where the material was grouped into preliminary themes guided by the SBM framework. These findings were then revisited and refined with the participants during the co-analysis, which led to a description of the groups' sustainable business models according to the SBM framework (see Figures 7 and 8). This collaborative process allowed for clarification, confirmation, and the identification of additional insights. The following sections present the key themes that emerged, supported by examples from both groups. The SBM framework plays a central role in this chapter, as the empirics were analyzed through the lens of the SBM framework presented in Chapter 2, theory. The SBM framework itself is inspired by previous work by (Osterwalder & Pigneur 2010; Bocken et al 2014; Lüdeke-Freund et al. 2018). The results are then grouped and presented around each component of the framework. As themes emerged beyond the SBM framework during FGDs and co-analysis, additional grouping was conducted which is presented under separate headings below. Namely, challenges and possibilities, key performance factors, and future aspirations.

Key Partners	Key Activities	Value Pr	opositions	Customer Relationships	Customer Segments
Supporting partner KEFRI (Capacity building, supported tree nursery) CDA (Supported with seeds) Buyer-supplier partner Farmers with tamarind trees. Local administration and County goverment buy seedlings for tree planting campaigns.	Core activities Production Distubution Sales Supporting activites Tree nursery, planting, and prunning of young trees. Key Resources Key Resources Human Labour in production and distribution. Physical Basic tools and equipment. Knowledge Important but not exclusive to this group.	Quality product Cleanliness, pur fresh. Accessibility Making product consumption. Customized sen Juice delivery to occations	s e, sweet, and is avaliable for vice o special	Low-cost orientation Informal and trust based relationship with customers. Simple personal assistance Simple products that did not require elaborate sale effors. Distribution Channels Distribution Local - direct (without middlemen) Mombasa - indirect (through middlemen) Communication Low-cost orientated (whatsapp, phone, face-to-face, word of mouth)	Segmented customer base Customers with different needs and requrements. Reached through different channels. Different markets in Mombasa and local area. Different products; juice and fruit.
Cost Structure Asset-light orientation Basic tools and equipment Low fixed costs Primarily variable costs dependent on quantity. Cost structure balanced between cost-efficiency and delivering customer value.		Revenue Streams Primarily revenue stream: tamarind fruit. Secondary revenue stream: tamarind juice. Payment was made at point of sale. Flexible pricing, mostly dependent on the market and negotiations. No influence over prices of tamarind fruit. Limited influence over the price of tamarind juice.			
Sustainability implications Social sustainability Income used to; access education, health care, food, clothes, and other essentials. Labourers were paid more then gobal poverty threshold. Gender balance and equality within the group. Environmental implications Tamarind trees contribute to increased forest cover, alleviate soil erosion, provide shade and serve as a windbrake. The shells of the tamarind fruit is good for soil moisture and nutrition.					

Figure 7. Sustainable business model for the tamarind enterprise.

This illustration outlines the business model of the tamarind enterprise and its sustainability implications. Each component features descriptions of how the tamarind group's business model relates to the respective component. For instance, the customer segment component indicates that a segmented customer base is served. This segmentation is based on the varying needs and requirements of customers in different locations, utilizing distinct products, and are reached through different channels. The content of each component is abstracted to correspond to the objective of the SBM framework. Collectively, these components represent the internal logic of the tamarind enterprise's operations. They demonstrate how the enterprise creates, delivers, and captures value, as well as highlighting its sustainability implications.



Figure 8. Sustainable business model for the apiculture enterprise.

The illustration above outlines the business model of the apiculture enterprise and its sustainability implications. Each component contains descriptions of how the apiculture group's business model relates to the respective component. For example, the customer relationship component describes the relationship as low-cost oriented and informal, built on trust with simple personal assistance during sales. The content of each component is abstracted to align with the objectives of the SBM framework. Collectively, these components represent the internal logic of the apiculture enterprise's operations. They demonstrate how the enterprise creates, delivers, and captures value, while also highlighting its sustainability implications.

5.1.1 Value proposition

The value proposition for both groups is analyzed and presented below, inspired by Osterwalder and Pigneur's (2010) reasoning.

Tamarind: The main product offered by the tamarind group was raw tamarind fruits, though they also occasionally produced tamarind juice. Their value proposition for the raw fruit emphasized accessibility for customers, particularly in Mombasa, where the local fruits are known for their high quality and sweet flavor. Customization formed another aspect of their value offering, including juice tailored for special events like school functions and weddings. Quality was highlighted as a vital component for both the juice and the fruit, ensuring cleanliness throughout the process and confirming that the juice remained fresh without any contamination from dirty water. Juice that wasn't too diluted lasted longer and had a better taste, which customers valued.

Apiculture: The apiculture group offered several types of products, namely, raw and processed honey, wax, and propolis. The value proposition for the honey, both raw and processed, was a sweet, natural, and good, long-lasting product, ready for consumption. The processed honey was also packaged and branded in different quantities: $\frac{1}{4}$ kg, $\frac{1}{2}$ kg, and 1 kg. Wax and propolis were sold raw.

5.1.2 Customer segments

Both groups' customer segments are analyzed and presented below, inspired by the reasoning of Osterwalder and Pigneur (2010).

Tamarind: The typical customers for the tamarind group were local individuals, restaurants, markets, and schools. To reach more lucrative markets, they transported the fruits to Mombasa city at certain times. Hence, the tamarind group served a segmented market with different needs and requirements. Their customers were also reached through different communication and distribution channels. Hence, the customer base was segmented.

Apiculture: The apiculture group sold honey to local individuals. They also sold wax and propolis to a nearby community-based group that produced wax and propolis products. They observed customer segmentation based on their various offerings, including both processed and unprocessed honey, wax, and propolis. Furthermore, they identified varied purchasing behaviors within the same product category, such as processed and unprocessed honey, noting that some customers had less purchasing power and, as a result, asked for smaller quantities.

5.1.3 Channels for distribution and communication

The channels for distribution and communication for both groups are analyzed and presented below, inspired by the reasoning of Osterwalder and Pigneur (2010).

Tamarind: In terms of communication, WhatsApp was used to market the products. Regular phone calls were employed to communicate with customers, as well as for direct interactions. Word of mouth was highlighted as a powerful method for reaching customers with their offers. Thus, the communication channels were characterized by a low-cost orientation. To distribute fruits, the group primarily sold large quantities but also occasionally smaller amounts upon request. Through the local market, customers were reached directly, without middlemen. In Mombasa, customers were reached indirectly through middlemen. The group reported that entering the Mombasa market was risky due to high expenses and price uncertainty, as well as concerns for personal safety. One member of the group expressed her significant discontent with the Mombasa venture due to profit uncertainty, the influence of middlemen, and personal safety.

Apiculture: Communication with customers was done through phone, direct communications, and word of mouth. The distribution was reported to be direct to customers, either at their homes or their processing facility, where some sales were reported. Hence, both communication and distribution channels were low-cost oriented.

5.1.4 Customer relationship

The group's customer relationships are analyzed and accounted for below, inspired by Osterwalder and Pigneur's (2010) BMC.

Tamarind: Because the raw fruit is a simple product, the group did not have any elaborate sales process apart from simple personal assistance at site or over the phone. Some customers were reported to be loyal by purchasing the fruits every week. These customers were mainly local restaurants, fostering a more continuous relationship. Moreover, the customer relationships were trust-based, informal, and low-cost oriented.

Apiculture: Customer relationships were informal and trust-based, with some simple assistance at the point of sale. Hence, customer relationships were low-cost oriented.

5.1.5 Key activities

Both groups' key activities are analyzed and presented below, inspired by the BMC of Osterwalder and Pigneur (2010).

Tamarind: Key activities mentioned included purchasing the fruits while still on the tree, harvesting, packaging, and distributing the fruits. For juice production, they blended the peeled fruits until they became liquid and then packaged them in plastic pouches and bottles. Supporting activities involved raising tamarind seedlings and later selling them. Some seedlings were planted independently. Young tamarind trees were pruned to achieve the desired shape and enhance growth.

Apiculture: Key activities included apicultural management, harvest, transport, processing, packaging, labelling, distributing, and selling.

5.1.6 Key resources

Key resources, drawing inspiration from Osterwalder and Pigneur (2010), are analyzed and presented below.

Tamarind: Key resources were categorized into three groups: human, physical, and knowledge. The most important category was human resources, which primarily involved labor. Labor was essential for all key activities. While the group members performed some tasks, additional laborers were also employed. The physical resources, which were of low value, included knives, a traditional machete (panga), sickles, a weight scale, a blender, a cooler box, and a fridge. Knowledge was considered important, but it was not exclusive to this group.

Apiculture: Key resources included physical assets such as a processing facility with a heater and an extractor, bee hives, and an apicultural kit containing the essentials. Other resources included knowledge and technical skills. The apicultural management was reported to be intricate and described as a craft that takes time to learn. Labor and transport were also important resources mentioned.

5.1.7 Key partnerships

Key partnerships of both groups are analyzed and presented below, drawing inspiration from Osterwalder and Pigneur (2010).

Tamarind: Key partnership consisted of supporting partners and buyer-supplier partners. The supportive partners were KEFRI and Coast Development Authority (**CDA**). KEFRI offered capacity building and supported the tree nursery, while CDA provided support for seeds. Buyer-supplier partners included the local administration, the county government, and the national

government for collaboration on tree planting, as they purchased seedlings from the group. Another prominent buyer-supplier partner was the farmers from whom they bought the fruits.

Apiculture: ICIPE was recognized as an important partner, having contributed the equipment and training at the start of the project and provided technical support when needed. Nature Kenya, another NGO, supported the group by donating bee suits and hives. These partnerships were thus described as supportive and enabling. Taita Taveta University was also noted as a key partner since the group shares a processing facility with the institution. Consequently, the group did not incur costs for electricity during honey processing. The university also utilizes the facility for apiculture teaching, and the group is occasionally invited to assist in training sessions. Since no revenue is generated, these activities were characterized as part of the ongoing partnership rather than part of the group's value proposition.

5.1.8 Cost structure

The group's cost structures are analyzed and presented below, inspired by Osterwalder and Pigneur's (2010) BMC, summarized in Table 1.

Tamarind: The tamarind group operated with low-value assets and minimal fixed costs. Their main variable expenses included labor for purchasing and peeling tamarind fruits, as well as local and regional transport. While the business was not strictly cost-driven, it was clearly shaped by labor intensity and logistical needs. Additional expenses occurred in the distribution line. However, these were too irregular to include in the table. The group had ambitions to strengthen the value proposition. Although they also stressed the importance of cutting costs in their operations to capture value.

Apiculture: The apiculture group, on the other hand, relied on externally funded high-value equipment, including processing tools, equipment, and beehives. Although these assets were donated, the group highlighted their high procurement costs and the challenges of maintenance, especially when the extractor broke down once. Variable costs included packaging materials, transport, and labor. Despite the higher asset value, fixed costs remained low, while regular business expenses were moderate and manageable without external support.

Category	Tamarind group	Apiculture group	
Assets	Sickel – 275	Heater – 400,000	
	Panga – 600	Extractor - 500,000	
	Knife – 200	Apicultural kit – 8,000	
	Blender – 4,000	One beehive – 8,000	
	Weight scale $-4,000$		
	Cooler box $-10,000$		
Variable costs	Fruits incl. labor (90kg) – 325	Container for honey – 45-60	
	Peeling (90kg) – 125	Transport – 1,200	
	Local transport (90kg) – 70-330	Labor per harvest $-2,500$	
	Regional transport (1000kg) – 2,000		
Cost structure	Assets light	High-value assets (externally	
	Low fixed cost	funded)	
	Labor and transport dominant costs	Low fixed costs	
	Between cost driven and value driven	Moderate variable costs	

Table 1. The cost structure of the enterprises is outlined here. All figures are approximations in KES

This table showcase the cost structure of the two groups. It includes the key assets of each group along with their prices, as well as the variable costs. Fixed costs are omitted since they are minimal. The cost structure row serves as an abstract summary. Additionally, the table

illustrates the differences in cost structures among the groups. Note that the table does not represent an exact account but serves as a tool for understanding the respective cost structures. For example, the tamarind group had several sets of the cheaper tools. But this was not included in the table to keep it simple.

5.1.9 Revenue streams

The group's revenue streams are analyzed using the SBM framework, inspired by Osterwalder and Pigneur (2010), and presented below.

Tamarind: The primary revenue stream came from fruit sales, while the secondary stream was from juice sales. Payments were required at the point of sale, with no credits offered, although occasional credits were received from farmers when purchasing fruits. Pricing for tamarind fruits was generally flexible and largely influenced by the market forces. Negotiations over price did occur. In contrast, the group held more control over juice pricing, which was determined based on rates in the nearby Voi town. They typically priced juice slightly lower to draw in customers. Furthermore, the group noted they did not function in a free market. They reported that several middlemen had too much control, making it challenging to access fair prices. This can be observed in Table 2, where prices in Mombasa can vary significantly due to brokers' excessive influence, as well as market factors. Quantity reported to be 500-1000kg /week of raw fruit.

Table 2. Prices in KES for the tamarind fruit and juice, both locally and in Mombasa, are provided

	Local market	Mombasa market
Raw fruit	20-50 KES/kg	20-120 KES/kg
Juice	300 KES/Liter	N/A

Prices for the raw fruit varied between the local market and the Mombasa city market. As shown in the table, the prices in Mombasa city exhibited significant differences. This created issues since Mombasa city is approximately 160 km away from the tamarind group. A great deal of uncertainty arose. The juice was only sold within the vicinity of the group's village.

Apiculture: Revenue was reported to primarily derive from the sale of honey. Payment was due at the point of sale. The price for processed honey was set based on a cost calculation plus a profit margin. The unprocessed honey, which was sold at a higher price, had a price based on a simple market analysis. Local customers were reported to prefer the unprocessed honey as it was viewed as more natural and purer. Prices also fluctuated based on yield in that area. The group mentioned that sometimes, when the honey supply decreased, they sold at a higher price. Prices in KES.

Processed: 1000/kg Unprocessed: 1200/kg

5.1.10 Sustainability implications

The group's correlation to sustainability is analyzed and presented below, drawing inspiration from (Bocken et al. 2014; Lüdeke-Freund et al. 2018)

Tamarind

The tamarind group reported several sustainability implications. No negative implications were reported by the group.

Societal: The group reported that their business provided income to members, enabling them to pay school fees, access health services, repay debts, and purchase basic household items. In

addition to their own earnings, they employed laborers who earned income above the global poverty threshold. Hence, they contributed to reducing poverty in their area. Women were reported to have equal opportunities within the group. One person living with disabilities was included, and the group emphasized the importance of inclusivity.

Environmental: Regarding environmental implications, they noted that tamarind trees help prevent soil erosion, enhance forest cover, serve as windbreaks, and offer shade. It was also mentioned that the fruit shells contribute to soil moisture and nutrition.

Apiculture

The apiculture group reported several sustainability implications, including one negative aspect.

Societal: The group stated that income generated from the business was used to pay school fees, access healthcare, and purchase essentials. They also employed local laborers who earned 500 KES per day, which is above the global poverty line. This job creation was appreciated due to high unemployment in the area. Hence, they contributed to reducing poverty in their area. They also mentioned that women had equal opportunities in the group.

Environmental: Pollination was noted as the group's key environmental contribution, due to the role of bees in improving agricultural yields. However, they also reported a risk of forest fires linked to traditional bee-attracting methods. In recent years, they had shifted to using smokers during hive inspections and harvesting instead of lighting fires.

5.2 Challenges and possibilities

5.2.1 Tamarind group

The tamarind group encountered several business challenges. They reported that accessing the market at fair prices was a significant issue. The market was characterized by middlemen who wielded excessive influence. The prices they received were neither fair nor aligned with market standards. While they reached customers directly in the local market without middlemen, this segment was deemed insufficient, prompting a desire to reach the Mombasa market. The local market was particularly lacking during the harvesting months when tamarind supply was plentiful. Additionally, there was a challenge with laborers not following best practices; some laborers reportedly resorted to cutting branches of the tamarind tree to reach the fruits. Another issue was the rising labor costs due to inflation affecting wages. Financing also posed a significant challenge.

In terms of possibilities, the group mentioned the possibility of registering as a company, which would help them be more recognized. They also considered splitting the current group so that the tree nursery and tamarind enterprise would be two different entities. They also articulated the possibility of acquiring a freezer for the tamarind juice. With a freezer, they could have readily available juice as part of their value offer.

5.2.2 Apiculture group

The apiculture group mentioned several challenges with apiculture management. These challenges included migrating bees, honey badgers that destroy hives, pests, rotting hives, vandalized equipment, honey theft, a low number of beehives, and forest fires. Organizational issues were also reported, with members quitting due to low harvests, which is problematic since a labor force is essential during harvest times. Other challenges included high container costs, restricted access to supermarkets due to a lack of approval from the Kenya Bureau of

Standards, caused by insufficient funds to cover unofficial fees, and difficulties in obtaining financing.

In terms of possibilities, they mentioned that the community forest association is active in the area and that a collaboration could be beneficial for the group. They also mentioned that more members joining the group would be beneficial.

5.3 Key performance factors

5.3.1 Tamarind group

The Tamarind group identified several key performance factors. Regular meetings were used to monitor group progress, and table banking supported internal organization and financial coordination. Favorable growing conditions contributed positively to their operations, with the local tamarind appreciated for its sweetness and quality, reflecting an important aspect of their value proposition. Customers from Mombasa were noted for valuing these qualities. As customer expectations increased, maintaining product quality became more important. For the group, this meant ensuring clean, sweet fruits and preparing fresh juice with minimal added water. Partnerships were also mentioned as an important performance factor, offering external support, capacity building, and collaboration on tree planting. Additionally, the group emphasized the need for local adaptability, as they regularly faced market fluctuations, varying customer demands, and inconsistent yields.

5.3.2 Apiculture group

The Apiculture group highlighted several key performance factors. One was the placement of beehives in both highland and lowland areas to increase resilience to changing weather conditions. During droughts, they emphasized the importance of providing sugar-water mixtures to prevent bee migration. These adaptive practices are connected to the key activity, apicultural management, and show how the group manages environmental risks in its operations. Another factor was the sale of honey in different container sizes, specifically ¼ kg, ½ kg, and 1 kg, which the group considered a successful strategy. They also discussed introducing even smaller sizes to improve accessibility for local customers. These choices reflect an understanding of customer segments and attention to customer relationships. Pricing strategies were also seen as important. The group explained that unprocessed honey sells at a higher price and requires less input, making it more profitable than processed honey. This shows the group's awareness of value capture. Partnerships also played a key role. Support from an ICIPE project, along with ongoing assistance from both ICIPE and Nature Kenya, provided training and equipment. These resources contributed directly to the group's development and are closely tied to the SBM's key partnerships.

5.4 Future aspirations

5.3.2 Tamarind group

The tamarind group had several aspirations for the future. They conveyed their desire to enhance the value of their products. They aimed to establish their own processing facility in the future, enabling them to produce longer-lasting juice, soap, sweets, and body lotion. Currently, their juice has a shelf life of only three days before fermentation occurs. In line with their goal of adding value, they expressed a desire to create their own brand. The group highlighted their need for additional training and capacity building focused on value addition and marketing. Furthermore, they articulated a long-term aspiration to enter international markets with their products.

5.3.3 Apiculture group

The apiculture group had several aspirations for the future. They expressed the long-term goal of adding 250 more hives to ensure business continuity. Currently, they have 44 beehives. They used to have more, but some were of poor quality and deteriorated over time. To prevent hive deterioration, the group aimed to install a shelter over the apiaries, but they have not been able to do so due to a lack of funds. Regarding harvests, they aim to reach 250 kg of honey per harvest, while currently yielding about 50 kg per harvest. To achieve this goal, they emphasized the importance of adding more beehives. The group also wanted to establish new partnerships with apiculture experts, as they face challenges in identifying and managing pest invasions. They noted that the support received from ICIPE was significant but not entirely satisfactory, as it did not cover all pest invasions, highlighting the need for a readily available partnership with an apicultural expert. Additionally, the group strongly emphasized the importance of training and capacity building in value addition, apiculture management, and marketing. They seek more training in value addition to develop advanced products, particularly regarding wax products. They currently sell the wax in its raw form but wish to add value themselves. The wax products they mentioned include candles and body lotion.

5.5 Synthesis

This section brings together key findings from both groups to raise the level of abstraction and support transferability of insights beyond the immediate study context. The objective is not to compare the groups for its own sake, but rather to highlight broader tendencies that emerged across both cases.

Both groups described external partnerships as important for enabling the start and continued operation of their activities. Support from NGOs and public institutions, including the provision of equipment, training, and technical advice, was frequently mentioned.

Challenges related to market access were evident in both cases. The tamarind group highlighted difficulties with relying on middlemen to reach regional markets like Mombasa, while the apiculture group primarily sold locally and expressed concerns about expanding beyond their local market. Accessing adequate financing also posed a challenge as funds were needed to expand their enterprises. Finally, both groups expressed the challenge of insufficient know-how within their respective operations, resulting in the adoption of practices not aligned with best practices.

Labor was raised as a key resource. While both groups relied on collective work to maintain operations, the tamarind group appeared even more dependent on manual labor.

In terms of value propositions, both groups placed strong emphasis on product quality and authenticity. For the tamarind group, this included ensuring clean, sweet fruits and fresh juice with minimal added water. The apiculture group focused on natural honey and packaging flexibility to meet customer needs. In both cases, customer trust and satisfaction were described as essential for maintaining regular sales.

Both groups also described social contributions, particularly income that supported household expenses such as education, food, and healthcare. These benefits were seen as valuable outcomes of participating in these enterprises, even if profits were modest. Both groups contributed to reduced poverty in their regions, as they employed otherwise idle laborers. Gender equality was also promoted in both groups since women had equal opportunities to participate and share income generated from the enterprises.

6 Discussion

This chapter discusses the study's findings in relation to previous studie and theory. It is structured around the three research questions, exploring key success factors, sustainability implications, and the role of the SBM framework in understanding group experiences and aspirations. It also connects findings to the SDGs and reflects on the method applied, the study's limitations, and transferability.

6.1 Key factors for sustainable management

This study identified several key factors that support the sustainable business management of the tamarind and apiculture groups. While their products and processes differ, both groups described similar conditions that allow them to manage and operate their enterprises successfully.

Access to knowledge and training was consistently mentioned as essential. The apiculture group highlighted the technical nature of beekeeping and the need for continuous learning, while both groups expressed interest in improving their skills related to value-added processing and marketing. These observations point out the role of knowledge and capability development as central for sustaining NTFP enterprises, which is congruent with Shackleton et al. (2007), especially in contexts where formal systems are limited.

Both groups stressed that product quality is vital for maintaining their operations. Additionally, the level and consistency of product quality significantly impact customer trust. Mutta et al. (2021) underscore the significance of product quality for charcoal producers in Kenya and the impact the quality has on customer loyalty. By comparing these findings, it is reasonable to suggest that product quality plays a crucial role in value propositions in informal Kenyan contexts.

Both groups faced operational challenges that underscored the need for adaptability. These challenges included accessing fair markets, varying yields, and financial constraints. Adaptability is typically a natural aspect of successful business management (Osterwalder 2004). However, these groups struggled to remain agile in this local context and occasionally resorted to accepting poor business decisions. Thus, the importance of adaptability to conquer contingencies becomes evident.

Partnerships were also important. The apiculture group received support from ICIPE and Nature Kenya. The tamarind group had weaker institutional links, but mentioned KEFRI and CDA as occasional supporters. Such partnerships primarily provided access to support. Appraising partnerships as essential for a business model is consistent with the BMC developed by Osterwalder and Pigneur (2010), which identifies partnerships as a core element in creating and delivering value. Nakanyete et al. (2025) also stress the importance of partnerships for community-based NTFP enterprises, as they can access training, capacity building, funding, and technical expertise.

In summary, training, partnerships, product quality, and adaptability are the most important factors for sustaining these NTFP enterprises. These findings support existing research and highlight how informal enterprises can deliver economic and sustainable benefits when supported by appropriate structures and relationships.

These findings show how small, community-based NTFP enterprises in rural Kenya can effectively manage their businesses. The observed patterns in both groups, which emphasize gaining knowledge, forming partnerships, and staying adaptable, are essential strategies for operating in informal and resource-constrained environments. Instead of depending on formal business structures or external planning methods, these groups leverage shared knowledge and networks to manage and operate their enterprises successfully. This indicates that sustainable business models in similar rural settings may thrive not through standardization or formalization, but by bolstering the local systems that foster learning, collaboration, and adaptability over time.

6.2 Sustainability impacts

The findings suggest that both community-based groups contribute to sustainability across social, environmental, and economic dimensions, even though they do not use formal sustainability frameworks themselves. Their activities reflect several aspects of sustainable development in practice, which is congruent with Shackleton et al. (2011).

Socially, both groups promote inclusion and improved livelihoods. Income from sales supports school fees, healthcare, and daily needs. Women are active in both groups, and the tamarind group has one person living with disabilities. These results align with Brundtland's (1987) definition of sustainability, which emphasizes meeting current needs while enabling future opportunities. They also support SDG targets related to poverty reduction, education, and gender equality.

Environmentally, the groups rely on and maintain natural systems. Tamarind trees support soil quality and climate change mitigation, while beekeeping enhances agricultural productivity through pollination. These activities correspond to ecosystem services and align with SDG 13 (Climate Action) and SDG 15 (Life on Land).

Economically, both groups contribute to local income and employment, aligning with the exposition of Shackleton et al. (2011). The apiculture group noted that demand is steady, and both groups see potential in expanding into value-added products. These ambitions reflect the potential for sustainable economic development supported by SDG 8 (Decent Work and Economic Growth).

Although the SDGs were not introduced during the FGDs or co-analysis, this study's conceptual framework was informed by the broader sustainability agenda in which the SDGs play an essential role. The decision to omit the SDGs in direct dialogue with the groups was deliberate, as participants were unfamiliar with the goals, and the focus was on enabling locally relevant discussions.

Nonetheless, the findings indicate that the activities of both groups contribute to several SDG targets (see Table 3). While the participants themselves did not explicitly make these connections, they reflect the potential for community-based NTFP enterprises to support broader sustainability outcomes. The absence of SDG awareness among the groups also points to a gap that could be addressed in future development initiatives. Raising awareness of the SDGs may support further alignment and open opportunities for funding or partnership, while still respecting the local context and priorities.

SDG	Goal Title	Related Group Activity	Comment
1	No poverty	Income generation from tamarind and	Modest but regular income
2	Zero hunger	Food-related activities and use of earnings for food	Income supports food access
4	Quality education	Use of earnings for school fees	School fees are a struggle for many Kenyans
5	Gender equality	Equal participation of men and women	Opportunities for women
8	Decent work and economic growth	Local work opportunities through group labor and production	Informal but essential due to high unemployment
12	Responsible consumption and production	Use of local resources	Low environmental impacts
13	Climate action	Tree plantings and beekeeping	Activities contribute to ecosystem resilience.
15	Life on land	Forest conservation and pollination	Indirect support to biodiversity through apiculture
17	Partnerships for the goals	KEFRI, ICIPE, Nature Kenya, etc.	Partners working together to achieve goals

Table 3. Relevant sustainable development goals to which these non-timber forest product enterprises relate

The third column from the left indicates the specific activity linked to each relevant target. The column on the right, labeled as comments, enhances the argument and offers further context.

Taken together, the findings suggest that both groups contribute to sustainability in tangible and locally relevant ways. These contributions are most visible in the areas of improved livelihoods and environmental care. While the scope and scale of these contributions are modest, they are meaningful within the context in which the groups operate. Sustainability in this case is not driven by formal policies or strategies, but emerges from the combination of social purpose, ecological knowledge, and adaptive enterprise. This reinforces the idea expressed by IPCC (2023), that sustainability can be achieved through grounded practices shaped by local needs, values, and capacities.

These findings contribute to a broader understanding of how sustainability can be practiced and experienced in small-scale, community-based enterprises working with NTFPs. In rural Kenyan contexts, where many such enterprises operate informally and without formal sustainability strategies, practices that promote environmental stewardship, social inclusion, and local economic development often emerge from daily experience rather than from structured planning. The results suggest that NTFP-based enterprises can function as locally embedded sustainability actors, delivering social and ecological value. This highlights the relevance of community-managed NTFP systems within wider sustainability debates, especially in regions where natural resource use and livelihoods are tightly interlinked. Such insights are valuable for both research and policy, as they point to the potential of informal NTFP enterprises to contribute meaningfully to sustainable development at the grassroots level.

6.3 Understanding aspirations and experience via SBM

During the co-analysis sessions, the SBM framework was used to help the groups describe and make sense of their own experiences and ideas. They did not redesign their business models in

any critical way. Instead, the co-analysis session gave structure to how they saw their current operations and what they hoped for going forward. While the discussions didn't result in clear strategies, it brought several patterns that can be understood through the SBM framework.

Both groups considered the concept of value proposition. The tamarind group expressed their ambition to develop more refined products, such as processed juice with a longer shelf life, soap, and lotion. These were viewed as ways to reach new markets and increase revenue through product diversification and an enhanced value proposition. The apiculture group mentioned packaging improvements and ideas around using beeswax. These examples suggest that the groups are starting to think more about how value could be added through new or improved products, even if those plans are still at an early stage.

When it comes to key resources, both groups pointed to things that limited their work. Both groups brought up the lack of know-how and financing, while the apiculture group talked about problems with hive durability and the lack of protective gear. These experiences show how resource constraints affect their ability to create and deliver value.

Both groups tried to navigate their respective markets. The apiculture group used different container sizes to meet customers with varying purchasing power. The tamarind group adjusted its offering to cater to the local context. Both groups conducted simple market analysis for pricing strategies, such as the case Mutta et al. (2021) studied. Even if these practices are not part of any formal plan, they reflect a practical sense of customer relationships. However, because middlemen had much influence over the market, characterizing the situation as an oligopsony, the tamarind group did not access a fair market with just prices for their fruits. Neither did the apiculture group access a fair market, as they were excluded from the formal market due to corruption. These examples reflect the ongoing struggle to connect informal community-based enterprises to formal markets. This aligns with findings from Nakanyete et al. (2025) who also discuss the problem for community-based NTFP enterprises in Namibia to reach formal markets on fair terms. They suggest training and capacity building on bargaining and marketing that could strengthen the NTFP enterprises. This study recommends training on negotiation and navigating malfunctioning markets, as well as general business practices, as something NGOs could implement to strengthen the self-reliance of these community groups.

Partnerships came up in both groups as a key factor. Support from NGOs and institutions, including training, equipment, and technical support, kept their activities going. At the same time, there were expectations for more support, especially equipment and training. This view was evident in both groups as they depended on external support. Partly, there was a missing entrepreneurial mindset among the groups as they were unwilling to emancipate from their heritage of receiving free support and donations. This is, at the same time, understandable given the local conditions and the high level of unemployment. Managing this balance between receiving donor support and embarking on entrepreneurial ventures is an ongoing challenge (Shackleton et al. 2007). However, both groups need to alter their mindset and broaden their views to harness the business opportunities that lie ahead. This could be something that could apply to other community groups that have been reliant on donor support.

Taken together, the way the groups talked about their business models using the SBM framework helped to make their thinking more visible. It showed that, even without formal plans or strategic tools, there is already a lot of reflection happening. This suggests that tools like SBM can support learning and help people organize their thoughts. In many cases, aspirations were closely tied to the groups' current limitations, which made them feel grounded.

However, some of the aspirations were not realistic given their current position. Instead, they were solely dependent on external help to be achieved. The strategy to get from their current position to achieve their long-term aspirations was lacking.

Looking beyond the cases, these findings offer insights into the broader phenomenon of sustainable business development in rural, community-based NTFP enterprises. In Kenya, where small-scale enterprises dominate much of the rural economy, the structured articulation of business models using tools like the SBM can support local innovation without requiring formalization. The fact that both groups engaged with the framework suggests that conceptual models such as the SBM can be applied to the realities of rural, community-based enterprises in Kenya.

6.4 Reflections on the method

This study followed an abductive approach and partly a participatory research design. The abductive approach allowed movement between theory and empirical material, which suited the open and exploratory nature of the study. The participatory elements were most evident during the co-analysis sessions, where the groups contributed to interpreting the findings based on their own experiences and perspectives.

FGDs were conducted to collect data. Since the groups already existed and had shared experience, this approach helped create a familiar setting where participants could reflect together. As Wibeck (2010) points out, using pre-existing groups in FGDs can strengthen group dynamics and allow for more open conversations.

At the same time, there were limitations. The data collection relied on a single method and did not triangulate with other sources, such as individual interviews or observations. This limits the depth of understanding and the risk of partial or skewed understanding (Bryman & Bell 2017). Language translation was another challenge, as all sessions were held in Swahili and translated into English. This may have affected some of the nuances or details in the data. Group dynamics also varied, and in some cases, certain voices were more dominant than others, especially in the apiculture group, which comprised many new members.

Bryman and Bell (2017) explain how the researcher might influence the research process in an undesirable way. It is inevitable to totally avoid influence from the researcher. Measures can be taken, and reflecting on the researcher's role and how he or she might influence the study can strengthen the overall trustworthiness of the research (Bryman & Bell 2017). As a researcher, my presence and role likely influenced the process. The way I asked questions, structured the sessions, presented the SBM framework, and my background may have shaped how the groups responded. Other measures adopted were to encourage open dialogue and engagement during the sessions and to have a local moderator lead the discussions. While efforts were made to reduce this impact, it is still a factor that needs to be acknowledged.

Despite these challenges, the co-analysis sessions added value by allowing the groups to comment on the initial interpretation, validate information, and participate in the analysis phase of the study. This helped enhance the credibility of the findings and supported a more authentic and grounded study based on the community groups' own perspectives.

6.5 Limitations and transferability

Like any study, this one has its limitations. The sample size was small, with only two community groups included. This means the findings are based on limited experiences and perspectives. The study was also geographically limited to Taita-Taveta County in southeastern Kenya, which affects how broadly the results can be applied. Another limitation is the risk of over-interpreting the implications of sustainability. While the groups expressed ideas related to sustainability, they did not frame them in those terms, nor was sustainable development a top priority for the community groups. It may be worthwhile to reflect on what sustainability means for these groups. This was not thoroughly addressed during the fieldwork. Still, the discussions during the sessions point towards a more short-term perspective and that long-term sustainability objectives can be undermined by the need to meet daily necessities.

Finally, all aspects of the studied NTFP have not been captured. There are certainly elements not included in this study, for example, the cost structure is more intricate than presented in this thesis. However, the overall idea was conveyed, and the broader picture was depicted.

Even with these limitations, some insights may still be transferable to other settings. The challenges and opportunities described by the groups could be relevant for other communitybased NTFP enterprises, especially in similar contexts. It is up to the reader to assess the transferability based on the descriptions of the setting, context, and process provided in this thesis. It is also worth noting that the results reflect the perspectives and conditions present during data collection. Some factors may remain relatively stable over time, while others may change over time. Consequently, the findings should be viewed as time- and context-dependent rather than universally enduring.

7 Conclusion

This chapter concludes the thesis by summarizing the main findings in relation to the research aim and questions. It highlights key insights about sustainable business models in community-based NTFP enterprises and their contribution to sustainable development. The chapter also presents contributions to knowledge, policy, and practice. It ends with final reflections and recommendations for future research.

The aim of this study was to explore sustainable business models within community-based NTFP enterprises in Kenya. Emphasis was placed on producers' perspectives to identify key performance factors for sustainable business management and future aspirations in collaboration with community groups. The starting point was the common assumption that NTFP enterprises contribute to rural livelihoods and sustainability. However, there is limited knowledge about the sustainable business models underpinning these enterprises and how business model thinking can be applied in informal and community-based contexts.

7.1 Summary of findings

This study explored three main questions related to how community-based NTFP enterprises in Kenya successfully managed their activities, contributed to sustainability, and how their experiences and aspirations can be understood through the SBM framework.

First, the findings showed that both groups shared some key performance factors, even though their processes and products differed. The most apparent key performance factors consisted of partnerships, training, product quality, and adaptability.

Second, while the groups were not familiar with formal sustainability frameworks, their work still contributed to sustainability in practice. This included improved livelihoods, gender equality, and positive environmental effects such as tree planting in arid regions and pollination for enhanced agricultural productivity. These contributions aligned with several SDG targets, even if the groups did not explicitly frame them as such.

Third, the SBM framework helped structure the discussions and made key elements of their business models more visible. While the groups did not use the tool to redesign their business models, their engagement revealed how they think about value creation, delivery, and capture. Their aspirations, such as strengthening their value proposition, pointed to a basic understanding of how to grow and adapt, even without formal planning.

Taken together, the findings show that these community-based NTFP enterprises are economically, socially, and environmentally important, and that tools like the SBM can support reflection and learning in community-based enterprises.

7.2 Contribution to knowledge

This study contributes to knowledge by showing how the SBM framework can be applied in community-based NTFP enterprises in Kenya. While the SBM framework has previously been used in more formal or commercial settings, this study demonstrates how it can be used

as a participatory tool to organize, reflect on, and describe business models in rural and informal contexts. By keeping a simple language and co-producing the analysis with the community groups, the framework became more accessible and meaningful for local actors. This adds to the limited but growing literature on participatory business model development for NTFPs in the Global South.

The study also responds to a gap identified in the literature, where NTFPs are often discussed for their potential benefits, but less attention is paid to the underlying business models that underpin these benefits. Previous research has tended to focus on ecological, forest conservation, or market-related aspects of NTFPs, without looking closely at how these enterprises are structured or sustained over time. This study addresses this gap by providing a bottom-up approach on how community-based NTFP enterprises can manage their operations, create, deliver, and capture value. It also examines the sustainability implications of these enterprises from their own perspectives.

The findings also show that sustainability does not need to be introduced through formal and external frameworks. Although the groups did not use structured approaches like the SDGs, their reflections still touched on key themes related to sustainability, such as gender equality, livelihood support, and environmental consideration. This concludes that these community-based NTFP enterprises already engage in basic sustainability practices, and that could be the case for other NTFP enterprises in similar settings as well.

7.3 Contribution to practice and policy

This study confirms the widely held belief that NTFP enterprises have the potential to promote rural development, consider environmental factors, and improve livelihoods. This applies to the two NTFP enterprises examined in this study, and transferability to other NTFP enterprises may be feasible depending on contextual similarities. However, the findings also indicate that this potential is far from assured. Without the appropriate support systems in place, even well-organized and motivated community groups struggle to grow or sustain their operations.

Both groups in this study emphasized the need for stronger and more consistent partnerships. Access to training, equipment, and technical knowledge was viewed as essential, but often relied on short-term projects or sporadic support. A more stable form of engagement, with long-term commitments, could help build capacity in a way that aligns with how these groups already operate. However, it's important to acknowledge the risks associated with donations and short-term projects. Both groups exhibited a limited entrepreneurial mindset, which could stem from their history of receiving free support. Therefore, the recommendations suggest that support for these groups or similar ones should concentrate on training and capacity building rather than on equipment.

Market access posed major challenge. In particular, the apiculture group explained how they were unable to reach supermarket shelves due to the high costs associated with obtaining standardization approval, a process that ensures product quality, as well as what they referred to as unofficial payments demanded by certain authorities. This raises deeper questions about how informal enterprises are excluded from formal markets, not based on product quality, but rather due to corruption. The tamarind group also faced market challenges, with middlemen dominating the market, characterizing the situation as an oligopsony. If NTFP enterprises are expected to play a role in sustainable development, these barriers must be addressed. There is

a need for more transparent and accessible regulatory processes, along with market systems that are open to smaller producers.

Financing opportunities were also lacking. Both groups expressed challenges in accessing adequate credit financing. This points to the need for more inclusive financing opportunities that can meet the needs of community-based NTFP enterprises.

Overall, the study concludes that these NTFP enterprises support sustainable rural development, and perhaps other NTFP groups in similar contexts as well, but the long-term sustainability can only be achieved if existing gaps are acknowledged and addressed. Strengthening partnerships, improving market conditions, and creating fairer financing opportunities are not merely supportive actions; they are necessary for the broader SDGs linked to NTFPs to be realized. By leveraging these findings, more effective policy frameworks and development projects can be created and implemented to support similar community groups in similar contexts for long-term sustainable development.

7.4 Reflection on methodological choices

The study's abductive and partially participatory approach, combined with the guidance of the SBM framework as a theoretical foundation, fostered both theoretical grounding and participant involvement in the research process. This approach helped maintain a focus on the participants' own experiences while also connecting to relevant theory. Utilizing co-analysis enabled the groups to actively shape the findings, adding depth and relevance to the results in a participatory manner. Although the initial intention was for the groups to analyze their own business models through the SBM framework, this aspect of the process was more limited than anticipated. Nonetheless, the framework proved effective as a tool for reflection and structure, supporting the goal of exploring community-based NTFP enterprises.

7.5 Suggestions for future research

Future research could explore other community-based NTFPs in Kenya or other countries in the Global South to examine interconnected areas. There might be shared challenges or implications among community-based NTFPs, which could provide a stronger foundation for policy development aimed at addressing pressing issues, bolstering these enterprises, and fostering sustainable rural development in the Global South.

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Appendices

Appendix 1. Discussion Guide FGDs

Explain purpose of the study. Promote active engagement and clarify that we seek their perspectives and experiences. Explain that they should not assume that we know their business.

Value proposition & delivery

- 1. Describe the types of products you sell.
- 2. In which form do you sell your product? (form; raw material e.g. tamarind fruit, processed tamarind juice)
- 3. Who are your customers? / Where do you sell your products? (Hawking, local open market, urban centers, cities, e.g., Mombasa)
- 4. How do you communicate and network with your customers?
- 5. What value do you offer your customers? (e.g., branding, packaging, service, taste, nutrition etc.)

Activities, equipment & technology

- 1. What activities and processes within the business do you perform?
- 2. What types of equipment do you use in your business? How do you use the equipment?
- 3. What resources/material do you use? (e.g. electricity, firewood, water, fuel etc)
- 4. What knowledge is required to run your business?
- 5. Do you use technology in Tamarind/ Honey business? What kind of technology (both communication and production purposes)

Partnerships

1. Which organizations/institutions are you partnering with in your work? (at county level and national government)

Economic

Use a unit of measure to calculate, e.g., per kg or liters. (Do they sell in kg or liters?)

- 1. How much does the equipment you use cost? (i.e. fixed costs, also the lifespan of equipment)
- 2. Cost of inputs? (i.e., varied costs. Inputs, resources, materials etc)

- 3. How many days of labor does it require to produce one unit of measure?
- 4. How much is the rate of labor per day?
- 5. How much do they sell per season? How many seasons per year? (If different products, then for each product.)
- 6. What is the price per unit of measure? (If different products, then per each product.)

Key performance factors & Sustainability

- 1. How does engaging in the Tamarind/Honey activity contribute to your livelihoods? (Income, paying school fees, paying for health services etc)
- 2. How are your activities contributing to environmental conservation?
- 3. Are there negative impacts to the environment associated to your activities?
- 4. What are you doing to ensure that your business is continuously running?
- 5. What are you doing to make sure that the business is contributing positively to environmental conservation?

Challenges and possibilities

- 1. What are the biggest challenges you face today?
- 2. What limits your ability to grow or boost profitability?
- 3. What limits your ability to become more sustainable?
- 4. What do you see as the biggest opportunities now and for the future?
- 5. What would help your business right now? / What kind of support do you need? (e.g., Financial, infrastructure, transportation, etc.)

Appendix 2

Co-analysis guide

- 1. Present the objective of the session, focusing on co-reflection. We want to hear their perspectives on important factors for this business, understand their goals and how to achieve them, engage in mutual learning, and verify our understanding of their inputs. 5min
- 2. Address verifying questions from FGD: 10min
- **3.** Present the BMC framework, both visually and with words. (Important part, provide handouts) 25min

The Business Model Canvas is like a map of your business. It takes a "birds eyes view" as it helps us understand how things work—from what you offer, who you serve, how you earn money, and what you need to keep going. Today, we'll use this map to look at how your business works, and how it could be made even stronger.

- 4. Let the group reflect on the BMC framework if it resonates with their business. 10min
- **5.** Present the initial findings, and let them validate them. (Provide BMC handouts with their business. Is there something that should be added? Has something been wrongly understood?) 15min
- **6.** Together identify important factors for good profitability and sustainability. (social and environmental implications) 15 min

Reflection on social impact:

- The international poverty line is currently 2.15 US dollars per day. Do you think the people who work in your business would earn less than that if they didn't have this opportunity?
- In what ways, if any, does the group help people get enough food?
- Has the group changed the way local people here access health care or education?
- Within this group, do women have the same possibilities as men?

Reflection on environmental impact:

- You previously mentioned some implications for environmental sustainability. Is there some other environmental impact that you want to highlight?
- How are environmental factors affecting for your business? (e.g., climate change, deforestation, etc.)

Profitability

- Let's think together about what makes this business work well. What are the most important things to make it profitable?
- What factors are most important to make this business continue?
- 7. Identify goals according to their aspirations. (in 1 year and 5 years' time) 5min
- **8.** Together, use the BMC framework as a tool for proposing improvement aligning with their aspirations. (What would need to be changed in the BMC to reach your goals? What would you like to add?) 20min

Kandidatarbeten / Bachelor Thesis Institutionen för skogsekonomi / Department of Forest Economics

1. Hallström, P. & Nylander, G. 2018. Ekonomisk analys av olika metoder att transportera flisad GROT

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2. Boglind, G. & Gyllengahm, K. 2018. Lönsamhetsanalys av biomassafokuserad skötsel för contortatall – En ekonomisk analys av olika skötselstrategier. *Profitability analysis of biomass-focused*

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3. Holfve, V. 2018. En analys av äganderätten och intrångsersättning. An analysis of private ownership and compensation for intrusion

4. Ekegren Hällgren, A. & Essebro, L. 2018. Lojalitet och engagemang för skogsägareföreningen i en ny tid – En fallstudie om medlemmar i Norra Skogsägarna. Loyalty and engagement for forest association in a new time – A case study for members in Norra Skogsägarna

5. Hermansson, E. & Strömvall Nyberg, T. 2019. Mot en ny framtid - en granskning av samarbeten och

förbättringsmöjligheter mellan företag. Towards a new future -a research of collaborations and improvements between companies

6. Bertills, M. & Hilmersson, F. 2019. Gender equality in the forest sector will happen - but when?

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barriärer eller hjälpmedel för en jämställd styrelse och organisation

7. Billefält, B. & Olsson, M. 2019. Hållbarhet i arbetet - Fallstudie ur ett medarbetarperspektiv. *Corporate social responsibility at work - Case study from the employee perspective*

8. Söderlund, M. 2019. Hur kommuniceras klimatfördelarna med att bygga flerbostadshus i trä. *How is the climate benefits communicated by building multi-storage houses in wood*

9. Dahl, P. & Sparrevik, G. 2019. Skogslagstiftning för en ny tid - Avkastning för olika lagstiftningsscenarion i Litauen. Forest legislation for a new era -Rate of return for different legislation scenarios in Lithuania

10. Johannesson, K. & Näslund, R. 2019. Biokol som produkt inom skogsbruket - En hållbar produkt med många fördelar. *Biochar as a product in forestry - A sustainable product with many benefits*

11. Nyström, A. & Nytell, A. 2020.Att mäta och jämföra hållbarhet – en fallstudie av tre svenska

skogsbolag. To measure and compare sustainability -a case study of three Swedish forest companies

12. Ljudén, A. & Rubensson, N. 2020. Hur hanterar den svenska skogsbranschen Brexit? – En kvalitativ studie med fokus på svenska sågverksföretag. *How does the Swedish forest line of business handle Brexit? – A qualitative study with focus on Swedish sawmill companies*

13. Eriksson, P. 2020. Digitala skogsbruksplanen i den operativa verksamheten – En fallstudie på den

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forestry plan in the operational activities -A case study based on the role of the digital forestry plan in the operational activities and the attitudes towards the tool

14. Algotsson, J. 2020. Varumärkesbyggande säljstöd för virkesköpare i skogsbranschen – en fallstudie om Martinsons Skogshandbok. *Brand Building Sales Support for Purchasers in the Forest Bransch – A Case Study about Martinsons's Skogshandbok*

15. Sjölund, A. & Tornberg, T. 2021. Mäklarens syn på flerbostadshus i trä – en jämförelse av mäklarroller. *Real estate agent views on wooden multistorey construction – a comparison of real estate roles*

16. Hernblom, C. & Häggberg, E. 2021. Privata enskilda markägares inställning till skogscertifiering

– En intervjustudie om fördelar och nackdelar ur ett markägar-perspektiv. *Private individual forest*

owners' attitude to forest certification – An interview study about advantages and disadvantages from alandowner perspective

17. Hurtig, A. & Åkersten, J. 2021. Värdering av bolagsmark – Företag och värderares syn på olika

värderingsmetoder. Valuation of company forest land – Companies and valuers opinion on different

valuation methods

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valuation process differ between different real estate agents?

19. Löwenhielm, G. 2021. Alternativ användning av skogsmark vid Forssjöområdet – Ekonomiska

konsekvenser vid olika skötselalternativ. Alternative use of forestland within the Forssjö area

Economical consequences depending on forest management method

20. Andersson, S. 2021. Ekonomisk jämförelse mellan certifierat och ocertifierat skogsbruk. *Comparison of profitability between certified and non-certified forestry in Sweden*

21. Lindquist, A. 2022. Lärkens framtid I svensk förädlingsindustri – Råvaruförsörjning och efterfrågan. *The future of larch in the Swedish processing industry – Raw materials supply and demand.*

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24. Grele, E. Larrson, S. & Lindgren, J. 2022. Attitydstudie kring avsättningar och kolinlagring - Privata enskilda skogsägare. *Study of attitudes regarding provisions of forest and carbon storage - non-industrial private forest owners*

25. Granath, J. & Söderström, M. 2022. Hyggesfritt skogsbruk - Ekonomisk inverkan på skogsbruket

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27. Sternö, A. & Tegnér, N. 2023. Att bryta barriärer: Marknadsföringsstrategier för att bredda deltagandet inom högre studier *Breaking barriers: Marketing strategies for widening participation within higher education*

28. Bäckman, C. & Granlund, V. 2023. Granbarkborrens inverkan på skogsfastigheters värdering. *Impact of spruce bark beetle on valuation of forest poperties*

29. Eriksson, L. & Nowik, J. 2023. Skoglig certifiering, inverkan på företag och skogsägarföreningar. *Forests certification, effect on companies and forest owner associations*

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32. Grubbström, T. & Janlert, V. Skogens produkter och dess rykte – konsumenters attityder till förnybara engångsartiklar och dess industriella sektor. *Forest products and their reputation, the consumers' mind-set towards single-use products and their industrial sector*

33. Ergonson, J. & Wennberg, G. 2023. Klimatkompensering I svenska skogar – lönsamhet i kolskogsbruk. *Climate compensation in Swedish forests – Profitability in carbon forestry*

34. Holmström, C. & Thorell, A. 2023. Kommunikation och klimatpåverkan vid nybyggnation i Sverige – Jämförelse mellan betong och träbyggnationer. *Communication and climate impact in new construction in Sweden – A comparison between concrete and wooden buildnings*

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36. Eriksson, O. & Koebe, E. 2024. Taxonominförordningens relation till lönsamhet. *The relationship between the taxonomy regulation and profitability*

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38. Hård av Segerstad, E. & Silfver Östberg J. 2024. Hållbar utveckling i skogsstandarder – En fallstudie med fokus på jämställdhet. *Sustainable development in forest standards* – *A case study with a focus on gender equality*

39. Apell, F. & Engström, A. 2024. Fritt utvecklad skog I stadsnära lägen – Perspektiv utifrån kommunal förvaltning. *Freely developed forests in urban areas – From a municipal management perspective*

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43. Boson, S. & Engström, E. 2024. Gynnar hybridlärken skogsbruket? Främmande trädslag inom omställningen. *Does hybrid larch benefit forestry? Perspectives on non-native tree species in the transition*

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