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Design Thinking for Social Innovation in Rural Mozambique

Exploring How the Design Thinking Process Can Foster Social Value
for Female Entrepreneurs in Linga Linga

Master's thesis in Quality and Operations Management

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Cover:

Fieldwork conducted in Linga Linga, Mozambique, illustrating the local
context of rural livelihoods and resource-constrained food systems.

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Abstract

Rural communities in Sub-Saharan Africa face ongoing challenges related to poverty, limited infrastructure, and restricted access to markets. In small-scale fisheries women play an important role in post-harvest activities, yet their work is often informal and constrained by limited resources. In Linga Linga, Mozambique, these challenges are reflected in the short shelf life of fish, limited use of available fish resources, and limited opportunities for value creation.

This study explores how the design thinking process can support value creation for female entrepreneurs in rural Mozambique. It also examines to what extent the resulting solutions contribute to social innovation, understood through the dimensions of addressing human needs, changes in social relations, and empowerment and agency.

The research is based on a qualitative case study conducted in collaboration with the non-profit organization Project Vita. Data were collected through a two-month field study, including observations, semi-structured interviews, surveys, and participatory methods adapted to the local context. Design thinking structured both the fieldwork and the analysis through the stages of empathize, define, ideate, prototype, and test, while social innovation served as the analytical lens.

The study resulted in four contextually grounded solutions: fish powder, fish samosas, raised drying racks, and solar tent dryers. These solutions address immediate needs related to fish preservation, food security, and income generation, showing a strong contribution to the dimension of addressing human needs. However, their impact on social relations and empowerment is more limited, reflecting the difficulty of achieving broader structural change within a short time frame and in a resource-constrained setting.

Based on these findings, the study develops a conceptual model that not only illustrates how different stages of the design thinking process contribute unevenly to the dimensions of social innovation, but also proposes how aspects of social relations and empowerment can be more deliberately integrated into short-term, resource-constrained design processes.

Keywords: Design thinking, Social innovation, Rural entrepreneurship, Female entrepreneurship, Small-scale fisheries, Value creation, Resource-constrained settings, Mozambique

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Emma Andersson, Gothenburg, June 2026

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Use of Artificial Intelligence Tools

Artificial intelligence (AI) tools have been used during the writing process of this thesis. The tools were limited to refining text, improving language, and increasing coherence of the text. Additionally, generative AI was used to create images of concepts and models in the thesis. AI has not been used to replace the authors' analysis, interpretation, or academic judgment throughout the process. Any AI-assisted text has been reviewed and approved by the authors before use. The authors take full responsibility for the final content of the thesis, including all arguments, results, conclusions, and references.

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1

Introduction

The introductory chapter positions this study within its broader socio-economic and academic context. It begins by outlining the structural challenges faced by rural communities in Sub-Saharan Africa, with a particular focus on small-scale fisheries and the role of women in these value chains. Building on this, the chapter introduces the relevance of design thinking as an exploratory approach for addressing complex, resource-constrained contexts, while also acknowledging ongoing critiques of the concept and its use.

The chapter then establishes the analytical lens of social innovation, which enables an assessment of value creation beyond purely economic outcomes by considering dimensions such as unmet needs, social relations, and empowerment. Thereafter, the purpose of the study and the research questions are presented, clarifying both the empirical focus and the theoretical contribution. Finally, the chapter describes the research setting and outlines the delimitations of the study, thereby defining the scope and boundaries within which the findings should be interpreted.

1.1 Background

In Sub-Saharan Africa, rural areas face challenges due to poverty, lack of proper infrastructure, and market access issues. The rate of poverty alleviation has been decreasing in the recent years, and the area is far behind the rest of the globe in terms of development (United Nations Development Programme, 2025). About 63% of the population in Mozambique, which translates to approximately 20 million people, live below the poverty line. In addition to this, the labor market shows high levels of informality. About 500,000 people join the labor market annually, whereas only about 30,000 people are absorbed into formal work. (World Bank, 2026a). Agricultural activities provide work for more than 70% of the population, whose productivity is low and exposed to climatic change shocks. This limits income stability and economic resilience (World Bank, 2026a). In the coastal regions, these factors define lifestyles that are directly connected with natural resources and specifically the small-scale fishing industry. In such systems, women have an important part to play during post-harvest such as processing, marketing, and distribution. Globally, women contribute significantly to the value chains of the fishing industry in these post-harvest processes (FAO, 2026). Despite their importance, these

activities remain informal due to lack of resources.

In the coastal village, Linga Linga, fish play an important role in providing livelihood opportunities and sustaining life. Unfortunately, there are few resources available for fish preservation and processing, leading to quick spoilage. As a result, locally available fish resources are not fully transformed into economic or social value, while spoilage contributes to food waste. This means that there is a mismatch between available resources and their potential to be transformed into economic and social value. Such circumstances are especially relevant for women operating on a small scale. The Food and Agriculture Organization of the United Nations (FAO) identifies several development strategies used in other fishing communities to address challenges related to fish harvesting and post-harvest activities, including infrastructure development, processing technology, value addition, and access to finance (Kimani et al., 2022). Although such approaches may support productivity and economic value creation, they tend to emphasize technical and economic outcomes. This is not sufficient if interventions are not usable, accessible, and meaningful in everyday life. Therefore, this study evaluates value creation not only through economic potential, but also through the formation of social value.

A promising approach to explore how such social value may be generated is the design thinking methodology. It has received increasing attention from researchers and practitioners since early 2010s and has been employed in a variety of settings, from business environments to social issues (**Review_design thinking**; Brown, 2008; Brown & Wyatt, 2010). The approach has usually been considered to be a human-centered way of dealing with “wicked problems” whose defining elements are uncertainty and evolution of the problem itself (**Review_design thinking**). However, the idea of design thinking has become a topic of critique for several years already. Some scholars say that there is no consensus about the nature of design thinking, nor its definition and the concept is understood in various ways by different groups of academics (Johansson-Sköldberg et al., 2013). Another issue highlighted in the literature is the tendency of design thinking to focus on individual users and organizational processes, while paying less attention to broader structural dynamics within the environment (Kimbell, 2011).

More recent literature suggests that the concept continues to evolve, with ongoing discussions regarding its interpretation and application in addressing complex societal challenges (Cross, 2023). Despite the increasing attention given to broader systems perspectives in design thinking, there remains limited empirical understanding of how design thinking is applied in practice in rural, resource-constrained development contexts. There is also limited knowledge of how the outcomes of such processes can be assessed beyond technical feasibility, usability, or economic potential. In particular, more empirical insight is needed into how design thinking can contribute to social innovation, including whether proposed solutions address unmet needs, influence social relations, and support empowerment and agency.

This study addresses this gap by applying the design thinking process in the small-scale fish value chain in Linga Linga, Mozambique, with a specific focus on female

entrepreneurs. By combining design thinking with a social innovation lens, the study examines both what contextually relevant solutions can be developed and to what extent these solutions contribute to social value. In doing so, the study contributes to a more nuanced understanding of the possibilities and limitations of using design thinking as a process for supporting social innovation in rural, resource-constrained settings.

Social innovation is used as an analytical lens to assess not only whether social value is created, but also how this value emerges. Here, social value refers to the outcomes generated, such as improved livelihoods or reduced resource waste, whereas social innovation captures the broader processes and structural changes through which these outcomes are achieved. Although social innovation is defined in different ways, this study builds on Moulaert et al.'s understanding of social innovation as new ideas and practices that address unmet social needs, transform social relations, and strengthen empowerment and agency (Moulaert et al., 2005, 2013).

1.2 Purpose and Research Questions

The aim of this study is to explore how the design thinking process can be applied in a resource-constrained rural setting to support value creation for women entrepreneurs. The study adopts a process-oriented perspective, examining how the different stages of design thinking unfold in practice within the small-scale fisheries value chain in Linga Linga, Mozambique, and how they lead to the development of relevant solutions.

Rather than only focusing on the solutions themselves, the study also analyzes how value is created through the design thinking process. To capture this, social innovation is used as an analytical lens to evaluate the extent to which the developed solutions address unmet needs, influence social relations, and contribute to empowerment and agency.

In addition, the study explores how such solutions may create conditions that enable a shift from necessity-driven towards more opportunity-driven forms of entrepreneurship, without assuming that such a transition occurs within the scope of the study.

Therefore, the study addresses the following research questions:

- *What contextual solutions for value creation in the fish value chain can be identified for female entrepreneurs through the design thinking process in Linga Linga?*
- *To what extent do the proposed solutions contribute to social innovation, assessed through the dimensions of addressing human needs, changes in social relations, and empowerment and agency?*

The study contributes theoretically by providing empirical insight into how design thinking unfolds as a process in a resource-constrained rural context, rather than only assessing the solutions produced. Furthermore, the study contributes by link-

ing the stages of the design thinking process to the dimensions of social innovation, resulting in a conceptual model that illustrates how social value can emerge through different stages of the process. Practically, the study provides insights for NGOs and development-oriented organizations working with community-driven entrepreneurship and value creation in rural settings.

1.3 Research Setting

This thesis is conducted in a coastal village named Linga Linga, located in the Morrumbene district in southern Mozambique. The village has approximately 1,000 inhabitants, where livelihoods are largely dependent on small-scale fishing activities.

In addition to Linga Linga, observations were also carried out in nearby areas, including Morrumbene and Maxixe, in order to capture a broader understanding of the market dynamics, mobility patterns, and interactions. These surrounding locations play an important role in the local value chain, particularly in relation to trade and access to goods and services.

The study is conducted in collaboration with Project Vita, a non-profit organization operating in southern Mozambique. Project Vita focuses on community-driven development initiatives. The intention is that selected solutions obtained by the design thinking process can later be implemented and scaled by the organization through their work.

1.4 Delimitations

This study is subject to several delimitations that define its scope. First, the study is limited by its time horizon, as the fieldwork was conducted over a period of eight weeks. Design thinking processes are typically iterative and extend over longer periods, including implementation and scaling phases. As such, this study focuses primarily on the early stages of the process, including problem exploration, ideation, and initial testing, rather than long-term evaluation of outcomes.

Second, the study focuses specifically on female entrepreneurs within the small-scale fisheries value chain. While this enables a deeper understanding of a particularly relevant group in the local context, it excludes other actors within the value chain, such as male fishers or larger-scale enterprises.

Third, the study is conducted within a single geographical context, the coastal community of Linga Linga in southern Mozambique. While this allows for a contextually grounded analysis, the findings are shaped by local conditions related to infrastructure, market access, and social dynamics. These delimitations enable a focused and context-specific analysis, while also defining the boundaries within which the findings should be interpreted.

1.5 Disposition of the Study

The remainder of this thesis is structured as follows. Chapter 2 presents the theoretical framework, including social innovation, entrepreneurship, and design thinking. Chapter 3 outlines the methodological approach, including the case study design, field study, data collection methods, and analytical process. Chapter 4 presents the empirical findings, structured according to the phases of the design thinking process. Chapter 5 discusses the findings in relation to the theoretical framework and presents the conceptual model developed from the study. Afterwards, it reflects on the limitations of the study and outlines suggestions for future research. Finally, Chapter 6 concludes the thesis.

2

Theory

This chapter presents the theoretical foundations underpinning the study and outlines how the different perspectives are conceptually connected. As the study brings together theoretical domains that are not always explicitly integrated in prior research, it is important to clarify how they relate to one another within the context of this study.

The chapter is structured in three parts. First, the concept of social innovation is introduced, including its core dimensions of addressing human needs, changes in social relations, and empowerment and agency. These dimensions form the analytical lens used to evaluate the outcomes of the study.

Second, perspectives on entrepreneurship are presented, with a focus on female and rural entrepreneurship, as well as the distinction between necessity-driven and opportunity-driven activities. This section provides a contextual understanding of the economic and social conditions in which the studied actors operate, and thereby complements the social innovation lens.

Finally, design thinking is introduced as a human-centered and iterative approach to innovation. Positioned as an operational process, it serves as a methodological bridge between theory and empirical work. The five-stage model- Empathize, define, ideate, prototype, and test, is used to structure the fieldwork and guide the development of contextually grounded solutions.

Taken together, social innovation defines what type of value is of interest, entrepreneurship explains the context in which this value is created, and design thinking provides the process through which such value can be developed. This integrated perspective forms the foundation for analyzing how design thinking can contribute to social innovation and value creation for female entrepreneurs in Linga Linga.

2.1 Social Innovation

Social innovation can be understood as innovative activities and services aimed at meeting social needs and primarily developed through organizations with social purposes (Mulgan et al., 2007, p. 8). The aim of social innovation is therefore finding ideas and solutions whose objective is meeting social goals (Mulgan et al., 2007).

2.1.1 Innovation in the bottom of the pyramid

Innovation in the bottom of the pyramid, (BOP), refers to innovation in emerging markets around the globe in developing countries, with a focus on underprivileged societies. The BOP market is characterized by people living on less than \$2/day, consisting of 4 billion people worldwide (Prahalad, 2012). Operating in BOP markets is seen as necessary for companies to participate to achieve sustained growth (Prahalad, 2012).

Innovation is sometimes seen with skepticism as a driver of long-term development in developing countries. This view is often linked to a narrow understanding of innovation as primarily high technology or R&D intensive activities (Paunov, 2013). However, innovation is also occurring in lower-technology sectors where there are great opportunities for economic and social impact. Agriculture and other livelihood-related industries are sectors which can benefit from innovation by improving productivity while addressing broader socio-economic challenges (Paunov, 2013).

Innovation can play an important role in promoting grassroot entrepreneurship and increasing the participation of marginalized groups in economic activities. Such innovation is often built on traditional knowledge, agricultural practices for example, or on adaptations of modern technologies that fit the local context (Paunov, 2013). These types of necessity-driven innovations can be used to improve living standards by addressing everyday needs. This is relevant for communities in the BOP market, where many economic activities are in the informal market. Innovations that help integrate these groups into formal economic systems have the opportunity to improve welfare and quality of life, while aiding an increased participation in future economic growth (Paunov, 2013).

2.1.2 Prerequisites for Social Innovation

Social innovation is a tool for solving challenging problems and being successful in business, as stated by Kanter (1999). Through social innovation, relationships can be built with local actors, and knowledge can be obtained about the market. However, there are prerequisites for social innovation to be successfully implemented. First, it is important to have a clear agenda for change (Kanter, 1999). Real difference can be made by defining the social need which the innovation aims to address. Secondly, it is essential to anchor the work in the setting and its users. Understanding the user makes innovation more effective and is needed for the social innovation to be successful. When trying to understand the user, obstacles in culture may arise, which must be overcome by an openness to the local culture and willingness to learn (Kanter, 1999).

Pervez et al. (2013) agrees that successful innovation in BOP markets requires understanding user needs and problems, and suggests partnering with local communities to create products and services fit for the local context. An important factor for BOP innovation is to see the BOP more as producers than buyers. If the group is seen as capable to produce and sell products locally and at more mature markets, a more sustainable and profitable business model is created instead of only aiding the

market out of poverty (Pervez et al., 2013).

In addition to these prerequisites, Kanter (1999) argues that working together with strong partners who are committed to the cause, and want to create change, is needed for social innovation. Having strong support means that social innovation can transcend from being isolated projects, to becoming a lasting systematic change (Kanter, 1999). Furthermore, Kanter (1999) mentions that having committed partners is a tool to gain access to markets that are under-served, and can help build up support for future ventures. Pervez et al. (2013) has a similar understanding, and argues that companies need to have an alignment with the BOP market, and innovate in collaboration with them to create opportunities to decrease poverty.

2.1.3 Evaluating Social Innovation Through Three Dimensions

Unlike technological innovation, which often evaluates on productivity or efficiency, social innovation has an emphasis on social well-being and addressing societal challenges (Cajaiba-Santana, 2014). Therefore, a widely used conceptual framework describes social innovation through three dimensions: addressing human needs, changes in social relations, and empowerment and agency, as described by Moulaert et al. (2005, 2013). The framework highlights that social innovation should be evaluated through not only outcomes, but the social and political transformation it enables.

2.1.3.1 Addressing Human Needs

The first dimension concerns the extent to which an innovation addresses an unmet or insufficiently met human need. Social innovation often occurs where existing markets mechanisms fail to provide solutions that are adequate, especially for marginalized groups (Moulaert et al., 2005). Moulaert et al. (2013, p. 2), describes the satisfaction of needs as a central element in social innovation, especially in contexts where social exclusion persists. Social innovation is therefore a tool to respond to societal problems that existing arrangements are unable to solve. Evaluating social innovation through this dimension therefore involves assessing whether an initiative contributes to improvement of fundamental human needs (Moulaert et al., 2013, p. 58).

2.1.3.2 Changes in Social Relations

The second dimension, changes in social relations, is closely connected to addressing human needs (Moulaert et al., 2013, p. 3). Social innovation change refers to improving relations between people on a micro level, and also between different social groups on a macro level (Moulaert et al., 2013, p. 16). Cajaiba-Santana (2014) also discuss social relations, and that social innovation is grounded in the change of attitudes and behavior to make new social practices. Evaluating social innovation through change in social relation therefore means to assess how innovations lead to

meaningful changes in relationships, governance structures, and collaborative processes (Cajaiba-Santana, 2014; Moulaert et al., 2005).

2.1.3.3 Empowerment and Agency

The third dimension, empowerment and agency, is about how social innovation increases the extent to which individuals and communities can influence their own conditions. Social innovation is in addition to addressing human needs, also about giving marginalized groups more power to be part of decisions affecting them (Moulaert et al., 2005). In the literature, social innovation comes from interaction between actors and structures, where agency reshapes institutional contexts (Cajaiba-Santana, 2014). Thus, empowerment reflects an expansion of agency, where individuals and communities gain the ability to act on their own conditions and create change. Evaluating social innovation through this lens, therefore, requires assessing whether an initiative strengthens participation, collective action, and the ability of actors to influence social relations and governance structures (Moulaert et al., 2013, p. 2).

2.2 Entrepreneurship

Entrepreneurship is becoming increasingly important for addressing instability, unemployment, and structural inequalities in both emerging and developed markets. In a context characterized by global uncertainty, entrepreneurship is considered a key driver for economic growth and resilience, job creation, and societal adaption (Global Entrepreneurship Monitor, 2026). Entrepreneurship is also growing beyond only economic objectives, with social and environmental goals becoming more relevant. Furthermore, entrepreneurship is becoming more diverse, with increasing participation from women and other underrepresented groups (Global Entrepreneurship Monitor, 2026).

2.2.1 Aspects of Successful Entrepreneurship

Being a successful entrepreneur is sometimes reflected in their personality traits. Miller (2020) notes that "there's no single personality profile, and it's important to pay attention to the entrepreneurial team, rather than focus on the individual" (Miller, 2020), but certain traits are especially important to start ventures.

An important trait is curiosity. Being able to continuously look for opportunities, rather than doing only what is known, means that an entrepreneur has an exploratory approach to ventures (Miller, 2020). This is also discussed by Dvir et al. (2009), who states that entrepreneurs are creative and dreamers. It is further stated that these traits are correlated with risk-taking of new ventures (Dvir et al., 2009). This is related to what Miller (2020) describes as risk tolerance, where an entrepreneur is willing to take risks to reach results, as long as the risk is being mitigated.

In addition to curiosity, an entrepreneur needs to be willing to experiment to understand what ventures are opportunities to pursue (Miller, 2020). Khosla and Gupta

(2017) offers a similar approach and mentions that an entrepreneur must be flexible in the market and adjust their approach when market needs change. Miller (2020) agrees with this, and adds that entrepreneurship is something iterative. It is impossible to be aware of everything that can happen, therefore being able to adapt to changing scenarios is key (Miller, 2020).

Innovative thinking is another important aspect. Not every innovation is something entirely new, it can also be an adjustment of something existing that fits the changing market needs better (Miller, 2020). Khosla and Gupta (2017) argues that, in order to stay competitive in the market, an entrepreneur must be responsive. This can be both through creative solutions or innovations, thus meaning that innovative thinking is a broad concept.

2.2.2 Female Entrepreneurship

A key driver of sustainable growth and poverty reduction is an inclusion of women in the workforce through employment, entrepreneurship, and leadership (World Bank, 2026b). Further, by making it easier for women to become entrepreneurs, a gender gap can be closed which in turn can lead to increased welfare and increased productivity on the labor market (World Bank, 2026b). Thus, a focus on female entrepreneurship is important for continued growth and opportunities for development in underdeveloped countries.

2.2.3 Rural Female Entrepreneurship

In rural areas, women's entrepreneurship is often shaped by necessity, rather than by opportunity. Self-employment and micro-businesses therefore serve as essential livelihood strategies. Rural women contribute both to household responsibilities and the economy, supporting the family's income through small-scale businesses and informal activities. As a result, rural entrepreneurship is a catalyst for sustainable economies in peripheral regions (Aggarwal & Johal, 2021).

Across Sub-Saharan Africa female entrepreneurship is associated with informality. Many women operate informal, home-based activities, reflecting limited integration into formal economic systems. A substantial proportion of African women work in the informal sector, often in precarious conditions and low-value activities. This informality reflects structural inequalities in access to resources and opportunities (Wedajo et al., 2023).

Socio-cultural factors further influence the entrepreneurial opportunities of women. Gender roles, family ties, and social norms may limit the mobility, decision-making authority, and access to capital of women. Women entrepreneurs often face constraints such as limited financial resources, inadequate property rights, weak networks, and persistent stereotypes that portray entrepreneurship as a male domain. Consequently, women entrepreneurs may have to depend on alternative support systems rather than formal institutions (Cardella et al., 2020).

2.2.4 Moving From Necessity-Driven Entrepreneurship to Opportunity-Driven Entrepreneurship

The distinction between necessity-driven and opportunity-driven entrepreneurship represents a view from which entrepreneurial motivation and behavior can be understood. At the core, the differentiation arises from why individuals engage in entrepreneurial activities. Necessity-driven entrepreneurship is based on individuals who are forced into self-employment due to limited alternative income options, often as a response to unemployment or economic vulnerability (Alam et al., 2021). In contrast, opportunity-driven entrepreneurship is related to individuals who voluntarily pursue market opportunities for growth (Alam et al., 2021).

The distinction also provides a perspective on broader structural dynamics. Opportunity-driven entrepreneurship is generally linked to economic development and access to resources, which help individuals identify opportunities more strategically (Cervelló-Royo et al., 2020). In comparison, necessity-driven entrepreneurship is characterized by constrained labor markets and limited institutional support. Thus, the two differ in terms of preparation, risk management, and long-term potential for growth (Cervelló-Royo et al., 2020).

Understanding the transition from necessity-driven to opportunity-driven entrepreneurship becomes therefore vital in developing contexts. The shift represents not only changes in individual capabilities and motivations, but also improvements in economic conditions and access to knowledge.

2.2.4.1 Motivation

In the context of motivation and the associated risk to entrepreneurship, Global Entrepreneurship Monitor (2026), mentions that in higher-income countries, there is a stronger recognition of opportunity, compared to lower-income countries where a lot of entrepreneurship is driven from necessity. Another view on what motivates a necessity-driven entrepreneur, is that they engage in venture to satisfy basic physiological and safety needs, such as securing food, income or financial stability (Dencker et al., 2021). This is supported by Dhahri et al. (2021), who sees lack of alternatives for income as a motivator for necessity-driven entrepreneurship. In comparison to this, opportunity-driven entrepreneurship arises from a want to succeed and exploit market opportunities (Cervelló-Royo et al., 2020). Thus, the underlying motivations behind entrepreneurship differ greatly between the two drivers.

2.2.4.2 Economic Impact

In terms of economic impact, the type of entrepreneurship affects the economic outcome. Opportunity-driven entrepreneurship is associated with positive economic effects, such as innovation and job creation, due to its nature of new market opportunities (Cervelló-Royo et al., 2020). In contrast, necessity-driven entrepreneurship tends to have weaker, or negligible, contribution to economic development, as empirical evidence shows that it does not significantly influence economic growth compared to opportunity-driven entrepreneurship, but rather focuses on acquiring an

income that supports their living (Dhahri et al., 2021). Dhahri et al. (2021) further mentions that necessity-driven entrepreneurship is more prevalent in less developed contexts. Thus, although both forms of entrepreneurship have an economic impact, they differ greatly, as opportunity-driven activities play a larger role in long-term economic growth.

This difference in impact also connects to poverty reduction. Due to its nature, opportunity-driven entrepreneurship is associated with improved living standards and quality of life (Omri et al., 2025). Necessity-driven entrepreneurship on the other hand, because it is subsistence-oriented, has a limited scalability and therefore a weaker effect on well-being. However, it is stated that with strong governance conditions, it can become more positive. This suggests that the poverty-reducing potential of entrepreneurship depends not only on the entrepreneurial type but also on the institutional context (Omri et al., 2025).

2.3 Design Thinking

Past research on design thinking shows that the most commonly identified attributes include a human-centered and empathetic orientation, creative problem solving for complex “wicked” problems, iterative experimentation, interdisciplinary collaboration, visualization, holistic (gestalt) thinking, abductive reasoning, a balance between intuitive and analytical thinking, and tolerance for ambiguity and failure. These characteristics show that design thinking is a flexible approach suited to uncertain, ill-structured problems and innovation contexts (Micheli et al., 2019). These attributes are operationalized through specific methods. Frequently used methods include ethnographic user research, personas and journey maps, brainstorming and mind-mapping techniques, visualization practices such as sketching and storytelling, prototyping, and real-world experiments. These tools enable teams to generate insights, test ideas iteratively, and refine solutions based on stakeholder feedback (Micheli et al., 2019).

The literature review about Responsible design thinking highlights a different limitation in innovation management research (Baldassarre et al., 2024). Traditionally, studies have focused predominantly on the economic dimension of the triple bottom line, with comparatively less attention given to social and environmental impacts. The review found that approximately 90% of analyzed studies address economic outcomes, around 40% consider social impacts, and only about 7% examine environmental consequences. The imbalance reveals a significant blind spot in conventional innovation frameworks, including the widely used desirability-feasibility-viability model, which often neglects broader societal and ecological implications (Baldassarre et al., 2024).

These conceptual and ethical limitations are compounded by the contexts in which design thinking has been studied. Design thinking has been extensively studied as an innovation method mostly in organizational and managerial settings, rather than in communities. Systematic reviews demonstrate that empirical applications of design thinking are often dominated by large corporations and business environments, with

several studies focusing on firms such as IBM, Samsung, SAP, and P&G (Micheli et al., 2019).

Similarly, design thinking research has often emphasized the use of design tools for solving business problems and shaping organizational culture (Elsbach & Stigliani, 2018). Johansson-Sköldberg et al. (2013) show that design thinking has often been framed in management literature as a transferable approach for creativity and innovation in business settings. This reflects a broader tendency in the literature to examine design thinking primarily within corporate and organizational environments, rather than in community and resource-constrained settings. Consequently, there remains limited understanding of how design thinking operates as a facilitated process in rural societies, particularly in the Global South.

2.3.1 Design Thinking as a Methodology

Design thinking is presented as a human-centered approach to innovation. Rather than treating design as a late-stage activity concerned mainly with appearance, design thinking integrates user needs, technological possibilities, and business considerations throughout the innovation process (Brown, 2008, p. 86). Brown describes design thinking as a process organized around three overlapping spaces: inspiration, ideation, and implementation. Inspiration refers to the problem or opportunity that starts the search for solutions, ideation is the generation, development, and testing of ideas, and implementation involves bringing ideas into practice (Brown, 2008, pp. 88–89). These spaces describe the broader logic of the innovation process rather than a strictly set of steps. In practice, design thinking is frequently operationalized through more explicit stage-based models. One commonly used representation is the five-stage model consisting of empathize, define, ideate, prototype, and test, which provides a clearer structure for organizing and describing design activities in empirical innovation projects (Hasso Plattner Institute of Design at Stanford, 2010). As an exploratory and iterative process, design thinking does not follow a strictly linear sequence of steps. Instead, projects may move back and forth between these spaces as ideas are refined and new directions emerge (Brown, 2008, p. 89).

2.3.1.1 Empathy

The first stage of the design thinking process is to develop an in-depth understanding of the users and their context. Empathy is central to human-centered design and aims to uncover users' needs, motivations, and challenges. However, understanding users is not limited to what they explicitly state. Often the most valuable insights emerge from observing behaviors, emotions, and routines that users themselves might not articulate (Hasso Plattner Institute of Design at Stanford, 2010). This emphasis on uncovering latent and often unarticulated needs is highlighted in the literature. Empathy in design thinking is concerned with identifying both functional and emotional needs, which are frequently difficult for users to express directly (Haddadian et al., 2019).

The empathy phase typically consists of three complementary activities: immer-

sion, observation, and listening. Listening involves engaging directly with users through interviews and conversations to understand their experiences, perspectives, and everyday practices. Observation complements this by allowing the researcher to identify behaviors, habits, and contextual factors that users may not express verbally. Immersion involves attempting to experience the users' context firsthand in order to better understand their environment and daily life (Hasso Plattner Institute of Design at Stanford, 2010).

These activities enable researchers to gain a deeper understanding of users' experiences and generate insights that can inform meaningful solutions. Before moving to the next phase, the collected observations and insights must be unpacked. This often involves visually organizing the gathered material such as notes, quotes, photos, and observations on a shared workspace to identify patterns and connections within the data (Hasso Plattner Institute of Design at Stanford, 2010).

2.3.1.2 Define

The define phase focuses on synthesizing the information gathered during the empathy stage in order to clarify the design challenge. The research team interprets and structures the collected insights to identify the underlying needs of the users (Hasso Plattner Institute of Design at Stanford, 2010). This process involves analyzing and reframing the findings, allowing researchers to move from observations to a more structured understanding of the problem. Rather than treating data as isolated inputs, the define phase interprets insights and their meaning through patterns and relationships in the data (Kurniawanti et al., 2023)

Through synthesis, patterns and recurring themes begin to emerge from the gathered data. These insights form the basis for formulating a point of view (POV), which clearly articulates the user, the need, and the insight that defines the design challenge. This step is critical because it frames the problem that the subsequent ideation process will attempt to address (Hasso Plattner Institute of Design at Stanford, 2010).

A common way to transition from the define stage to the ideation stage is by formulating "How might we" (HMW) questions, which translate the problem statement into open-ended questions that guide the generation of potential solutions (Hasso Plattner Institute of Design at Stanford, 2010).

2.3.1.3 Ideate

The ideation phase focuses on generating a wide range of potential solutions to the defined problem. At this stage, the objective is not to identify the single best idea but to explore multiple possible approaches. By encouraging creativity and avoid being judgmental, teams can develop a broad set of concepts that address the identified user needs (Hasso Plattner Institute of Design at Stanford, 2010).

This phase is characterized by structured and exploratory methods aimed at expanding the solution space. Rather than converging too early, ideation emphasizes the

generation of diverse alternatives through creative problem-solving. Common methods include brainstorming, mind mapping, and role-based exploration, all of which support the development of innovative and non-obvious solutions (**Review__design thinking**; Hasso Plattner Institute of Design at Stanford, 2010). These techniques help transform abstract ideas into more tangible concepts that can later be explored and refined. Generating a large number of ideas increases the likelihood of identifying innovative and contextually relevant solutions (Hasso Plattner Institute of Design at Stanford, 2010). Selected ideas are then carried forward into the prototyping phase for further exploration and development (Hasso Plattner Institute of Design at Stanford, 2010).

2.3.1.4 Prototype

Prototyping involves creating simplified representations of potential solutions in order to explore ideas and answer specific questions about their functionality and value. Prototypes can take many forms, such as physical models, sketches, storyboards, role-playing or mock-ups (Hasso Plattner Institute of Design at Stanford, 2010). Instead of being representations, prototypes are tangible objects that enable designers to visualize, communicate, and evaluate ideas. Prototypes help reveal assumptions, support communication, and generate feedback that can guide further development (Brown, 2008, p. 87).

Early prototypes are typically low fidelity. The goal is not to create a finished product but to learn rapidly about how users interact with a concept. By externalizing ideas through prototypes teams can test, identify strengths and weaknesses, and refine the concept through iteration (Hasso Plattner Institute of Design at Stanford, 2010). Each prototype is designed to test specific assumptions about user behavior, desirability, or feasibility. This iterative cycle of building, testing, and refining allows teams to learn about strengths, weaknesses, and possible directions for further development (Brown, 2008, p. 87).

2.3.1.5 Test

The testing phase involves presenting prototypes to users in order to gather feedback and evaluate how well the proposed solutions address their needs. Testing provides an opportunity to observe how users interact with the prototype and to gain insights into their experiences, preferences, and challenges (Hasso Plattner Institute of Design at Stanford, 2010). User interactions with prototypes generate new insights that can refine not only the solution but also the understanding of the problem itself. This reflects the iterative nature of design thinking, where insights continuously evolve through cycles of testing and refinement (Gwangwava, 2021).

It is important to understand how and why users respond to the prototype. Observing real user behavior often reveals discrepancies between what users say and what they actually do. Therefore uncovering deeper insights that may not emerge through direct questioning alone. Feedback from users can reveal unexpected findings that require going back to earlier stages of the design process (Hasso Plattner Institute of Design at Stanford, 2010). Testing therefore represents both an evaluation and a

learning phase within the design thinking process, supporting continuous improvement of the proposed solution and the overall understanding of user needs (Hasso Plattner Institute of Design at Stanford, 2010).

2.3.2 Constraints to a successful idea

One way to determine the success of an idea, that is widely associated with design thinking, is to use three fundamental constraints: feasibility, desirability, and viability (Brown, 2008). The framework suggests that an idea becomes successful only if it is technically possible to implement in the context, desirable for users and can become part of a sustainable business model (Brown, 2008). The framework is iterative and uses a systemic approach, where solutions are continuously tested and refined against these constraints.

2.3.2.1 Desirability

In design thinking, desirability is related to human-centered design, which suggests that humans are at the core of innovation. Brown (2008) highlights that solutions must be meaningful and relevant to the context in order to succeed. This is reflected in IDEO's human-centered design approach, which focuses on empathy, observation and engagement to find latent needs, motivations and challenges (IDEO.org, 2015). Furthermore, Giacomini (2014) mentions that a human-centered approach can obtain an understanding that explores beyond needs and thoughts that are explicit. Because it extends beyond explicit needs, it therefore has a focus on the individual rather than the products. This leads to intuitive products and services that are fit-for-purpose, which helps with inclusivity (Giacomini, 2014).

2.3.2.2 Feasibility

The feasibility of a successful idea relates to the extent a proposed solution can be implemented in the existing context. The constraints in the context include available technology, skills infrastructure and resources, among other. From a design thinking perspective, feasibility relates to whether a solution is technically possible given the current, or realistically obtainable, means (Brown, 2008). This is strengthened by Fenn and Hobbs (2017) as they mention that a solution not only needs to be technically feasible, but also appropriate to the social and cultural context. Thus, innovations and designs must adhere to the local context for which they are created in order to be considered feasible.

2.3.2.3 Viability

The viability refers to whether an idea can be considered economically sustainable over time. While it often can be associated with profitability in commercial settings, viability in a development setting may instead relate to financial self-sufficiency and long term value creation for stakeholders (Bocken et al., 2014). From a business model perspective, viability requires solutions where value can be captured in a way that also supports continued operation. Osterwalder and Pigneur (2010) discuss this

as a need for alignment between value proposition, revenue stream, cost structure and key resources, among other. Without an alignment between them, even desirable and feasible ideas risk failure.

In a sustainable innovation context, viability is including social and environmental impact. Bocken et al. (2014) argue that long-term viability depends on the ability to integrate economic goals with social inclusion and responsible use of resources, instead of seeing them as competing objectives. This is increasingly relevant in a low-to middle income context where projects aim to strengthen local entrepreneurship.

3

Methods

This chapter presents the methodological approach used in this study and explains how the research was designed and conducted within the context of rural Mozambique. It outlines the interpretive and qualitative research strategy that is grounded in a constructionist ontology and an abductive research process. It also explains how these perspectives guided the development of the study throughout the fieldwork. In addition, the chapter describes the case study conducted together with Project Vita and discusses how the design thinking framework laid the foundation of both the empirical investigation and the development of relevant solutions.

The empirical data collection methods included observations, interviews, PRA-inspired questionnaire activities, and a participatory workshop. These methods were complemented by desk research and design thinking tools, which supported the contextual understanding, idea generation, and development of prototypes. Multiple methods were used to triangulate the findings and strengthen the empirical foundation of the study. Finally, the chapter discusses the quality criteria applied to ensure trustworthiness and reflects upon the ethical considerations associated with conducting field-based research in a rural and culturally unfamiliar setting.

3.1 Research Strategy & Design

The research used an interpretive approach and a constructionist ontology, where information has been gathered mainly through the use of qualitative and abductive methods (Bell et al., 2019, p.24, & p.27-29). Knowledge was understood as context-dependent and socially constructed. This was suitable for the study, as the aim was to understand how women's entrepreneurial activities, needs, and opportunities were shaped by the social and economic context in Linga Linga. This abductive reasoning has been conducted by creating concepts and frameworks throughout the study that have been based on the themes, relationships, and patterns found during the fieldwork. The abductive approach was chosen because of limited pre-existing knowledge and because the findings during the study would lead the hypothesis instead of it being preconceived, which also aligned with the iterative logic of design thinking.

To explore opportunities for local entrepreneurial women in Linga Linga, a case study was conducted in collaboration with Project Vita. The case study was cho-

sen due to the nature of the research, where the study needed to gain an in-depth understanding how the local fish value chain functioned (Bell et al., 2019, p.63-64). It is argued that a case study allows for multiple qualitative approaches in combination, mitigating the risk of not obtaining useful data when relying on only one method, enabling triangulation across observations, interviews, questionnaires, and participatory activities (Bell et al., 2019, p.63). This was important for developing a more comprehensive understanding of the fish value chain, local practices, and the conditions influencing value creation.

The design thinking approach was used as the main process framework during the research. Its phases structured the movement from understanding and identification of user needs to ideation, prototyping, and testing. In addition to the empirical data collection, desk research was used to complement the findings and inform the development of potential solutions. Several design thinking tools were applied throughout the process, including persona development, POV statements, HMW questions, brainstorming, prototyping, testing, and desirability-feasibility-viability evaluation. These tools helped translate empirical insights into design-oriented outputs. social innovation was used as an additional framework through which the results were interpreted. Solutions created in the process were analyzed through the lens of social innovation in three aspects: human needs, changes in social relations, and empowerment and agency. Through this it was possible to understand if the solutions have the potential to generate wider social value.

Although the study focused on women and their entrepreneurship, men were also included in observations, interviews, and workshops. By including a wider group of participants, the study sought to avoid analyzing women's entrepreneurship in isolation from the broader social and economic environment in which it takes place.

3.2 Field Study as Data Collection

The data collection was conducted through an immersive, two-month field study. A field study approach was selected to gather rich insights that would not have been accessible through desk research or remote interviews. Field research allows for direct observation and cultural interpretation in natural setting, and this is an approach that is particularly recommended when working in unfamiliar or complex social contexts (Bell et al., 2019, p.366-368 & 404-405). Therefore the physical presence of the researchers enabled immersion in everyday village routines, trust-building with participants, and a deeper ethnographic understanding of the environment.

The purpose of this field study was to gain an understanding of the local customer preferences for fish products and cooking methods, and to study the women's current practices, challenges, and opportunities in the fish value chain. The choice of a mix of different qualitative data collection methods was to gain as nuanced and valid information as possible. This allowed the research to mitigate risks of drawing conclusions from certain behavior, that could be valid only for specific days, or time of the day (Bell et al., 2019, p.400).

3.3 Data Collection Methods

The data collection methods chosen were observations, interviews, surveys and a workshop. Multiple methods were chosen to triangulate the findings.

3.3.1 Observations

The purpose of this chosen method was to capture daily practices, routines, and challenges with limited researcher interferences (Bell et al., 2019, p.405). There is varying levels of illiteracy and since English is not commonly spoken, this proved an efficient way of acquiring more nuanced information. Also, observations allowed the study to gain information that participants could have a hard time explaining themselves.

The focus of the observations was guided by the theoretical concepts of the study. Attention was given to unmet needs, resource constraints, social interactions, entrepreneurial practices, and activities within the fish value chain. The observations therefore aimed not only to document daily life, but also to understand how women navigated economic limitations, interacted within local market structures, and adapted existing practices in their entrepreneurial activities. These insights later informed the empathize and define stages of the design thinking process by helping to translate contextual observations into user needs, POV statements, and design opportunities. The observations mainly included household observations, market observations, social observations, and observations of fish-related selling and production practices. Depending on the situation, both participatory and non-participatory observations were conducted. Participatory observations enabled the researchers to gain closer insight into everyday practices and social interactions, while non-participatory observations allowed for more distanced documentation of naturally occurring activities. In some situations, observations were conducted in a more covert manner in order to reduce the risk of influencing participants' behavior (Bell et al., 2019, p.410). This combination of observation types helped balance contextual immersion with analytical distance (Bell et al., 2019, p.413-414).

After observations were made, descriptive field notes were written by both observers to make sure that important details were not lost over time. A field note guide was developed and followed to support consistency in the documentation process and to ensure that the notes captured relevant aspects of the observations, in line with recommended fieldwork practice. Additional end-of-day notes were used to document events, reflections, and contextual details that had occurred during the day (Bell et al., 2019, p.416-417).

3.3.2 Interviews

The interviews conducted were made to complement and deepen the information gathered by the observations. Thus, the interviews were grounded in the data found during previous field study research to further build on existing knowledge. The first set of interviews aimed at exploring user preferences and practices in their

daily lives. Afterwards, two interviews were held with the fieldwork translator to gain a better understanding from the questionnaire and workshop activities. Lastly, a final in-depth interview was done to explore the potential impact of the proposed solutions. Considering that the research is of a qualitative approach, each interview was flexible and led to different points of interest based on answers to questions (Bell et al., 2019, p.435). In general, the interviews followed a semi-structured approach, where prepared questions were used as a guideline during the interview. This allowed each interview to stay on topic, while allowing for pivots when deemed necessary (Bell et al., 2019, p.436).

The interviews were designed to explore themes connected to the study's theoretical framework. Questions focused on participants' everyday challenges, access to resources, decision-making processes, fish consumption and selling practices, and perceived opportunities for income generation. In addition, the interviews explored how participants collaborated, shared knowledge, and perceived constraints related to entrepreneurial activities. This enabled the interviews to generate empirical material connected to the dimensions of social innovation as well as the entrepreneurial context of the study.

A total of six interviews were conducted during the field study. The interviews had different questions depending on the context of the interview. Table 3.1 provides an overview of the interviews and includes a description, time, and date for each interview. The interviews have been assigned an ID as well, which is used in the report.

Table 3.1: Overview of conducted interviews.

Interviewee	ID	Guide	Date	Time	Interview type
Mother in Linga Linga who consumes and prepares fish	1	A	9th of February	22 min	Semi-structured interview
Man in Linga Linga who consumes fish	2	A	9th of February	12 min	Semi-structured interview
Man in Linga Linga who consumes fish	3	A	9th of February	11 min	Semi-structured interview
Fieldwork translator	4	B	19th of February	36 min	Semi-structured interview
Fieldwork translator	5	N/A	17th of March	15 min	Semi-structured interview
Local leader and CEO of local NGO	6	C	23rd of March	80 min	Semi-structured interview

Source: Fieldwork by researchers.

3.3.3 PRA-Inspired Activities

Two Participatory Rural Appraisal-inspired (PRA) activities were developed to capture the needs and practices of local inhabitants at a broader scale. The first activity consisted of a translator-facilitated questionnaire focused on fish-related habits, household needs, and local consumption practices. It involved thirty four participants and was conducted verbally to make participation accessible for respondents with varying literacy levels. To ensure contextual relevance, the questionnaire was first explained in detail to the local translator, who then piloted it with individuals working in the same environment. Following this, data were collected through structured administered questionnaire sessions conducted verbally by the translator. This approach helped mitigate literacy barriers and ensured that questions were communicated in a culturally relevant manner.

The second activity was a participatory workshop that combined structured questioning with visual and physical tools. Respondents used objects such as stones to support ranking, scoring, and discussion. This made it possible for participants to express preferences and evaluate proposed ideas without relying on written language or a formal written survey format, which made the process more accessible for respondents with varying literacy levels (Sontakki et al., 2019, p. 2).

The use of verbal, semi-structured interaction aligns with PRA principles, which emphasize learning through dialogue, local engagement, and adaptation to participants' contexts rather than rigid survey structures (Sontakki et al., 2019, p. 3). Semi-structured interviews are also described as a PRA technique for collecting village-level information through locally grounded interaction (Sontakki et al., 2019, p. 5).

These PRA-inspired activities supported the study's aim of generating inclusive and grounded empirical material. By enabling participants to actively engage, the approach provided insights into local preferences and potential acceptance of proposed ideas and prototype concepts. The participatory structure was also relevant in relation to the study's focus on empowerment and agency, as it allowed participants to express perspectives in ways that were less dependent on written language or formal interview formats. Portions of these interactions were recorded to support subsequent analysis.

3.4 Participant Selection & Sampling

The sample population of the study was limited to inhabitants of Linga Linga, Morrumbene, and Maxixe. Linga Linga constituted the primary field site, while Morrumbene and Maxixe were included to capture complementary perspectives, particularly in relation to market activities and exposure to alternative fish processing and selling practices

From the available population, the researchers used purposive sampling to acquire relevant information, which is based on criteria that are relevant for the goal of the study (Bell et al., 2019, p.391). The selection of participants focused on individuals involved in fish-related activities, such as fishing, processing, or selling fish, as well as women engaged in informal entrepreneurial practices within the local economy. In addition, local market participants were included to capture consumer perspectives. Choosing a purposive sampling method will hinder the option to generalize findings to a population, but is useful to access participants who have the ability to provide relevant information (Bell et al., 2019, p.389). This approach aligns with the exploratory and context-specific aim of the study, which seeks to understand needs, practices, and opportunities for value creation within a resource-constrained rural setting.

In addition to the purposive sampling, some of the participants were found through opportunistic sampling. As mentioned by Bell et al. (2019, p.396), ethnographic research must sometimes be flexible and use the available information that can be gathered, as there can be an indifference to the research. The participant selection was therefore not intended to achieve statistical representativeness, but rather to access individuals with experiences relevant to the study's analytical focus on social innovation, entrepreneurship, and fish-related value creation practices.

3.5 Data Analysis

The collected qualitative data were analysed with an inductive thematic analysis. The data was continuously documented and reviewed throughout the field study. Because qualitative data typically generate large and unstructured datasets, the analysis required an iterative and interpretive approach to identify meaningful patterns (Bell et al., 2019, p.518)

The analysis followed an iterative process, where data collection and analysis were conducted simultaneously. Insights emerged to inform subsequent data collection and refine the research focus over time, which is consistent with qualitative research practices (Bell et al., 2019, p.518). The initial coding was conducted by identifying recurring patterns, statements, and behaviors across the different data sources. They were grouped into first-order themes without applying predefined theoretical categories in order to remain grounded in the empirical material.

Next, the identified themes were clustered into broader categories of representing key structural and contextual conditions within the research setting. The process reflects the core principles of thematic analysis, where the researcher searches for patterns across the dataset and organizes them into meaningful themes (Bell et al., 2019, p.519). To enhance the credibility of findings, data triangulation was used by comparing insights across observations, interviews, and questionnaire responses. Using multiple data sources allows for a more comprehensive understanding and reduces risk of relying on a single perspective (Bell et al., 2019, p.364-365)

Themes were interpreted in relation to the study's theoretical framework. Themes connected to unmet needs, resource limitations, and daily practices were analysed in relation to the dimension of addressing human needs. Themes concerning collaboration, market interactions, and community dynamics were interpreted through the dimension of changes in social relations. Furthermore, themes related to women's decision-making, perceived opportunities, and entrepreneurial constraints were analysed through the lens of empowerment and agency.

The findings were subsequently translated into design-oriented insights through the design thinking framework. This involved reformulating empirical observations into user needs, point-of-view statements, and ideation opportunities that later informed the prototyping and testing phases.

3.6 Quality Criteria

Bell et al. (2019, p.362) highlights that it is important for business research to be trustworthy. In this study, credibility, dependability, confirmability, and transferability has been criteria to which the trustworthiness has been upheld.

To uphold dependability, as described by Bell et al. (2019, p.363), the research has been continuously documented. In addition, the method chapter, along with the theory chapter on design thinking, has described the research process to create

transparency and lay a foundation for reliability in the results. Furthermore, by adhering to the geographical area in which Project Vita is active, existing relations with the local community was utilized. Local people assisted in building trust with the community and also aid in overcoming the language barriers by translating questions into Gitonga, the local language. By using this approach, the research could increase the reliability of the answers, while also mitigating potential barriers in trust.

Moreover, the research has continuously worked with triangulating data, which is an important aspect to build credibility (Bell et al., 2019, p.363). Transferability is more challenging, considering the unique contextual setting that the study is being done in. However, the research has tried to mitigate this by explaining the context in detail, which is described as thick description (Bell et al., 2019, p.364). Therefore, even though the insights may not directly be transferable, there exists information for readers to make a judgment on the possibility of transferability. Lastly, confirmability was addressed by documenting the research process and by reflecting on the role of the researchers in the field. Since the study was conducted in an unfamiliar cultural context and relied partly on translators and local contacts, the researchers continuously reflected on potential biases, interpretation challenges, and the influence of their own presence. The use of triangulation, field notes, and translator-supported clarification helped reduce the risk that findings were based solely on the researchers' assumptions. In this way, the study sought to act in good faith and maintain transparency in the interpretation of the empirical material (Bell et al., 2019, p.364).

3.7 Ethical Considerations

This study was conducted in accordance with established principles of business research ethics, including avoidance of harm, informed consent, privacy, and the prevention of deception (Bell et al., 2019, p.114). Given the qualitative and field-based nature of the research, particular emphasis was placed on safeguarding participants' well-being and ensuring respectful engagement throughout the study.

All participants were informed about the purpose of the research, how the data would be used, and their rights as participants prior to data collection. Informed consent was obtained before each interview. Participants were also asked for permission to record interviews when applicable. To facilitate communication and ensure informed consent, a local translator assisted during data collection. This enabled participants to receive information in their native language and express themselves more accurately. At the same time, the use of a translator introduced potential risks of misinterpretation, which were mitigated through preparation, continuous clarification, and iterative discussions.

Confidentiality and anonymity were maintained throughout the research process. Personal identifiers were excluded or generalized, and data was handled with care to prevent the identification of individuals. This was particularly important in a small community context such as Linga Linga, where individuals may otherwise be easily

identifiable. Ensuring anonymity enabled participants to speak openly about their experiences, challenges, and economic activities without concern for potential social or reputational consequences.

The study was conducted in a rural Mozambican context that was unfamiliar to the researchers, requiring sensitivity to local cultural norms and social structures. Given the focus on women's entrepreneurship, additional ethical considerations were necessary, as gender roles and dynamics could influence both participation and potential risks. The research, therefore, aimed to create a safe and respectful environment for female participants, ensuring that their involvement did not expose them to discomfort or unintended consequences.

Finally, the dual role of the researchers, as master's students and as temporary collaborators with Project Vita during the field study, was communicated to participants to ensure transparency.

4

Results

This chapter presents the empirical findings of the study and shows how solutions in the fish value chain were identified through the design thinking process. It begins by presenting the study context of Linga Linga, including the social, economic, infrastructural, and environmental conditions that shaped the fieldwork. It then presents the exploratory phase, where observations, interviews, and PRA-inspired activities were used to understand needs and challenges related to value creation. These findings are synthesized into themes, a fish value chain mapping, a persona, and POV, which together form the basis for the subsequent ideate phase.

The concepting and prototyping phases then describe how potential solutions were developed into contextually adapted prototypes. Finally, the testing phase presents findings related to perceived relevance, feasibility, adoption patterns, and barriers to implementation. The chapter concludes by analyzing the proposed solutions in relation to the three dimensions of social innovation: addressing human needs, changes in social relations, and empowerment and agency.

4.1 Study Context: Linga Linga

Linga Linga is a coastal village characterized by a physical and social environment in which much of daily life takes place outdoors. Observations indicate that activities such as fishing, food preparation, and trade commonly occur in shared spaces, often under natural shade provided by trees and simple structures (Observation data, 2026). Social interaction is frequent, with people gathering in groups throughout the day, and music is often present in communal areas (Observation data, 2026).

Households generally maintain tidy living areas around their homes. However, observations also showed that along roads and on the beach there are plastic containers, glass bottles, and other forms of waste. Waste disposal practices observed in the community include burning (Observation data, 2026). The village is built largely on sandy ground, which allows rainwater to be absorbed relatively quickly. At the same time, storms and strong winds can lead to the accumulation of natural debris in public spaces, which residents were observed to clear from areas close to their homes (Observation data, 2026).

Environmental conditions have a direct impact on infrastructure and accessibility.

Heavy rainfall can damage roads and make them difficult or impossible to use for extended periods (Observation data, 2026). During the fieldwork period, it was reported that storm damage had previously disrupted electricity supply, resulting in several weeks without power (Observation data, 2026; Personal communication, 2026). Damage to public infrastructure, including parts of the local school, was also described, with community members organizing efforts to fund repairs (Personal communication, 2026).

The village is geographically isolated, with limited transport options. The primary mode of transport is chapas (private individuals driving minibuses in exchange for money), which were observed to be frequently overcrowded (Observation data, 2026). This limited transport infrastructure affects mobility and access to external markets, goods, and services (Personal communication, 2026).

Housing structures typically consist of several small buildings used for different purposes, such as cooking, sleeping, and sanitation (Observation data, 2026; Personal communication, 2026). Food preparation commonly takes place in designated cooking areas separate from living spaces, and meals are typically prepared over open fires. Water for household use is often collected from wells (Observation data, 2026).

Basic services such as small shops, markets, and healthcare facilities are present within the village but were described as limited in availability (Observation data, 2026; Personal communication, 2026). Access to goods is therefore partially dependent on transport from outside the village. Personal communication further indicates that while basic utilities and infrastructure are present, access to more advanced technologies is limited (Personal communication, 2026).

4.2 Exploratory Phase

In the first phase of the design thinking process, the goal is to define the opportunities. To start, it first diverges by emphasizing the user and surroundings to later converges into defining the pain points and struggles that form the basis of the next phase.

4.2.1 Empathy

The empathy phase aimed to develop a contextual understanding of everyday life, livelihoods, and food practices in Linga Linga. Data were collected through observations, formal interviews, informal conversations with local inhabitants, questionnaire data, and immersion in daily activities. A thematic analysis of the collected data identified several recurring themes that describe the social, economic, and environmental conditions influencing fish consumption, preservation practices, and entrepreneurial opportunities in the community.

4.2.1.1 Thematic analysis

The empirical findings from the empathy phase were analyzed thematically. The analysis identified four key themes that capture the main conditions shaping fish consumption, preservation practices, and entrepreneurial opportunities in the community:

- Resource-constrained food system
- Informal and adaptive livelihoods
- Social organization and gendered work
- Spatial isolation and market access

These themes reflect recurring patterns across observations, interviews, and questionnaire data, and form the basis for identifying key needs and opportunity areas in the next steps of the design thinking phases.

Resource-Constrained Food System

Fish plays a central role in local diets, with survey data indicating that most respondents consume fish several times per week, and some daily (Questionnaire data, 2026). Sardine, tuna, and mackerel were identified as the most commonly consumed fish types (Questionnaire data, 2026; Interview 4, 2026).

Preparation methods are relatively simple, with boiling and pan frying being the most frequently reported, followed by drying (Questionnaire data, 2026). Boiling was interpreted as a boil of fish, tomato, onion and other ingredients (Interview 4, 2026). Interview data indicate that cooking practices are closely linked to ingredient availability. One respondent described fish that is easy to prepare as fish that does not need a lot of ingredients (Interview 4, 2026), suggesting that perceived ease of preparation is shaped by limited access to complementary ingredients.

A key constraint identified is the limited shelf life of fresh fish. Survey responses indicate that fish typically remains suitable for consumption for one to two days, with fewer responses indicating up to three days (Questionnaire data, 2026). This creates a mismatch between supply and consumption, particularly when catches are large (Personal communication, 2026). Unsold fish may need to be discarded if it cannot be sold or consumed within this time frame (Personal communication, 2026).

Food choices are strongly shaped by affordability and access. Interview data indicate that respondents frequently refer to “I buy what I can afford” or “the cheapest to cook” when describing preferred fish options (Interview 1; interview 4, 2026). Survey responses further show that affordability is a key determinant in food selection (Questionnaire data, 2026). Fish preferences appear to be influenced by both availability and perceived value. Interview data indicate that sardines are commonly consumed but sometimes perceived as less desirable due to preparation challenges, while larger fish such as mackerel are preferred because they provide more meat (Interview 1, 2026).

Access to complementary ingredients is limited. Tomatoes and onions were consistently identified as essential but not always available, followed by items such as carrots, garlic, and paprika (Questionnaire data, 2026; Personal communication, 2026). In addition, limited access to refrigeration constrains food storage, with interview data indicating a demand for improved preservation methods, including refrigeration (Interview 1, 2026). At the same time, personal communication suggests that while basic utilities such as water access and simple cooking facilities are present, access to more advanced technologies remains limited (Personal communication, 2026). This indicates that although refrigeration is perceived as a desirable solution, it may not be feasible within the current infrastructural context.

Given these constraints, alternative preservation methods become relevant. Solar drying technologies have been identified as suitable in rural contexts with high solar radiation and limited access to refrigeration and electricity (Magoncia et al., 2024). Such systems reduce moisture content, slowing microbial growth and extending shelf life, while also offering improved product quality compared to open sun drying through reduced contamination and more controlled drying conditions (Magoncia et al., 2024).

These findings indicate that the local food system is constrained by short product lifespan, limited storage capacity, restricted ingredient access, and strong affordability pressures.

Informal and Adaptive Livelihoods

Economic activity in Linga Linga is largely informal and characterized by flexible income generating activities rather than stable employment (Observation data, 2026; Personal communication, 2026). Livelihoods appear highly adaptive, with individuals engaging in multiple activities depending on available opportunities. This is reflected in interview data, where one respondent described that “he does many things” (Interview 3, 2026).

Women were frequently observed engaging in small scale entrepreneurial activities, particularly purchasing fish, transporting it via chapas, and reselling it locally (Observation data, 2026). This buy–transport–sell activity represents a common form of income generation (Personal communication, 2026). In addition to fish-related activities, women were observed producing handcrafts such as baskets and handbags, some of which are sold to external actors for further processing and resale (Observation data, 2026; Personal communication, 2026). Interview 1 (2026) is selling and making handbags with her mother as an extra income generating activity apart of her job as housemaid.

Community members possess locally developed skills related to fishing and food preparation, including interpreting water conditions to locate fish, cleaning fish using knives and basins, drying small fish directly on sand, and preparing meals with limited ingredients (Observation data, 2026; Interview 1, 2026). Fish is commonly prepared through boiling, frying, salting, or drying, and meals are typically cooked in large pots over open fires. Work activities frequently take place collectively, with fish-

ing conducted in coordinated groups and tasks such as fish processing, craft-making and transportation carried out collaboratively (Observation data, 2026; Personal communication, 2026). Economic activity is further shaped by informal financial practices. Interview data indicate that transactions may occur through delayed payments or informal credit arrangements, reflecting both trust-based exchange and financial constraints (Observation data, 2026; Personal communication, 2026).

These findings indicate a livelihood system characterized by flexibility, diversification, and dependence on locally available opportunities rather than formal employment structures. The structure of informal and flexible livelihoods suggests potential for value-added activities within existing practices. Supporting this, previous research has shown that value addition in fish processing can generate significant economic returns. For example, a study on catfish processing in Kenya identified products such as fish fingers, fish balls, fish samosas, and smoked fish, with profit margins ranging from 7% to 100% depending on the product (Kyule et al., 2014).

Social Organization and Gendered Work

Social organization in Linga Linga is closely linked to fishing activities and household responsibilities (Observation data, 2026; Personal communication, 2026). Fishing is typically organized in groups, often guided by more experienced individuals, suggesting an informal hierarchy based on knowledge and experience.

Gender roles appear relatively defined. Women were frequently observed preparing food and engaging in small-scale trade, often while simultaneously caring for children (Observation data, 2026). This indicates that productive and reproductive responsibilities are closely intertwined in daily life. Children were commonly observed spending time in groups within shared spaces while adults were engaged in work activities (Observation data, 2026), suggesting that childcare is embedded within community structures rather than formalized systems. These patterns align with existing research on small-scale fisheries, where women play a central role in fish processing and trading activities within local markets (Kyule et al., 2014).

Spatial Isolation and Market Access

Linga Linga is geographically isolated, with limited infrastructure affecting access to markets, goods, and services (Observation data, 2026). Transport is primarily dependent on chapas, which were frequently observed to be overcrowded and unreliable (Observation data, 2026; Personal communication, 2026). Many goods must be transported from outside the village, influencing both availability and pricing (Observation data, 2026; Personal communication, 2026). While most economic activity takes place locally, some individuals travel to nearby areas to buy or sell goods (Interview 2, 2026; Personal communication, 2026).

Fish forms part of a broader exchange system. Interview data indicate that fish is traded with inland communities and may be exchanged for other goods, including vegetables. Salted fish, due to its longer shelf life, is particularly suitable for such exchanges (Interview 2, 2026). Fish prices were reported to vary depending on

species and season, typically ranging between approximately 50 and 100 MZN per kilogram (Interview 1, 2026). However, the limited shelf life of fresh fish remains a key constraint, reinforcing the importance of timely sale or preservation. These findings indicate that spatial isolation and limited transport infrastructure significantly shape both market access and resource flows within the community.

4.2.1.2 Fish Value Chain

To understand how fish moves through the local system, a simplified fish value chain was developed based on the thematic analysis, including observations, interviews, and questionnaire data collected during fieldwork (Observation data, 2026; Interview data, 2026; Questionnaire data, 2026). The mapping is presented in Table 4.1 and illustrates the key stages from catching fish to consumption and highlights insights.

Table 4.1: Fish value chain activities, context, and insights.

Stage	Activities	Observations	Insights
Access to fish	Receives fish from family members who fish, buys fish from local fishermen, or collects fish from landing sites.	Fish availability varies depending on weather, fishing success, and time of day.	Fish supply is unpredictable. People may have limited control over when and how much fish they receive.
Initial handling	Sorts fish, cleans fish, and decides whether to cook, dry, fry, or sell it fresh.	Handling often happens outdoors near the home or landing site.	Lack of cooling or preservation means fish begins spoiling quickly in heat.
Processing	Fish is cooked, salted, or dried depending on intended use or sale.	Processing uses simple tools and traditional methods.	Drying is often done on the ground, which can reduce quality and increase contamination.
Storage	Fish is stored temporarily before consumption or sale.	Storage options are limited and refrigeration is generally unavailable.	High risk of spoilage and food waste if fish cannot be processed or sold quickly.
Selling or distribution	Fish is sold locally in the village, in nearby towns, or sometimes traded further inland.	Informal selling occurs near homes or at surrounding markets.	Limited local demand, transportation barriers, and low purchasing power affect income.
Household use	Remaining fish is used for household meals or shared with family.	Fish is a key protein source in the local diet.	Lack of variety and limited ingredients may restrict food options.

Source: Fieldwork by researchers.

4.2.1.3 Persona

The persona illustrated in Figure 4.1 was developed based on patterns identified in the thematic analysis, drawing on observation, interview, and questionnaire data collected during the empathy phase (Observation data, 2026; Interview data, 2026; Questionnaire data, 2026). It represent a typical female household member engaged in informal economic activity within the community. The persona summarizes com-

mon livelihood activities, household responsibilities, and pain points.



Figure 4.1: Persona profile of Maria.

Source: Fieldwork by researchers.

4.2.2 Define

The pairs of needs and insights presented in Table 4.2 were synthesized into a guiding POV to frame the design challenge. This POV centers Maria as the primary user and reflects the pain points and conditions shaping her daily life.

POV: Maria needs ways to make the most of the locally caught fish because access to additional resources is limited.

This POV highlights how locally available fish represents one of the most reliable resources within the community, while access to complementary ingredients, storage solutions, and alternative income sources remains constrained. As a result, maximizing the utility and value of fish is vital to both household wellbeing and potential income generation. The formulation of this POV provides a direction for the ideation, ensuring that proposed solutions are grounded in existing resources, align with everyday practices, and address the structural limitations identified in the context.

Table 4.2: Need–insight pairs derived from the Maria persona.

Need	Insight
Reliable ways to maintain household stability	Household wellbeing is shaped by unpredictable access to food and income, forcing reactive decision-making and limiting long-term planning.
Ways to manage unpredictable resources	Access to food and income varies daily, making planning difficult and reinforcing short-term coping strategies.
Improvements that fit existing routines	Daily life is dominated by childcare and domestic responsibilities, leaving little time or capacity for complex or time-intensive practices.
Low-risk ways to support the household	Engaging in unfamiliar economic activities introduces risk in already resource-constrained conditions, discouraging experimentation.
Ways to reduce food and income loss	Limited storage and preservation options increase the likelihood of spoilage, directly affecting both food security and income potential.
Ways to better utilize locally available fish	Fish is one of the most accessible resources but is underutilized due to spoilage and limited processing capabilities.
Solutions aligned with community norms	Daily practices and economic activities are shaped by social structures and cultural expectations, influencing what is feasible to adopt.

Source: Fieldwork by researchers.

4.3 Concepting Phase

The concepting phase aimed to generate a wide range of potential solutions addressing the needs identified in the define phase. The process followed a divergent-convergent approach consisting of the formulation of HMW questions, brainstorming of ideas, clustering of concepts into thematic areas, and evaluation using the Desirability–Feasibility–Viability (DFV) framework.

4.3.1 Ideate

The ideate stage translated the insights from the define phase into potential solution areas. The purpose was to generate a broad set of ideas that could respond to the identified needs in the local fish value chain, particularly in relation to preservation, value creation, reduced waste, and the use of existing resources.

4.3.1.1 How Might We-Questions

The HMW questions focused on key opportunity areas identified in the define phase, particularly related to improving fish preservation, increasing value creation, reducing waste, and enhancing local capabilities. Examples of guiding questions included how to extend the shelf life of fish, how to increase the attractiveness of fish products, and how to create more value from existing resources within the local context. These questions served as starting points for the brainstorming process, allowing for a broad exploration of potential solutions while remaining grounded in the identified needs and insights.

4.3.1.2 Brainstorming

A brainstorming session was conducted to explore possible solutions to the formulated HMW questions. The process generated a wide range of ideas related to fish processing, preservation methods, product innovation, service concepts, and knowledge transfer. Examples of ideas included, but not limited to, are fish powder, flavored dried fish, solar drying solutions, fish samosas, cleaning and gutting services, delivery concepts, and cooking or knowledge-sharing initiatives.

This divergent ideate phase resulted in a broad pool of potential solutions addressing different stages of the fish value chain. To facilitate evaluation, the ideas were grouped into broader thematic categories based on their primary function. The first being value-added fish products that focused on increasing the value of fish through new products or improved processing methods, such as fish powder, dried fish variations, and fish samosas. Second one is service innovations that include concepts related to fish handling, preparation, and distribution, such as cleaning and gutting services, delivery solutions, and recipe-based offerings. Third one being value-chain efficiency through improvements aimed to reduce waste and improve handling practices, including early sorting, improved drying methods, and communal processing solutions.

4.3.1.3 Idea Selection

Following the brainstorming, the generated ideas were evaluated and selected using the DFV framework as presented in Table 4.3 . This framework was used to assess the potential of each concept from three complementary perspectives.

Desirability refers to the extent to which the solution addresses user needs and is perceived as valuable and relevant by the community. Feasibility concerns whether the solution can be realistically implemented given available resources, skills, and local conditions. Viability relates to the economic sustainability of the solution, including its potential to generate income or be maintained over time.

Based on the DFV evaluation, several concepts showed strong potential. The final selection was therefore not based on DFV scores alone, but also on further desk research and the perceived fit between each concept and the local context. Four concepts were selected for further development: fish powder, fish samosas, raised solar drying racks, and solar tent dryers.

These concepts were chosen because they represented different forms of value creation within the fish value chain. Fish powder and raised drying racks represented low-cost, incremental improvements based on existing practices and locally available resources. Fish samosas represented a value-added product opportunity with potential for local income generation and consumer acceptance. Solar tent dryers were included despite lower feasibility because desk research indicated stronger preservation potential and because the concept could enable shared, collective, or service-based drying models.

Table 4.3: Evaluation of generated ideas using the DFV framework, where H = high, M = medium, and L = low.

Idea	Desirability	Feasibility	Viability
Fish powder	H	H	H
Fish samosas	H	H	H
Flavoured dried fish	H	H	H
Solar tents	H	M	H
Drying racks	H	H	H
Cleaning & gutting service	L	H	H
Fish delivery	M	M	M
Communal freezers	H	L	M
Recipe kits	M	H	M

Source: Fieldwork by researchers.

4.4 Prototyping Phase

In this study, the term prototype is used to refer to early-stage and low-fidelity representations of potential solutions. Since the fieldwork was limited in time and implementation was outside the scope of the study, several of the prototypes should be understood as conceptual prototypes rather than fully tested products. Their purpose was to explore contextual relevance, feasibility, and potential social value, rather than to evaluate long-term adoption or technical performance.

The prototyping phase involved both developing and testing selected concepts. In line with the design thinking process, this phase included a divergent step, where the selected ideas were translated into prototype forms, and a convergent step, where the prototypes were evaluated through user feedback and expert input.

The selected concepts were first developed through desk research, conceptual visualization, and contextual adaptation based on findings from the empathy and define phases. This allowed different ways of shaping and implementing each concept to be explored. The process then became more convergent as the prototypes were assessed in relation to perceived relevance, feasibility, adoption potential, and barriers to implementation.

Physical prototyping was conducted for the fish samosa concept through a street-based taste test, while the remaining concepts were assessed as conceptual prototypes through desk research and feedback.

4.4.1 Prototype Development

The prototype development step focused on translating the selected concepts into more concrete solution proposals. Each concept was further developed through desk research and then adapted to the local context based on empirical findings from the fieldwork. This included considering available materials, existing skills, current food preparation and preservation practices, market access, affordability, and potential ownership or implementation models.

4.4.1.1 Selected Concepts

The following section presents the four selected concepts and describes how each was developed through desk research before being contextualized in relation to the local conditions observed in Linga Linga.

Fish Powder

One prototype explored the production of fish powder as a method for improving the utilization of small fish and fish by-products while increasing the nutritional value of local diets as illustrated in Figure 4.2. According to FAO guidelines (Food and Agriculture Organization of the United Nations (FAO), 2016), fish should first be thoroughly dried to reduce moisture content and prevent microbial growth. Drying can be performed using solar drying for approximately one to three days, depending

on weather conditions and fish size. Complete drying is essential, as insufficiently dried fish can spoil during storage. After drying, the fish are manually processed using a pestle and mortar to grind the dried material into smaller particles. The ground material is then sieved to obtain a fine powder suitable for culinary use (Food and Agriculture Organization of the United Nations (FAO), 2016).

Fish powder production allows the use of small fish species or fish parts, including bones, heads, and viscera, which are often discarded or underutilized in traditional processing systems. This approach therefore contributes to reducing fish waste while retaining valuable nutrients. The resulting powder is rich in protein, calcium, and micro-nutrients, as bones are included in the grinding process (Food and Agriculture Organization of the United Nations (FAO), 2016).

The final product can be stored for extended periods compared to fresh fish and incorporated into commonly consumed foods. Fish powder is typically added to dishes such as maize porridge, cassava-based meals, soups, or sauces, where it functions as a nutrient-dense ingredient that improves the protein content of meals without requiring major changes to existing cooking practices. Because the process relies on sun drying and manual tools, the production costs remain low and the technique can be implemented at household or small-scale entrepreneurial levels (Food and Agriculture Organization of the United Nations (FAO), 2016).



Figure 4.2: Conceptual visualization of the fish powder production process, based on fieldwork findings and supported by literature on fish powder production.

Source: Authors' own illustration based on fieldwork data and FAO (2016). Visual illustration generated with support from OpenAI. (2026). ChatGPT [Large language model]. <https://chatgpt.com/>

Fish samosas

Another prototype presented by Figure 4.3, explored the development of fish samosas as a value-added fish product that could be produced and sold locally. Fish samosas represent a simple processed food that combines fish with commonly available ingredients such as flour, onions, and spices. The product is widely consumed as a street food in several African countries and has been identified as a potential way to increase the value of small fish and fish by-products (Kyule et al., 2014).

The preparation process typically involves several steps. First, fish is cleaned and cooked to produce a filling mixture. The cooked fish is then combined with chopped vegetables, spices, and seasoning to form a flavored filling. Dough is prepared separately using wheat flour, water, and oil. The dough is then rolled into thin sheets and cut into triangular shapes. The fish filling is placed inside the dough, after which the samosas are folded and sealed before being fried in hot oil (Kyule et al., 2014).

Fish samosas offer several advantages as a value-added product. Processing fish into prepared foods allows producers to diversify the forms in which fish can be consumed and sold. The product can also utilize dried fish or fish powder as an ingredient, which enhances flavor while improving the utilization of available fish resources. Studies have shown that consumers respond positively to fish-based snack products such as samosas due to their taste, convenience, and familiarity as a street food (Kyule et al., 2014).



Figure 4.3: Conceptual visualization of the fish samosas production process, based on fieldwork findings and supported by literature on fish samosas production.

Source: Authors' own illustration based on fieldwork data and Kyule et al (2014). Visual illustration generated with support from OpenAI. (2026). ChatGPT [Large language model]. <https://chatgpt.com/>

Solar drying racks

A third prototype focused on improving traditional fish drying practices through the use of raised solar drying racks as visualized in Figure 4.4. In many small-scale fisheries, fish are commonly dried directly on the ground or on bare surfaces, which exposes the product to contamination from dust, sand, insects, and animals. These conditions can reduce product quality and increase post-harvest losses (Food and Agriculture Organization of the United Nations (FAO), 2014).

Raised drying racks represent an improved drying technique that enhances airflow and reduces contamination. The rack structure typically consists of a wooden frame supported by vertical wooden legs, with a mesh or netting surface on which the fish are placed. FAO guidelines recommend that racks elevate the fish approximately 1 meter above ground level, which significantly improves air circulation around the product (Food and Agriculture Organization of the United Nations (FAO), 2014).

For optimal performance, racks should be located in open areas with good air circulation and relatively low humidity. In some cases, the rack surface may be installed with a slight slope, allowing better airflow and drainage during the drying process. When fish are raised above ground level, drying can occur from the upper, lower, and lateral surfaces simultaneously, which increases drying efficiency (Food and Agriculture Organization of the United Nations (FAO), 2014).

Under favorable conditions, solar drying on raised racks can significantly reduce drying time. According to FAO guidance, fish dried on elevated racks with sufficient airflow may reach adequate dryness in approximately 6–10 hours at an ambient temperature of around 42°C, although larger fish may require longer drying periods. Smaller fish may dry more rapidly under the same conditions (Food and Agriculture Organization of the United Nations (FAO), 2014).

Additional protective measures can further improve the drying process. Fish should be covered with tarpaulins or placed under shelter during nighttime or rainy periods to prevent moisture absorption. By reducing contamination and improving drying efficiency, raised racks can lead to higher-quality dried fish products with improved shelf life and potentially higher market value (Food and Agriculture Organization of the United Nations (FAO), 2014).

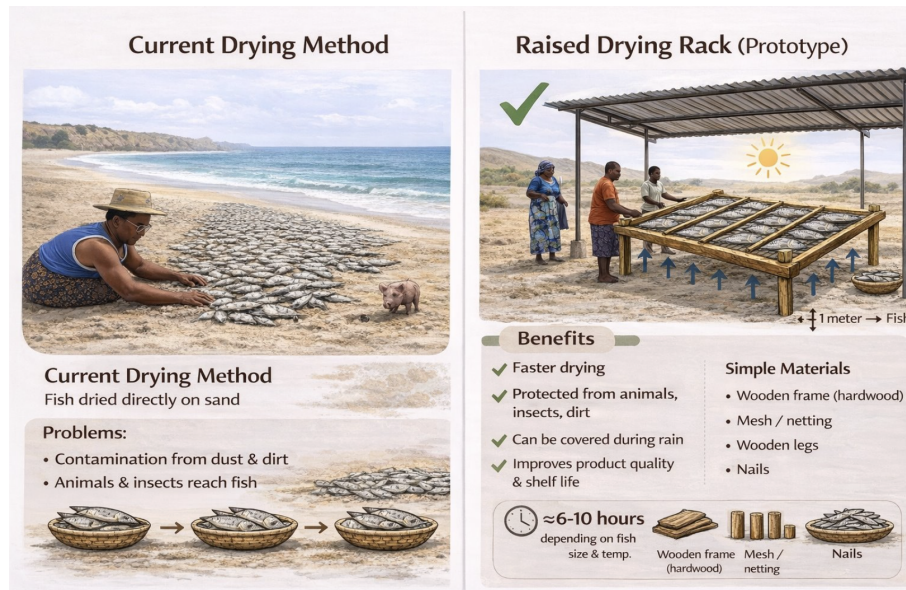


Figure 4.4: Conceptual visualization of the fish drying rack, based on fieldwork findings and supported by literature on fish drying methods.

Source: Authors' own illustration based on fieldwork data and FAO (2014). Visual illustration generated with support from OpenAI. (2026). ChatGPT [Large language model]. <https://chatgpt.com/>

Solar tents

A fourth prototype explored the use of solar tent dryers as an improved fish preservation technology presented in Figure 4.5. Solar tent dryers create a controlled drying environment that protects fish from contamination while accelerating the drying process. Unlike traditional sun drying, where fish are exposed directly to the environment, solar tent dryers enclose the product inside a semi-covered structure made from a wood, or metal, frame covered with transparent polyethylene sheets (Nagoli et al., 2020).

The drying system functions through a greenhouse effect. Solar radiation passes through the transparent plastic covering, increasing the temperature inside the tent while allowing moisture to escape through ventilation openings. This creates a warm and relatively dry environment that improves drying efficiency. According to previous research, solar tent dryers can reduce drying time by more than 50% compared to traditional open-air drying methods (Nagoli et al., 2020).

The structure typically consists of a simple frame constructed from wooden poles or metal rods. Inside the structure, mesh trays or drying racks are installed to hold the fish during drying. The entire structure is then covered with UV-treated polyethylene sheets, which allow sunlight to enter while protecting the product from rain, dust, and insects. In one example implementation, approximately 7.5 m² of polyethylene sheeting with a thickness of around 200 micrometers was used to construct the drying enclosure (Nagoli et al., 2020).

Several benefits are associated with this drying method. The enclosed structure protects fish from insects and animals, reduces contamination from dust and sand, and creates more consistent drying conditions. These improvements can extend the shelf life of dried fish products from approximately three days to up to seven weeks, depending on storage conditions (Nagoli et al., 2020).



Figure 4.5: Conceptual visualization of the solar tent dryer, based on fieldwork findings and supported by literature on fish drying methods.

Source: Authors' own illustration based on fieldwork data and Nagoli et al (2020). Visual illustration generated with support from OpenAI. (2026). ChatGPT [Large language model]. <https://chatgpt.com/>

4.4.1.2 Contextualized prototypes

The prototypes were developed through a combination of empirical findings from the field study and supporting desk research, and subsequently adapted to reflect locally observed practices, constraints, and resource availability.

Fish powder

In the fish powder, drying remains a central step but can be improved through the use of raised surfaces where available. Once dried, the fish can be processed using locally available wooden pestles and mortars, which are commonly used for grinding food products (Interview 5, 2026; Observations, 2026). The sieving process can be performed using palm-leaf sieves that are produced locally (Interview 5, 2026; Observations 2026).

For storage, the resulting fish powder can be kept in reused plastic bottles or other

available containers, which are commonly observed in the local environment. This enables low-cost storage while extending the usability of the product compared to fresh fish. Production is expected to take place at the household level or in small groups, using existing cooking and preparation spaces. This adaptation requires minimal behavioral change and relies entirely on tools and practices already present in the community (Observation data, 2026).

At a larger scale, the prototype presents opportunities for further development. An upscaling of production could involve the introduction of small-scale grinding machinery to increase efficiency and output. This would enable more consistent production volumes and potentially support the establishment of local micro-enterprises. Such an expansion could create additional employment opportunities within the community and allow distribution beyond the village. In particular, fish powder could be transported and sold to inland areas where access to fresh fish is limited, thereby extending both the economic and nutritional impact of the product.

Fish samosas

The Preparation of the fish samosas can take place in household cooking areas using open-fire stoves, cooking pots, and basic utensils already in use (Observation data, 2026). The filling can be produced using locally available fish combined with commonly used ingredients such as onions and spices (Personal communication, 2026). Additional ingredients, such as carrots, may also be incorporated depending on availability, allowing for variation in the product. Furthermore, the concept is not limited to fish, as other types of meat could be used, increasing flexibility and adaptability to local resource conditions (Personal communication, 2026).

Data indicate that fish samosas are already produced and sold in nearby areas such as Maxixe (Observation data, 2026; Personal communication, 2026). This suggests that the product is culturally familiar and has an established market acceptance within the region. As such, multiple implementation pathways are possible. Samosas could be transported and sold in Linga Linga by existing producers, or knowledge transfer could occur through training, enabling local women to produce and sell the product themselves. Alternatively, individuals in the community may independently replicate the product based on exposure and informal learning.

Production can be integrated into existing informal market structures, with sales taking place along roads, near households, or in small local markets (Observation data, 2026). By building on familiar cooking techniques and an already established product concept, the prototype reduces barriers to adoption while offering opportunities for small-scale income generation.

Solar drying racks

The solar drying rack prototype was adapted as an incremental improvement to current drying practices. Instead of drying fish directly on sand (Observation data, 2026), the prototype introduces a raised structure constructed from locally available wooden poles and simple mesh or netting. The racks can be built using basic

construction skills observed within the community and placed in open areas where drying already occurs, such as near the beach or household compounds (Observation data, 2026).

Further, the racks can be covered during periods of rain or high humidity, for example using tarpaulins or other available materials, which helps prevent reabsorption of moisture and reduces the risk of spoilage. Construction and use of the racks can be carried out individually or collectively, depending on resource availability and social organization within the community.

The drying process itself remains unchanged in principle, ensuring that the prototype builds on existing knowledge while improving efficiency and product quality. The resulting dried fish can be stored for longer periods compared to fresh fish, providing an alternative to refrigeration, which is largely unavailable in the local context. This also facilitates further processing into value-added products, such as dried fish products or fish powder.

Solar tent

The solar tent prototype represents a more advanced adaptation of existing drying practices, introducing an enclosed drying environment while maintaining reliance on solar energy. The structure can be constructed using a simple wooden frame combined with transparent plastic sheeting, materials that are either accessible through nearby markets or imported. Inside the structure, fish can be placed on racks or mesh surfaces similar to those used in the drying rack prototype.

To enhance feasibility, the structure can be implemented in smaller-scale formats, allowing individual users or households to test the concept with limited resources. Such smaller units can function as pilot implementations, reducing risk and enabling gradual adoption.

At a larger scale, the prototype also allows for more collective or service-based arrangements. For example, solar tents could be shared within the community, rented out, or managed by individuals who provide drying services to others. This creates flexibility in ownership and use, enabling both individual and collective models depending on local preferences and resource availability.

Despite representing a more advanced solution, the solar tent remains grounded in familiar drying principles and can be integrated into existing processing activities while offering potential improvements in efficiency, hygiene, and storage capability.

4.4.2 Prototype Testing

The developed prototypes were evaluated through street-based taste test and a semi-structured interview with Interviewee 6. The evaluation focused on perceived relevance, feasibility, adoption patterns, and potential social implications of the proposed solutions. The findings are presented below as key themes identified across both community and expert perspectives.

4.4.2.1 Adoption & Diffusion

The findings indicate that adoption of new solutions in Linga Linga is not immediate and does not primarily depend on clearly articulated needs. Adoption instead appears to be driven by observation and imitation. Individuals are generally a bit reluctant to initiate new activities independently and prefer to adopt solutions once they have been demonstrated as successful (Interview 6, 2026).

As expressed in the interview, “People don’t want to be the first... they let someone else do it and then copy them.” (Interview 6, 2026). This suggests that innovation follows a sequential process in which one actor initiates an activity, and others follow once its viability becomes visible (Interview 6, 2026).

Visible success, such as consistently selling out products, was described as a key driver for replication. When individuals observe that a product generates income, they are more likely to imitate the activity. This mechanism was illustrated through an example of bread production in the village where initial introduction led to replication after its commercial success (Interview 6, 2026).

4.4.2.2 Perceived Relevance and Value Creation

The evaluation suggests that the perceived relevance of solutions will reveal after exposure. The respondent indicated that individuals are generally satisfied with existing practices and do not actively seek alternatives. However, once new products or practices are introduced, they may become desirable and integrated into everyday life (Interview 6, 2026).

This pattern was supported by the results of the fish samosa taste test conducted within the community. The findings indicate a generally positive reception. According to the translator, “almost all people said that the samosas are very good” (Interview 5, 2026), suggesting strong acceptance of the product. Participants also highlighted the combination of ingredients, noting that the samosas were appreciated “because they were made with onion, fish, carrots, and spices.” (Interview 5, 2026).

In addition, participants demonstrated familiarity with similar products such as samosas with alternative fillings, which indicates that the concept aligns with existing food practices. These findings indicate that value is constructed through interaction and experience rather than identified in advance, and that exposure plays a key role in shaping perceived relevance (Interview 6, 2026).

4.4.2.3 Feasibility and Barriers to Implementation

Several barriers to implementation were identified during testing and expert evaluation. First, risk aversion emerged as a central behavioral constraint. Individuals were described as hesitant to engage in unfamiliar activities due to fear of failure, economic loss, and potential social consequences. As expressed in the interview, “People don’t want to be the one who fails” (Interview 6, 2026). This suggests that

adoption depends not only on the usefulness of a solution, but also on whether it can be introduced with limited personal risk.

Feasibility was shaped by access to materials and infrastructure. Solutions relying on locally available tools, skills, and resources were perceived as more realistic, while concepts requiring externally sourced materials were considered more difficult to implement. For example, plastic structures for solar tent dryers were described as more challenging due to limited local availability and dependence on external markets (Interview 6, 2026).

Practical constraints such as time, labor, and technical execution were identified as important. Many individuals balance household responsibilities with income-generating activities, which limits the time available for additional processes. In fish preservation, proper drying was also described as critical, as moisture during nighttime or rainy periods could reduce product quality and increase the risk of spoilage (Interview 6, 2026).

Affordability influenced the viability of value-added products. Although the fish samosas were positively received, participants explained that purchasing would depend on daily income availability. As stated during the taste test, “we would like to buy always, but because of money we would buy on the days we have money” (Interview 5, 2026). This indicates that demand may exist, but products must fit within irregular and small-scale spending patterns.

4.4.2.4 Entrepreneurial Actors and Social Dynamics

The findings suggest that adoption is likely to be driven by specific individuals rather than by the community as a whole. According to the local expert, younger women may be particularly well positioned to initiate new activities, as they were described as having greater exposure to education, external influences, and digital media (Interview 6, 2026). At the same time, limited safety nets reduce willingness to take risks, even when opportunities are identified.

The findings also indicate that economic activities are often organized individually, although some forms of collaboration exist. Sustained cooperation was described as challenging when differences in effort, skill, or contribution create tensions in collective arrangements. However, activities involving clearly divided or sequential tasks may be more suitable for collaboration, suggesting that cooperative models require clear roles and perceived fairness to function effectively (Interview 6, 2026).

4.4.2.5 Role of the External Support

External support was identified as important for initiating new activities. Demonstration, training, and initial facilitation were described as key enablers of adoption, particularly because individuals may be reluctant to be the first to test an unfamiliar solution. Once a solution has been demonstrated and proven locally, it may spread more organically through observation and imitation (Interview 6, 2026).

4.5 Social Innovation Contribution of the Proposed Solutions

To operationalize the social innovation framework in the analysis, the three dimensions were translated into empirical indicators. Addressing human needs was assessed through whether the solutions responded to practical needs such as food preservation, nutrition, income generation, and reduced waste. Changes in social relations were assessed through whether the solutions could influence collaboration, roles, market interactions, or collective practices. Empowerment and agency were assessed through whether the solutions could strengthen local control, build on existing skills, reduce dependency on external actors, or increase women's ability to act on economic opportunities.

The comparison presented in Table 4.4 should be understood as an interpretive assessment of the proposed solutions' potential contribution to social innovation, rather than as a measurement of actual long-term impact. Since the prototypes were not implemented over time, the analysis focuses on how the concepts may contribute to the three dimensions of social innovation based on fieldwork findings, prototype testing, and expert feedback.

Table 4.4: Comparison of developed prototypes based on social innovation dimensions.

Dimension	Fish samosa	Fish powder	Solar drying rack	Solar tent
Human needs	High desirability and acceptance. Purchase limited by income availability.	Addresses preservation, nutrition, and waste using existing resources.	Improves drying efficiency and hygiene compared to current practices.	Extends shelf life significantly but requires additional resources.
Social relations	Potential for imitation-based diffusion. May enable informal collaboration.	Mainly individual or small-scale production with limited relational change.	Fits existing individual practices; minimal change in social structure.	Potential for shared use, requiring coordination and collective organization.
Empowerment & agency	Requires initiative and risk-taking; likely driven by specific individuals.	High accessibility; low-cost and builds on existing skills and tools.	Moderate accessibility; simple improvement of existing methods.	Lower accessibility due to cost, materials, and perceived complexity.
Barriers	Cost of ingredients, time investment, and financial constraints.	Risk of improper drying and spoilage due to moisture.	Exposure to weather, animals, and environmental factors.	Material access, cost, complexity, and fear of failure.
Adoption pattern	Requires initial actor; spreads through observation and imitation.	Likely gradual uptake due to simplicity and familiarity.	Incremental adoption due to similarity to current practices.	Requires external initiation and demonstration.
Social innovation potential	Medium–high	High	Medium–high	Medium

Source: Fieldwork by researchers.

4.5.1 Human Needs

The first dimension to be understood is human needs, the needs identified in the developed solutions relate to fish preservation, resources used, access to food and income generation. Survey result show that fish is eaten frequently in Linga Linga. It is consumed every day or several times a week. But the shelf life is described as about one to three days (Questionnaire, 2026). Therefore there is a need for improved preservation of fish. Observations strengthen that fish is important both as food source and as a part of the local economy. Techniques used for preservation is fish drying but the observed practices are limited by exposure to sand, insects, and weather conditions. Another constraint is that fish is handled in open environments with basic tools (Observation data, 2026). In the workshop synthesis above, improved preservation as a need was also reflected in patterns related to spoilage, limited storage, and importance of making more out of what is available.

The fish powder and drying-solutions address practical needs more directly than the samosa solution. In the interview with the local leader, fish powder was described as relevant because “everyone likes fish” and because people already complain that they cannot freeze fish (Interview 6, 2026). He also explained that the idea is simple, cheap, and based on practices people already know, such as drying, pounding, and sieving. Also the raised drying rack was considered relevant because it improves a process that already exists and makes drying faster and cleaner. In addition, it still relies on techniques that are not far from current practice (Interview 6, 2026; Observations, 2026). These solutions therefore address needs linked not only to preservation, but also to reducing waste and extending the value of an already central resource.

The solar tent addresses the same underlying need, but in a more technically advanced way. While it offers stronger preservation potential, it was described as “a bit advanced” in the final interview because of the material plastic requirement and the difficulty of sourcing specific materials locally (Interview 6, 2026). Although the solution might respond to some practical need, it is dependent on external support and adaptation.

The fish samosa differs from the other solutions because it does not primarily address preservation. It instead create value addition and food enjoyment. The taste test showed very positive reactions. Almost all participants described the samosas as very good and said they would buy them if available in Linga Linga (Interview 5, 2026). On the other side the participants also explained that they would not be able to buy them every day due to limited money, even if they wanted to. This suggests that the samosa addresses a different type of need that is not basic preservation, but access to a desirable and more varied fish-based product that fits within occasional everyday spending.

An important result across the interview material is that needs are not always expressed as problems. Interviewee 6 repeatedly described people as generally satisfied with what they already have, and argued that value often becomes visible only after a solution has been introduced and shown to work (Interview 6, 2026). They illus-

trated this through an example of bread in the village. Bread was not an expressed need before it became available. When it became available however, people began to buy it regularly. This suggests that addressing human needs is not only about solving clearly articulated problems, but also about introducing solutions that become meaningful through use and exposure.

The strongest potential contribution to addressing human needs lies in solutions that improve the use, storage, and value of fish. It should be in ways that are simple, affordable, and compatible with existing practices. Fish powder and improved drying techniques are especially relevant, while fish samosas respond more to value addition and consumer desirability than to preservation itself.

4.5.2 Changes in Social Relations

The developed solutions could influence the social relations in Linga Linga, but mainly in incremental rather than transformative ways. Across the interview material, adoption was not described as a process driven by formal planning or collective decision-making, but by observation, imitation, and visible proof of value. Interviewee 6 (2026) explained this repeatedly by stating that people do not want to be the first to try something new, but instead let someone else test it and then copy it if it works (Interview 6, 2026). This pattern suggests that new solutions spread socially, but through imitation rather than organized collective innovation.

This has implications for all four solutions. The results suggest that fish powder, raised drying racks, and fish samosa are more likely to spread if one actor starts successfully and others then follow. Interviewee 6 described this as a domino-like process, where one person shows that a product works, after which others become interested in doing the same (Interview 6, 2026). In this sense, the solutions may contribute to changes in social relations by creating new forms of imitation, visibility, and inspiration within the local economy.

At the same time, the findings indicate that collective organization is complex. In the workshop synthesis and observations, community life was described as social and interconnected, with people spending time together outdoors, women often working alongside one another, and some activities already organized in groups (Observation data 2026). However, interviewee 6 also emphasized that cooperative models do not always function well over time. Referring to local bag production, they explained that collective work becomes difficult when people perceive that effort and quality differ, for example when one person is better or faster than another but the reward is shared equally (Interview 6, 2026). This suggests that while collaboration exists, it is not automatically stable in economic activities.

This is particularly relevant for the solar tent. Among the solutions, the solar tent most clearly opens up for shared or communal use. Interviewee 6 suggested that such a structure could create curiosity, community use, and even a sense of pride if introduced through a communal model (Interview 6, 2026). They compared it to women's gardening plots, where each person has her own area but still works in a shared social environment. In that sense, the solar tent could potentially sup-

port new forms of interaction, especially among women, if organized in a way that combines shared space with individual ownership or clear task division.

The drying rack may also affect social relations, but in a more limited way. Interviewee 6 described it as something that could fit with existing behavior, where each woman could have her own section or use her own setup while still working in proximity to others (Interview 6, 2026). This indicates that the rack aligns more with parallel cooperation than with full collective work.

For fish samosas, the results suggest a somewhat different social dynamic. Because the product is new in Linga Linga but familiar in nearby markets, its introduction may create visibility and curiosity. Interviewee 6 argued that selling something new in the village could make people start thinking beyond the current practices where many continue doing the same established activities, such as selling coconuts or making bags (Interview 6, 2026). They also suggested that certain parts of the samosa process could potentially be divided among several women, such as filling, folding, and frying, which may make it more suitable for cooperative organization than some other products. At the same time, they were also clear that such collaboration would only work if roles were perceived as fair and useful.

The findings suggest that the solutions do not fundamentally transform social relations, but they do have the potential to create new patterns of imitation, small-scale cooperation, and visibility around alternative income generating activities. Change in social relations therefore appears possible, but mainly through slow introduction, social proof, and collaboration rather than through major structural change.

4.5.3 Empowerment and Agency

The solutions vary in their potential to strengthen empowerment and agency, depending on how accessible, risky, and controllable they are within the local context. Empowerment was not mainly described in terms of formal participation or institutional influence, but in terms of whether people feel able to try something, manage it themselves, and gain some benefit from it (Interview 6, 2026).

A central result is that willingness to act is strongly shaped by risk. Interviewee 6 repeatedly explained that people are hesitant to try new things because they do not want to fail, be laughed at, or lose scarce resources (Interview 6, 2026). They explained that there is little protection if a new activity goes badly, and that this makes people hold on to familiar behaviors. This was also reflected in the notes following the interview, where lack of safety nets, low risk tolerance, and the importance of support structures such as loans or external help were highlighted as barriers to entrepreneurial action.

This means that solutions that are simple, low-cost, and close to current practice appear to have the strongest empowerment potential. Fish powder was described by interviewee 6 as particularly promising because it is easy, cheap, and based on techniques people already use, such as drying fish, pounding products, and sieving powder (Interview 6, 2026). They also suggested that it may involve less work for

women than the current transport chain, since fish can be processed locally rather than carried and sold over distance. This indicates that fish powder may strengthen agency by allowing individuals to make more use of their existing resources with relatively low additional risk.

The raised drying rack also appears relatively accessible in this regard. According to interviewee 6, it is not far from what people already do, since some already build raised surfaces to dry fish on (Interview 6, 2026). Because the rack can be made with simple local materials and does not require specialized inputs, it is more within individual reach than the solar tent. The main benefit here is not that it radically changes the activity, but that it improves an existing one. This type of incremental change seems more compatible with local conditions and therefore more likely to support practical agency.

The solar tent offers a different picture. While it may have strong technical benefits, interviewee 6 repeatedly described it as more advanced and dependent on materials that are not easily available locally, especially the plastic sheeting (Interview 6, 2026). They also stressed that even if people are capable of building things, they may not want to use or adopt something unfamiliar if the perceived risk is too high. This makes the solar tent more dependent on external actors, demonstration, and possibly longer-term project support. As a result, its potential contribution to empowerment appears weaker at the individual level, at least in the short term.

For fish samosas, empowerment potential is tied more directly to entrepreneurship and local market participation. interviewee 6 linked this solution particularly to young women. Women around 24 to 28 years old would be the most likely to start something new because they have somewhat more schooling than older generations, more exposure to the outside world, and potentially a stronger drive to try new activities (Interview 6, 2026). At the same time, they also emphasized that this would require someone to start first and prove that the product sells. This means that the solution can support agency, but only where there is both visible opportunity and a manageable level of risk.

The interview material also points to a more gendered aspect of empowerment. Interviewee 6 suggested that women are often better positioned than men to use income in ways that support household well-being, for example food, school costs, and clothing, while men were described as more likely to spend money on other things (Interview 6, 2026). Although this is one actor's perspective and should be treated carefully, it does indicate that income-generating opportunities for women may have broader household effects. At the same time, the findings do not suggest that the solutions would fundamentally change women's position in society. Rather, the likely effect is more modest: more room to save, buy needed goods, or gain some additional independence through earnings.

Empowerment in this context is not primarily about radical transformation, but about whether a solution enables people, especially women, to act with lower risk and greater practical control. Solutions that are easy to understand, cheap to start, and close to existing routines appear to have the strongest potential in this respect.

4. Results

Fish powder and improved drying methods therefore show greater alignment with local agency than more technically demanding options such as solar tents, while fish samosas appear to offer a more entrepreneurial but also more market-dependent pathway.

5

Discussion

In this chapter, findings from the research are discussed in connection to theoretical perspectives and the research questions that guided the research. This study focused on exploring ways through which design thinking could be used to foster value creation for women entrepreneurs along the small-scale fisheries value chain in Linga Linga, Mozambique, as well as the extent to which the suggested solutions could foster social innovation.

The findings show that the design thinking process enabled the identification of four contextually relevant solutions which are adapted to local needs and resource constraints: fish samosas, fish powder, drying racks, and solar tents. The developed concepts particularly contributed to addressing human needs through improved fish preservation, opportunities for value addition, and potential income generation. However, the findings also indicate that contributions to changes in social relations and empowerment and agency were more limited, reflecting the challenges of achieving broader structural transformation within a short-term and limited resources intervention.

Findings have been interpreted using perspectives related to design thinking, entrepreneurship, and social innovation. Trade-offs encountered during the process are also elaborated upon in this chapter, together with a presentation of a conceptual model explaining the integration of dimensions of social innovation into the design thinking process.

5.1 Design Thinking Outcomes

The design thinking process resulted in solutions aimed at addressing challenges in the local fish value chain. The final concepts, including fish powder, fish samosas, drying racks, and solar tents, are different approaches to reduce the impact of the existing conditions. According to the literature, solutions should be human-centered and context-fitting (Brown, 2008, 2009; Hasso Plattner Institute of Design at Stanford, 2010). The identified solutions demonstrate this, as they are derived from empirical insights of the local constraints, such as limited shelf life and existing processing methods.

5.1.1 Design Thinking Perspective

The strongest indication of a design thinking logic is the fact that the solutions build on the existing behaviors of Linga Linga, rather than creating external solutions that would require changes from the user, which reflects the view from Brown (2008, 2009) and Hasso Plattner Institute of Design at Stanford (2010). However, the findings indicate that this is not only due to the usage of design thinking, but also a consequence of the contextual constraints. In the context of the study, the constraints on economic resources and infrastructure directly affect the range of solutions that are feasible. Therefore, the solution space is implicitly directed towards incremental improvements, without the application of design thinking.

For example, the drying racks represent an incremental improvement to the existing drying practices, improving hygiene and efficiency without demanding large structural changes to the infrastructure and behavior. While this outcome can be seen as a successful usage the human-centered side of design thinking (Brown, 2008; Giacomini, 2014), the findings suggest more nuance. In this case, the incremental solution could be seen as good practice of design thinking but it could also show the transformative limitation of design thinking in a resource-constrained environment. This support the research by **Review_design thinking<empty citation>**, who says that design thinking works well for ambiguous and complex problems, but it does not necessarily provide disruptive outcomes. Instead, the findings suggest that the process is a tool to find incremental optimizations within the socio-technical systems.

Another aspect of how well the design thinking process works in such a context is the contextual feasibility of solutions. As discussed by Brown (2008), successful ideas are evaluated through feasibility, desirability and viability. Through the study, several solutions were identified that fulfilled the three aspects to different extents. This means that while many solutions may be relevant and desirable, the feasibility varied. Low-technology solutions, such as the drying rack, had a contextual feasibility due to it requiring only material and skills that already existed, which Fenn and Hobbs (2017) deems necessary for contextual feasibility. On the other hand, more demanding concepts, like the solar tent, could yield high performance but depended on external resources and knowledge. This shows that even though the design thinking process can provide a range of solutions for the context, there is tension between maximizing performance and adhering to contextual feasibility. Thus, the findings follow a similar reasoning to Brown (2008), as he mentions that an idea is only successful if it can adhere to all three dimensions. However, it also extends the view of Brown (2008), where feasibility, desirability and viability must be balanced. In a resource-constrained context, feasibility becomes more of a dominating factor, which implies that design thinking in turn functions as a tool for incremental changes rather than transformational innovation.

In addition to the contextual feasibility, the tension between desirability and affordability becomes important for the design thinking process in a resource-constrained environment. The taste tests and interviews indicate that certain solutions, particularly fish samosas, are highly desirable and positively received by the community.

But participants also emphasized that their ability to purchase such products is constrained by irregular income and limited financial resources. This suggests that desirability alone is not sufficient for adoption, as mentioned by Brown (2008). As highlighted by Bocken et al. (2014), viability is not only connected to value creation, but also to integrate it with social impact and sustainable economic activities. In this context, viability becomes linked with affordability and economic constraints, rather than long-term market potential. Similarly, Osterwalder and Pigneur (2010) discuss viability as the need for solutions that support continued operations, which in this case appears to be closely connected to the limited purchasing capabilities of customers.

These results also provide insight into the iterative nature of design thinking. While the process is generally described as iterative and exploratory (Brown, 2008; Hasso Plattner Institute of Design at Stanford, 2010), the time limited nature of the field study reduced the numbers of iterations that could be done. This indicates that while iteration is seen as an inherent feature of design thinking, it is dependent on the conditions of the research. If time and resources become constraints, the process risk becoming more linear than iterative, which may affect the robustness of outcomes.

5.1.2 Entrepreneurship Perspective

From an entrepreneurship perspective, the identified solutions can be analyzed in relation to how they affect the drivers behind entrepreneurship. The empirical findings in the study indicate that the women of Linga Linga primarily engage in necessity-driven entrepreneurial activities, as seen through the small-scale trading and immediate income generation from their daily activities. This reflects how necessity-driven entrepreneurship typically arises in contexts where income opportunities are limited (Alam et al., 2021). However, the findings also suggest that this kind of entrepreneurship is not static, but rather adaptive to changes in the local context.

The proposed solutions are largely built on existing activities rather than replacing them, which indicates that they operate within, rather than disrupt, the current entrepreneurial logic. By introducing improved preservation and processing techniques, the solutions contribute to enhancing the current livelihood strategies. These findings align well with innovation within BOP markets, where livelihood sectors often can benefit by increasing productivity (Paunov, 2013). For example, the new methods for drying fish and the production of fish powder allow for less time-urgent sales, thus increasing the stability of the business. In this sense, the solutions support improvements to necessity-driven entrepreneurship by reducing vulnerability and increasing the efficiency of the operations, rather than transforming it into opportunity-driven entrepreneurship. Such an outcome aligns with prior research which emphasizes that necessity-driven entrepreneurship is often related to subsistence rather economic growth (Dhahri et al., 2021; Omri et al., 2025). At the same time, this highlights an important point that while increased efficiency improves short-term stability, it can also reinforce existing structures rather than enable transformative change.

However, the outcomes could also indicate a possible shift towards more opportunity-driven entrepreneurship. By introducing processed products, such as fish powder and fish samosas, the entrepreneurs have the option of targeting new markets through differentiated products. This suggests a partial shift from survival-based activities towards more strategic value creation, which is associated with opportunity-driven entrepreneurship (Cervelló-Royo et al., 2020). The shift however, is more at the level of potential, and not realized change. The findings therefore could indicate a hybrid form of entrepreneurship which is based in necessity-driven context but introduces elements that are opportunity-driven.

The transition towards opportunity-driven entrepreneurship is limited however, and highly dependent on contextual conditions. Constraints such as infrastructure, limited market access and financial resources reduce the feasibility of scaling these opportunities. This supports the argument by Cervelló-Royo et al. (2020) that entrepreneurial behavior is not only dependent on individual agency, but also on structural conditions. Consequently, while the solutions do create possibilities, they still do not alter the underlying conditions that define necessity-driven entrepreneurship. Instead, they act as enablers in a constrained system, suggesting that a transition towards opportunity-driven entrepreneurship is gradual and conditional.

Another key factor identified in the findings is the tension between risk aversion and entrepreneurial opportunity. While the developed solutions create opportunities for increased value creation, their adoption is constrained by a reluctance to take risks. This reflects the importance of risk tolerance as a characteristic of entrepreneurs (Miller, 2020). In this context, risk aversion is not necessarily seen as an individual trait but a response to structural vulnerability, as limited financial resources and the absence of safety nets amplifies the consequences of failure. This aligns with previous research on necessity-driven entrepreneurship, where entrepreneurs are more likely to prioritize security over experimentation (Dencker et al., 2021).

The observed pattern of sequential adoption, where the entrepreneurs wait for others to succeed before experimenting with new activities, reinforces this dynamic. While this reduces the individual risk, it means that the diffusion of innovation and scalability is limited. As a result, opportunities identified through the design thinking process do not automatically translate into entrepreneurial action. This finding is consistent with Omri et al. (2025), who associates necessity-driven entrepreneurship with low scalability and low impact on the broader economic development.

In essence, the findings suggest that the solutions are in between the two drivers of entrepreneurship. They do not simply follow the status-quo, but they do not enable a full transition towards opportunity-driven entrepreneurship either. Instead, they show how incremental innovations can expand the scope of necessity-driven entrepreneurship while still remaining bounded by contextual constraints. This highlights an important implication that a shift towards opportunity-driven entrepreneurship may require more than individual solutions, it requires a structural change that reduces the limitations created by the local environment.

5.2 Interpreting Social Innovation

The results show that the three dimensions of social innovation are not equally achieved. This imbalance can be interpreted in relation to the conceptualization of social innovation by Moulaert et al. (2005, 2013), where social innovation extends beyond need satisfaction to include changes in social relations and empowerment and agency. While the developed solutions clearly address the first dimension, the latter dimensions require changes in social structures and institutional dynamics. As argued by Cajaiba-Santana (2014), these dimensions are embedded in broader social and institutional contexts, which are not easily influenced through isolated solutions.

The first dimension of addressing human needs is the most clearly fulfilled. This reflects innovation in BOP markets, where innovation improves living standards through addressing everyday needs in the community (Paunov, 2013). The developed solutions respond directly to practical and immediate challenges in the local context, particularly related to fish preservation, food security, and income generation. Empirical findings show that fish is a central resource in Linga Linga, but its short shelf life and limited preservation methods create inefficiencies and loss of value. Solutions such as fish powder and improved drying methods therefore demonstrate a strong alignment with identified needs, suggesting that the design thinking process has been effective in capturing and translating contextual challenges into relevant solutions. This suggests that the emphasis on empathy and contextual immersion enables the identification of both explicit and latent needs, which are then translated into tangible and feasible solutions (Hasso Plattner Institute of Design at Stanford, 2010), which is consistent with literature emphasizing need satisfaction as a core component of social innovation (Moulaert et al., 2005, 2013). From this perspective, design thinking demonstrates a clear advantage in bottom-of-the-pyramid contexts, where unmet needs are immediate and observable.

In contrast, the dimension of changes in social relations is less fully realized. The solutions largely build on existing practices and structures rather than transforming them. Economic activities remain primarily individual, and while some forms of collaboration exist, they are limited and context-dependent. The adoption patterns observed in the study, characterized by imitation rather than collective organization, further suggest that the solutions do not fundamentally alter how actors interact or organize themselves. Therefore the solutions still operate within existing structures and to change them there is a need for institutional or structural change in the society (Cajaiba-Santana, 2014).

Similarly, the potential for strengthening empowerment and agency appears constrained. Although several solutions are accessible and based on existing skills, individuals' willingness to act is limited by risk aversion and lack of resources because of low financial and institutional support. This indicates that the introduction of new solutions does not automatically lead to increased empowerment, as broader structural conditions continue to shape the ability of individuals to act.

The findings therefore suggest that the dimensions of social innovation do not necessarily develop simultaneously. Addressing human needs appears as a more immediate outcome, while changes in social relations and empowerment emerge more gradually and remain conditional. Rather than indicating that design thinking is unable to capture these dimensions, the findings instead point to differences in how and when they are realized. While the design thinking process effectively supports the identification and development of solutions that address immediate needs, its outcomes appear more limited in relation to relational and structural transformation within the time frame of the study. This reflects how social innovation extends beyond the satisfaction of needs to include changes in social relations and empowerment, which are often embedded in broader social and institutional contexts (Cajaiba-Santana, 2014; Moulaert et al., 2005). As a result, these dimensions are less immediately observed within early-stage innovation processes. The uneven development of social innovation dimensions is therefore not only related to the outcomes of the design thinking process itself, but also how solutions are shaped and realized within the local context. To further understand this imbalance, it is necessary to examine the practical trade-offs that influence which types of solutions emerge and how they develop over time.

5.3 Trade-offs and Tensions in Social Innovation

The uneven development of the three dimensions of social innovation identified in the previous section can be further understood through a set of underlying trade-offs shaping which solutions emerge, how they are adopted and which dimensions of social innovation are most likely to be realized within Moulaert et al.'s framework.

5.3.1 Feasibility versus Transformative Potential

A central trade-off identified in the study is between feasibility and transformative potential. Solutions such as fish powder and raised drying racks are highly feasible, because they build on existing practices, locally available materials, and familiar skills. This aligns with the empirical findings, where solutions closest to current behaviors were perceived as easier to adopt and more realistic to implement. This trade-off reflects broader observations in the literature, where design thinking has been associated with generating contextually feasible and desirable solutions, but has been critiqued for its limited capacity to address systemic and structural change (**Responsible__design thinking**; Brown, 2008; Cajaiba-Santana, 2014).

This trade-off can be further understood through the framework of desirability, feasibility, and viability (Brown, 2008). In resource-constrained contexts, feasibility becomes strongly tied to locally available resources and existing practices, which favors incremental adaptations over more transformative solutions. While such solutions are more likely to be adopted, they remain embedded within existing structures, limiting their capacity to contribute to broader social transformation. Instead more advanced solutions, such as the solar tent, introduce greater potential for change in how resources are processed and shared. But are on the other hand also perceived

as more complex, resource-dependent, and risky.

This trade-off helps explain why the dimension of addressing human needs is more readily fulfilled, while changes in social relations and empowerment remain limited. Solutions that are highly feasible tend to focus on immediate needs, but are less likely to transform underlying social structures.

5.3.2 Adoption versus Collective Transformation

A further trade-off identified in the study is between adoption and collective transformation. Solutions that are easily adopted at the individual level, such as fish powder and improved drying methods, require limited coordination and build on existing practices. This facilitates diffusion through imitation, as observed in the empirical findings, where individuals prefer to adopt solutions only after seeing others succeed.

While this pattern supports the spread of solutions, it does not necessarily lead to changes in how economic activities are organized or how actors interact. Instead, adoption remains largely individual, and collective forms of organization, such as cooperation or shared resource management, are limited. This suggests that solutions optimized for individual adoption primarily contribute to addressing human needs, while constraining the potential to generate changes in social relations and empowerment.

This trade-off reflects a broader distinction within social innovation between changes in individual practices and transformations in social structures. As argued by Moulaert et al. (2005, 2013), social innovation involves not only the satisfaction of needs but also the reconfiguration of social relations and collective processes. However, such transformations often require coordination, trust, and shared action, which are less likely to emerge from solutions designed for individual adoption.

While individual-level adoption enables incremental improvements, it may limit the potential for broader structural change. This highlights a tension where solutions that are easier to adopt and diffuse are also less likely to contribute to collective transformation, thereby reinforcing the uneven development of the dimensions of social innovation.

5.3.3 External initiation versus Local Ownership

The findings also reveal a tension between external initiation and local ownership. The results show that new solutions are unlikely to emerge independently within the community, as individuals are hesitant to be first movers. Adoption is instead dependent on external actors introducing and demonstrating new ideas, which aligns with the observed pattern of imitation-based diffusion.

At the same time, this reliance on external initiation creates challenges for local ownership. Solutions that depend on external resources, materials, or knowledge risk becoming difficult to sustain without continued support. While solutions that

rely on existing tools and knowledge, such as fish powder and drying racks, are more likely to be adopted and maintained independently. This suggests that while external actors are important for enabling innovation, long-term impact depends on the extent to which solutions can be internalized within local practices.

This tension is particularly relevant for the dimensions of social relations and empowerment. While external initiation enables the introduction to new solutions, limited local ownership constrains the extent to which these solutions contribute to social relations and increased agency. This aligns with the understanding of social innovation as a process that requires active participation and involvement of local actors, rather than the passive adoption of externally introduced solutions (Moulaert et al., 2005, 2013)

5.3.4 Short-term Improvements versus Long-term Transformation

Finally, the findings reveal a tension between short-term improvements and long-term transformation. The developed solutions clearly address immediate challenges, such as reducing spoilage, improving preservation, and enabling additional income generation. On the other hand there is limited evidence that these improvements lead to long-term changes in social relations, market structures, or entrepreneurial conditions. The solutions strengthen existing livelihood strategies rather than fundamentally transforming them.

This outcome is also influenced by the scope of the study. The design thinking process was carried out up to the stages of prototyping and early testing, while full implementation and scaling were not conducted. As a result, the findings primarily reflect the early stages of social innovation, where needs are identified and solutions are introduced.

Structural changes, such as shifts in social relations and increased agency, are more likely to emerge over time through continued use, adaptation, and integration of solutions. This suggests that the observed imbalance between the dimensions of social innovation is partly a result of the stage at which the process was studied. While the limited timeframe of the study constrained the ability to observe long-term effects, this also reflects the processual nature of social innovation. As argued by Cajaiba-Santana (2014), empowerment and changes in social relations emerge through ongoing interaction between actors and structures. Such transformations are therefore unlikely to be captured within short-term design processes focused on prototyping and early testing.

This trade-off reinforces the temporal differences between the dimensions of social innovation, where addressing human needs can be achieved in the short term, while changes in social relations and empowerment require longer-term engagement to materialize.

5.4 Theoretical Implications

The theoretical implications of this study are summarized in a conceptual model that illustrates how social innovation dimensions can be more explicitly integrated into the design thinking process. The conceptual model discussed in this section has been constructed through an interpretive analysis of the results with respect to the theoretical concepts related to design thinking and social innovation. The model is not proposed as a universally validated framework, but as an interpretive synthesis developed from the empirical findings and the theoretical perspectives used in this study.

This conceptual model has been generated on the basis of the findings that indicated unequal value creation in the different steps of the design thinking process in addressing various aspects of social innovation. Although the two first stages played a significant role in identifying unmet human needs, it became apparent that transformation in social relations and empowerment and agency were addressed insufficiently throughout the design thinking process. The model suggests ways to integrate these aspects into design thinking practice in resource-limited rural communities.

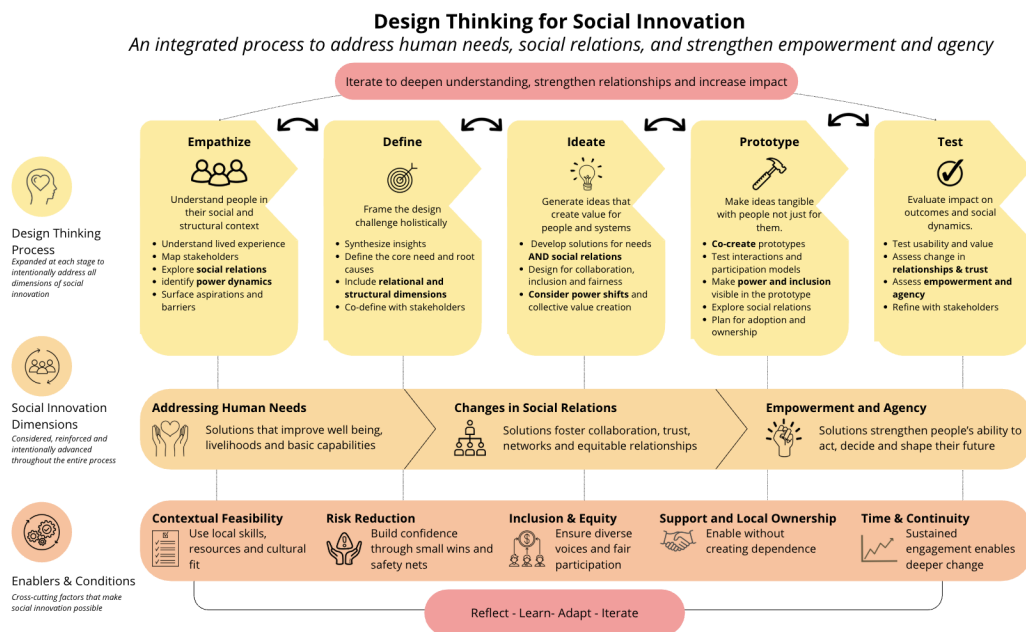


Figure 5.1: Visualization of conceptual model for capturing social value with Design Thinking.

Source: Authors' own illustration.

In the empathize stage, the focus is extended beyond individual users to understand people in their social and structural context. This begins with understanding lived experiences through traditional design thinking methods (Hasso Plattner Institute of Design at Stanford, 2010), but is expanded to include mapping of stakeholders, exploration of social relations, and identification of power dynamics. Particular em-

phasis is placed on surfacing aspirations and barriers to capture system-level needs rather than only individual needs. In the define stage, this understanding is translated into a holistic problem framing by synthesizing insights, identifying core needs and root causes, and explicitly incorporating relational and structural dimensions. Co-defining the challenge with stakeholders enables multiple perspectives to be included. As a result, problem framing shifts from an individual perspective toward a relational and systemic perspective. These stages contribute strongly to addressing human needs, while also creating the foundation for changes in social relations.

Building on this foundation, the ideation stage expands from generating functional solutions to designing for both people and systems. Solutions are developed not only to address needs, but to reshape interactions between actors through collaboration, coordination, and shared value creation. Emphasis is placed on inclusion, fairness, and the consideration of how power dynamics may shift through the proposed solutions. This stage initiates changes in social relations by moving beyond product or process improvements toward the reconfiguration of interactions between actors.

In the prototyping and testing stages, the focus is extended to evaluate both technical performance and social dynamics. As in traditional design thinking, ideas are made tangible, but here this is done with people rather than for them through co-creation. This includes testing interactions, participation models, and making aspects such as power and inclusion visible within the prototypes. Consideration of adoption and ownership is introduced early. In practice, this involves developing low-fidelity prototypes that not only represent the product or service, but also simulate interactions between actors.

Evaluation extends beyond usability and value to assess participation, behavioral change, trust, and collective interaction. Solutions are therefore refined not only based on functional performance, but also on their influence on relationships and social processes. Iteration between stages is emphasized when solutions do not produce the intended social effects, enabling continuous learning and adaptation.

Through these stages, solutions are developed that are contextually relevant, socially embedded, inclusive, and capable of contributing to transformation over time. The goal is to achieve sustainable improvements in well-being, while strengthening agency and empowerment for individuals and communities. The model further emphasizes that design thinking must be understood as an iterative process, where reflection, learning, and adaptation are continuous. Feedback loops enable insights to be captured and both solutions and processes to be refined over time, allowing the different dimensions of social innovation to reinforce each other.

Finally, the model highlights a set of key enabling conditions that support the realization of social innovation. These include the use of local resources, skills, and cultural fit to ensure contextual feasibility; building confidence through small wins and risk reduction; ensuring inclusion and equitable participation; balancing external support with local ownership to avoid dependency; and emphasizing time and continuity through sustained engagement. These enablers are critical for enabling deeper change and ensuring that solutions can be embedded within local practices

over time.

5.5 Practical Implications

For practitioners, such as NGOs and development organizations, the findings suggest that innovation efforts should prioritize solutions that are closely aligned with existing practices, resources, and skills. Solutions such as fish powder and improved drying methods demonstrate strong potential because they build on locally available knowledge and reduce the risk associated with adoption.

The results also indicate that implementation strategies must account for local adoption patterns. Since innovation spreads through observation and imitation, early demonstration and visible success are critical. Supporting initial actors who test and validate new solutions may therefore be more effective than introducing multiple solutions simultaneously.

At the same time, the findings highlight the importance of balancing external support with local ownership. While external actors play a key role in initiating innovation, long-term sustainability depends on the ability of individuals to adopt and manage solutions independently. Solutions that rely heavily on external resources risk limited long-term impact.

For similar rural and resource-constrained contexts, the study suggests that incremental improvements to existing practices may be more effective than introducing complex or technologically advanced solutions. Contextual feasibility and risk reduction appear to be more important than maximizing technical performance.

However, even though the results suggest solutions that mainly contribute to incremental improvements at a community and individual level, the practical implications may extend beyond immediate value creation. In the short term, the solutions offer a more efficient use of resources and increased income-generation for the female entrepreneurs in the fish value chain. In the long term however, these solutions can be seen as potential enablers for transformation. By strengthening the local economy, incremental increases in income stability can contribute to gradual improvements towards a more resilient micro-economy.

Over time, such improvements can act as supporting conditions towards a transition from survival-based, necessity-driven entrepreneurship to opportunity-driven activities. The increased income stability can lead to more investments locally towards education and skills development, while also allowing business expansion. Thus, the solutions has the potential to allow for increased empowerment and agency locally, rather than focusing on only income generation, which would indicate that social innovation dimensions mentioned by Moulaert et al. (2005), are found over time. Therefore, solutions should be evaluated on their capacity to initiate transformative cycles towards social development, instead of only the immediate impact. In the end, while the solutions reinforce the living conditions incrementally, their long term effects may become transformational through continuous efforts locally.

5.6 Limitations of the Study

This study highlights specific insights to its context on how design thinking can be used for value creation and social innovation for female entrepreneurs in Linga Linga. However, the findings should be interpreted in relation to several methodological and contextual limitations. First, the study was limited to eight weeks of field work. While this amount of time enabled an in-depth understanding of the context, it hindered iterations of the process. The nature of design thinking is grounded in iteration, where ideas can be tested and refined based on user feedback. While the process in this case could reach an initial testing phase, it did not allow for iterations thereafter. Therefore, the findings primarily reflect the early potential of the solutions, rather than long-term effectiveness or adoption over time. The time limitation is important, especially in the case of interpreting the feasibility and viability of the developed solutions. In this context, the study was able to assess whether the solutions were perceived as relevant and contextually feasible, but could not evaluate the actual performance of them. For example, the fish samosas could be assessed through initial testing, and the remaining solutions were assessed on contextual feedback. Thus, the conclusions on value creation and entrepreneurship should be viewed as indications of potential rather than evidence of proved impact.

Another limitation of the study is that part of the data collection relies on a small number of informants, especially the insights on social innovation and evaluation of solutions. Since these conclusions are drawn from a single expert interview, they should be viewed with caution. The interview contributes valuable information, but it cannot fully represent the diversity of views among the entrepreneurs and community members, nor is it validated through additional interviews. This affects how far the conclusions can be drawn regarding the evaluation of the solutions, and the impact on social innovation.

Further, the study is shaped by a qualitative and context-specific case study design. The empirical data was collected in Linga Linga, and nearby areas, meaning that the findings are closely related to the contextual conditions of this setting. While this strengthens the relevance for this context, it limits the possibility to generalize the findings to other rural communities. The study may provide insights that can be relevant for similar resource-constrained contexts, but they would need to be adapted to each new specific setting.

Another methodological limitation concerns the reliance on a local translator during parts of the data collection. Although this enabled participation across language barriers and supported contextual understanding, it also means that some meanings may have been filtered, simplified, or influenced through translation. This risk was partly mitigated through follow-up questions, observations, and comparison across different data sources, but it remains a limitation of the study.

Together, these limitations mean that the findings of the study should be viewed as an exploration of the potential role of design thinking for social innovation. Further research is therefore needed to validate the findings of the study and provide it with

more empirical data.

5.7 Future Research

Based on the findings of this study, there are several opportunities for future research. Since time was a limiting factor in this case, the analysis primarily focused on the earlier parts of the design thinking process. Therefore, there is limited insight into whether the solutions are adopted and generate measurable social value over time. Future research should use a longitudinal perspective to understand adoption rates and societal improvements over time. Such research would aid in understanding the long term impact of using design thinking in such a context. Additionally, it would also add to the robustness of these findings, and validate the long term effects discussed in the study.

Another area for future research is the ability of design thinking to contribute to more transformative forms of social innovation, moving beyond incremental improvements. The findings of this study indicate that while the solutions are contextually relevant and address human needs, their impact on broader structural changes is limited. Therefore, using the proposed model from this study, future research could explore the conditions under which design thinking can contribute to shifts in social relations, power structures, and institutional arrangements. This would provide the conceptual model with empirical testing, adding to its robustness, while also exploring the transformational opportunities of design thinking.

Lastly, future research is needed to increase the understanding of the transition from necessity-driven to opportunity-driven entrepreneurship in resource-limited environments. While the findings suggest that the developed solutions contribute to reduced vulnerability and improved efficiency, they also indicate that the incremental improvement simply expand the scope of necessity-driven entrepreneurship rather than transitioning into opportunity-driven. They further suggest that a shift towards opportunity-driven entrepreneurship requires more than individual solutions. Therefore, future studies could explore the conditions under which such a shift may occur, for example knowledge development and institutional safety nets for entrepreneurs. Examining how such factors influence drivers behind entrepreneurship in resource-constrained environment could provide insights into how entrepreneurial activities can evolve beyond subsistence-based practices.

6

Conclusion

This study aimed to understand how well the design thinking process can be used for social innovation and value creation for female entrepreneurs in the fish value chain in Linga Linga, Mozambique. By using the design thinking method from the empathy phase to the testing phase, the study found contextual solutions and assessed them in both a design thinking perspective, relating to how well they align with design thinking values, and a social innovation perspective using the three dimensions: addressing human needs, changes in social relations, and empowerment and agency.

The four identified solutions from the design thinking process are: fish powder, fish samosas, drying racks, and solar tents. All four of the solutions are closely aligned with local practices, indicating that the design thinking process was effective in finding solutions that based on user needs and behaviors. However, it was noted that not all solutions were contextually feasible, as the solar tents required material not available to the community. The economic situation in the village therefore rendered the solution less feasible than the rest.

An underlying reason that affected the feasibility of the outcomes, is the aforementioned time limit of the study. The study has found that the lack of possible iterations of the solutions directly contributed to the varying contextual feasibility. It was additionally seen through the trade-off between affordability and desirability. While the fish samosas were very desirable for example, the economic situation in Linga Linga directly affects the market since customers not necessarily are financially stable enough to support such a venture. Another key insight related to design thinking based on the findings is the relation between desirability, feasibility, and viability. While literature suggests that the three dimensions are equal, and all need to be balanced for a successful idea, the study instead finds that the contextual feasibility outweighs the other two dimensions when in a resource-constrained environment. For practitioners in similar environments, this provides insight in how the dimensions should not be viewed as equal conditions, but rather as guidelines that all need to be considered to different extents.

From the other analytical lens, social innovation, the findings indicate that the solutions mainly contributes to addressing human needs, and less to social relations and empowerment. The solutions focus on food preservation, waste reduction, and income generation for the female entrepreneurs, which directly relates to fundamen-

tal livelihood challenges. Its contribution to increased agency is that the solutions are enablers for the women to make more strategic choices, and extends their opportunities for economic activities. The impact on broader social relations are limited however since the solutions are largely built on existing structures, limiting a potential societal transformation.

From a theoretical perspective, the study suggests that design thinking in a resource-constrained environment primarily acts as a tool for incremental improvements, rather than radical innovation. While the process can create solutions that are contextually desirable and feasible, it do not necessarily lead to structural changes and shifts in power dynamics. This highlights a limitation in using design thinking for social innovation, as its outcomes may be constrained by the existing socio-economic conditions. This study therefore contributes to existing literature by the creation of a conceptual model to be used when applying design thinking in a social innovation context. The conceptual model is presented as an addition to the design thinking process, where it is seen as a cumulative process that incorporates different dimensions of social innovation in each step of the process. Thus, through the proposed model, design thinking may extend beyond incremental improvements and find solutions that are capable of transformation over time.

In addition the theory on social innovation and design thinking, the study also contributes to theory on entrepreneurship. The results show that the design thinking process created solutions that could reduce vulnerability and increase efficiency for the female, while only enabling a partial transition towards opportunity-driven entrepreneurship. These findings show that while incremental solutions may help necessity-driven entrepreneurs do more within their contextual limitations, structural changes may be required for entrepreneurs to shift more towards opportunity-driven entrepreneurship.

The contributions of the study also opens up for future fields of research. It is noted in the discussion that several limitations affect the extent to which the findings can be interpreted. Therefore, the research opens up for a longitudinal study to continue assessing the impact of the developed solutions in regards to social innovation. Further, the study proposes new empirical studies to empirically test the developed conceptual model. This would enable insights into design thinking as method to contribute to transformational social innovation change. Lastly, the study suggest research into the transition towards opportunity-driven entrepreneurship, especially with a focus on the conditions required for a transition from necessity towards opportunity-driven entrepreneurship.

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A

Appendices

A.1 Appendix A: Translated and Condensed Household Fish Consumption Interview Guide

1. How old are you?
2. What do you usually do during the day?
3. Can you tell us a little about your family?
4. What does a normal day look like for you?
5. What do you usually eat during the day?
6. What type of fish do you usually eat?
7. How do you usually get fish?
8. How do you choose which fish to buy?
9. What is most important when choosing fish?
10. How do you usually cook fish?
11. Are there other ways of preparing fish that you know about?
12. How do you salt and dry fish?
13. How long does dried or salted fish usually last?
14. Has fish ever gone bad before you could eat it?
15. What meals do you usually make with fish?
16. What ingredients do you usually use together with fish?
17. If you could improve something related to fish handling or storage, what would it be?

A.2 Appendix B: Structured Survey Questionnaire

Demographics

1. How old are you?
 - (a) 0–19
 - (b) 20–39
 - (c) 40–59
 - (d) 60+
2. What is your gender?
 - (a) Male
 - (b) Female
 - (c) Other

Questions

1. How often do you eat fish? Give your best guess.
 - (a) Never
 - (b) Several times per year
 - (c) Several times per month
 - (d) Several times per week
 - (e) Every day
2. What fish do you eat?
 - (a) Tuna
 - (b) Sardines
 - (c) Other
3. How do you get the fish?
 - (a) Buy it in Morrumbene
 - (b) Buy it in Linga Linga
 - (c) Fish it in Linga Linga
 - (d) Fish it somewhere else

- (e) Other
4. What would help your family most?
- (a) Cheaper fish
 - (b) Fish that is easy to cook
 - (c) Fish that lasts longer
5. Which of the following do you eat?
- (a) Fresh fish
 - (b) Fish snacks, for example fish samosas
 - (c) Canned fish
 - (d) Salted fish
 - (e) Dried fish
 - (f) Other
6. How do you cook sardines?
- (a) Boiling
 - (b) Pan frying
 - (c) Deep frying
 - (d) Drying
 - (e) Stewing
 - (f) Other
7. How many days does it last until it spoils? Give your best guess.
- (a) 1 day
 - (b) 2 days
 - (c) 3 days
 - (d) 4 days
 - (e) 5 days or more

A.3 Appendix C: Translator Reflection Interview

1. How did you frame the question about fish consumption?
2. How did respondents interpret answers such as every day, several times a week, or sometimes?
3. Were there any questions that were difficult to explain?
4. Did respondents mention things that did not fit the survey alternatives?
5. What fish did respondents talk about the most?
6. How did most respondents get fish?
7. How did respondents interpret fish that is “easy to cook”?
8. How did respondents interpret words such as “fresh”, “fried”, or “stewed”?
9. Were there things in the survey that did not match local cooking or food practices?
10. What ingredients or foods did respondents say they were missing?

A.4 Appendix D: Prototype Evaluation with Expert Interview Guide

1. Do you think this solution would be useful in Linga Linga?
2. Does it solve a real problem?
3. Who do you think would benefit from this the most?
4. Do you think people here would want to work with this?
5. What problems or barriers could arise?
6. What would be needed for it to work in practice?
7. Do you think this could become economically sustainable?
8. How could this affect people's daily lives?
9. Could it affect food, income, or stability?
10. Could this change how people work together?
11. Could it create new opportunities for women or families?
12. Do you think women would be interested in starting something like this?
13. What challenges could women face if they wanted to start a small business?
14. How do people here view taking risks?
15. Could this affect women's opportunities to earn money?
16. What would be needed for this to continue long-term?



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