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Business Models for Urban Agriculture and Keys to Sustainable Value Creation in the Free State, South Africa

Master's Thesis

by

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Abstract

With the implementation of the Sustainable Development Goals in 2015, it is imperative, now more than ever, to understand how governments, organizations, and people can contribute to sustainable development. The purpose of this study was to understand how urban agriculture enterprises can contribute to this through sustainable value creation, specifically in the Free State of South Africa. This purpose was pursued due to a knowledge gap existing on what aspects of business models for urban agriculture enterprises can lead to sustainable value creation, especially in the Global South. Overall, this study sought to answer to the following research question: “*What are the key business model principles for urban agriculture enterprises to generate sustainable value in the Free State of South Africa?*”. Following a framework developed from the Triple Layered Business Model Canvas, and utilizing a Life Cycle Sustainability Assessment tool, an interview guide was developed for a case study analysis on urban agriculture enterprises seeking to create sustainable value. From initial participatory action research and informal interviews, four case studies were selected for this case study analysis, and in-depth interviews were conducted with the cases. The results of this case study analysis provided many results regarding the urban agriculture enterprises examined. First, there was a diverse set of variables or principles used within the case studies’ business models. From these, the case studies were classified into two separate typologies, based on the size and scale of the enterprise, as well as the primary focus of the enterprise. Lastly, the impacts on sustainability of these enterprises were examined and linked with the business model variables that caused those impacts, allowing for trends to be seen throughout the case studies. Together, these results showed that there were key principles surrounding low cost resources and activities, environmental costs necessary for environmental impacts, and the involvement of partner organization in urban agriculture enterprises.

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1. Introduction

Over the past 50 years, the world has begun moving towards a sustainable approach to development. With the introduction of the sustainable development goals (SDGs) by the United Nations in 2015, the global community has embraced the idea that despite society's continual 21st century development, humanity must work within the natural systems of the global ecosystem. Now that leaders and states have set their sights on goal and indicator achievements by 2030, it is imperative to enable governments, communities, and individuals to implement effective techniques for sustainable development.

As a result of SDG implementation, one area of development gaining more attention is urban agriculture (UA). Historically, development research has often focused on the rural agriculture and how that can contribute to sustainability. However, due to population growth experienced over the past 75 years, UA has received increased attention as a coping mechanism for the various impacts caused by increased urbanization worldwide. More recently, much of academic debate has focused on UA and its competition for ecological resources or economic viability. With the implementation of the SDG, that focus has changed; now, UA activities are seen to help address several of the goals (Game & Primus 2015), specifically goal #2, #3, #10, #11, and #12. Therefore, it is important to understand “how UA can be a sustainable component of the global urban food system” (Game & Primus 2015).

In research regarding UA and its contributions to sustainability, the focus is largely on UA practiced as a form of leisure, livelihood, or crisis mitigation activity, but has recently seen market-oriented UA has become more of a trend in development (Liu 2015). Despite this, little research has been done on entrepreneurial or market-oriented UA (Liu 2015), and often focuses on cases in the global north. Therefore, it is essential to know more about entrepreneurial UA, especially in the global south, and to enable people in creating sustainable value from UA enterprises.

2. Theoretical Framework

2.1. Urban Agriculture

UA is defined as “the growing of plants and the raising of animals within and around cities” (FAO 2014), and is part of sustainable food insecurity solutions in urban areas. While urban farming has existed for centuries, starting in the 1980s, the development community saw the great potential of UA, with the Brundtland Commission saying:

Officially sanctioned and promoted UA could become an important component of urban development and make more food available to the urban poor. The primary purpose of such promotion should be to improve the nutritional and health standards of the poor, help their family budgets (50-70 percent of which is usually spent on food), enable them to earn some additional income, and provide employment. UA can also provide fresher and cheaper produce, more green space, the clearing of garbage dumps and recycling of household waste (WCED, 1987).

Since then, UA has taken on several diverse forms and spatial structures, such as green roofs, hydroponic greenhouse, community and backyard gardens, food cooperatives and markets (Kontothanasis 2017). While UA is practiced in various contextual settings producing a variety of products, the practice primarily focuses on “perishable and high-value products (green vegetables, mushrooms, herbs, fresh milk, eggs, poultry and pig meat, fish) that can be grown in confined spaces” (De Zeeuw et. al 2011).

While the different forms and locations of UA projects are interesting to examine, an important aspect to understand about UA is its role in many urban socio-economic and ecological systems (Mougeot 2000). Specifically, urban and peri-UA projects “use urban resources (land, labor and urban organic wastes), [grow] produce for urban citizens, is strongly influenced by urban conditions (urban policies and regulations, high competition for land, urban markets, prices, etc.) and impacts the urban system (having effects on urban food security and poverty, as well as having impacts on ecology and health)” (De Zeeuw et. al 2011). The following sub-sections discuss these urban socio-economic and environmental integrations that UA has in cities and urban contexts.

2.1.1. Urban Agriculture and Food Security

First, UA has the ability to contribute to food security in several ways. Most directly, households that produce their own food have more access to nutritious foods, supporting a varied and higher quality diet (Poulsen 2015). With food more readily available, households can utilize their income in other ways. Additionally, UA can potentially minimize the effects of an inconsistent income or fluctuating food prices (Poulsen 2015). When looking at the causes for engaging in UA, studies have often seen UA used primarily for household consumption (Poulsen 2015).

When considering UA as a food safety net, there are several issues that impede it from being an effective coping mechanism. One of the key limitations to UA in developing countries is that in large metropolitan areas, the opportunity costs associated with land are not supportive of UA (Ruysenaar 2013). In the Global South, households with a backyard often construct a shack as a source of income for accommodating travelers instead of committing to personal food production, as it is a larger, more consistent source of income. On a neighborhood and city level, urban land that is used for agricultural production often has its land use agreement abruptly ended.

Another key limitation surrounding UA and its effectiveness as a safety net for food insecurity is that the tactic is often used only as a short-term coping mechanism. Typically, people do not employ UA as a long-term livelihood strategy (Rogerson 1993). Instead, households often engage with UA, expecting it to provide all their food and nutritional needs, and give up when it cannot do that (Rogerson 1993). In the broadest context, UA cannot be relied upon as effective safety net on its own.

With the combined issues of land access, varying production levels and capabilities, and the seasonality of farming, UA in South Africa should not be utilized as coping mechanism for food insecurity on its own (Ruysenaar 2013). However, studies have shown that UA has limited success in producing food surpluses. When correctly implemented as a more expansive program, UA projects could be successful in helping reduce food insecurity.

2.1.2. Urban Agriculture and Environmental Impact

While UA is primarily used as a coping mechanism for food insecurity, there are many additional benefits that can arise in successful projects. UA's capacity to have a positive impact on the environment, to reverse some of the effects of large-scale industrial farming, while also helping mitigate climate change are three of the most important additional benefits. UA can have a positive environmental impact by increasing water absorption by 'greening' urban surfaces, enhancing biodiversity within urban spaces, and increasing the potential for recycling through composting practices (Kontothanasis 2017). Additionally, by producing the food locally or near where it is being consumed, fewer energy inputs are required for the production and overall consumption (Jouzi 2017).

It should be noted that while UA can have environmental benefits, if projects are not implemented correctly, they can also have detrimental impacts on a local environment. Use of agrochemicals (fertilizers, pesticides, and fungicides) can lead to contamination of groundwater. Mismanagement of livestock can lead to health risks if manure, urine, and slaughterhouse procedures are not given adequate consideration regarding their effects on community health and local environments (De Zeeuw et al. 2011).

2.1.3. Urban Agriculture and Economic Impacts

From an economic perspective, UA's potential benefits supersede providing just an income. Beyond providing relief in times of financial trouble, UA can support economic activities on a smaller scale by integrating local farms, retailers, and food cooperatives (Kontothanasis 2017). However, the effects of UA on poverty alleviation are not guaranteed, as the effect is dependent upon the food products produced and the market orientation of the UA project. Additionally, subsistence and semi-commercial UA projects have less economic impacts (De Zeeuw et. al 2011). Since these activities are often not collected in an official capacity by municipalities and governments, it is difficult to account for all UA activities, and therefore their derivative benefits (De Zeeuw et. al 2011).

2.1.4. Urban Agriculture and Social Impact

The last aspect of UA projects that influence the urban context is the social benefits that they can provide. Specifically, UA and its economic and environmental benefits re-spatialize and re-socialize the entire food production and distribution system (Kontothanasis 2017). Not only does nutritious food come closer to the most vulnerable households, by creating new markets and associations for production and distribution of the products, UA enhances social equity and democracy. For women, UA has been exhibited as an empowerment tool. UA affords women more control over household food consumption, while giving them a larger role— provider of food and income— within their household (Slater 2001). Lastly, UA can help form networks and groups among cultivators, which can lead to the sharing of knowledge, produce, and money. (Olivier 2017).

Despite the numerous positive social impacts of UA initiatives, there are also some negative. Specifically, public health risks are often associated with UA, as projects typically are unregulated. This can cause environmental impacts, which potentially generate human health risks and additional negative social consequences. Flynn (1999) conducted a literature review of public health risks associated with UA, focusing on the potential health risks of UA regarding contamination of urban natural resources and zoonoses. While contamination is an environmental risk, it can have a social impact, such as how contamination of a water source may dictate a household relocating to avoid said contamination. Often these legitimately concerning impacts are a result of ambient conditions from where the UA project is taking place, due to UA being conducted in the wrong way, or in a setting that is not ideal for that type of UA activity (Mougeot 2000).

2.2. Sustainable Urban Agriculture

As previously stated, there is a significant amount of research on the benefits and consequences that can occur from the proliferation of UA in a community or city. Frequently, this research focuses on one aspect of sustainability such as economic viability, gender issues, or ecological

practices. However, for the practice of UA to be truly sustainable, UA, as a whole, should be sustainable. Specifically, UA should be socially just, environmentally beneficial, economically viable, and self-sufficient all at once (Liu 2015). Furthermore, research also focuses on subsistence or leisure UA, not often considering market-oriented or entrepreneurial UA (Liu 2015). With the implementation of the SDGs, achieving sustainability in all facets of society is now more important than ever. Therefore, it is important to analyze UA enterprises, and understand how they can sustainably create value. Some research exists regarding business models for urban farmers, but many of these studies focus on cases in the Global North (Pölling 2017). Therefore, it is the goal of this to help fill the knowledge gap regarding the individual business level for UA entrepreneurs in the Global South, specifically South Africa.

2.3. Business Models

To understand a business or organization, the business model of that organization must be analyzed. The purpose of a business model is to fully understand the process by which an organization “creates, delivers, and captures value” (Osterwalder and Pigneur, 2010) from the sale of their product or service. Per Osterwalder (2004), a business model seeks to answer three questions regarding an organization:

- 1) What are key functions of an organization that are brought together to deliver value to their consumers?
- 2) How are these key functions interconnected within the organization, as well as throughout its partner organizations and stakeholder groups?
- 3) How does the organization generate value through these interconnected functions?

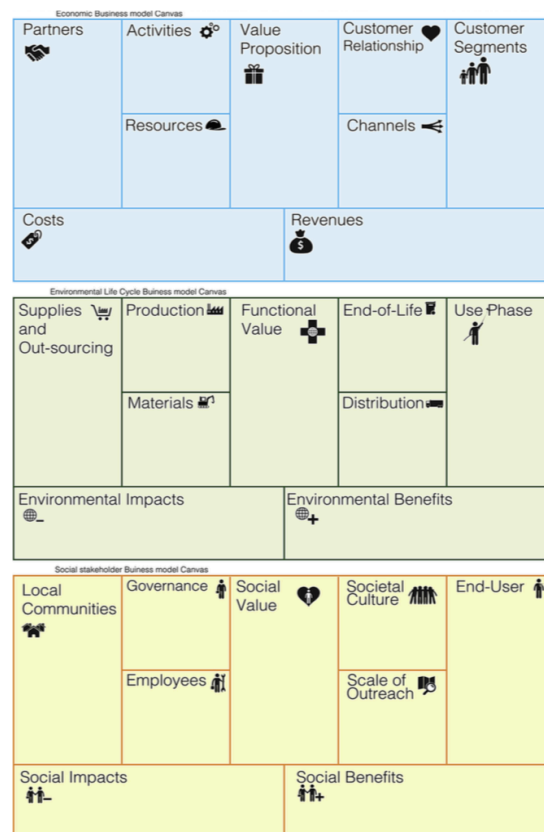
Once these questions are understood within the business model, an organization can better align or change the key functions of their business, which can enable them to be more competitive or sustainable. Utilizing a business model make these functional alignments explicit, allowing organizations to innovate and tap into unseen opportunities for value creation by transforming their key functions (Johnson et al., 2008).

To help businesses explicitly understand the alignment of their key functions, Osterwalder and Pigneur (2010) developed the Business Model Canvas (BMC). Specifically, the BMC is a visualization tool to help facilitate the innovation process for an organization by creating a systematic understanding of an organization and its impacts.

The BMC is use through the business and academic worlds, and follows the trend that business models primarily focus on how to maximize financial profits of an organization. While focusing on the financial aspect of an organization may have originally been the purpose of business models, organizations in the 21st century must consider all their environmental, social, and financial resources in order to be successful (Rifkin 2014). While the BMC does account for the financial resources of an organization, social and environmental oriented innovation must be considered within organizations now, as well as in within its business model.

2.4. Triple Layered Business Model Canvas

Figure 1. The Triple Layered Business Model

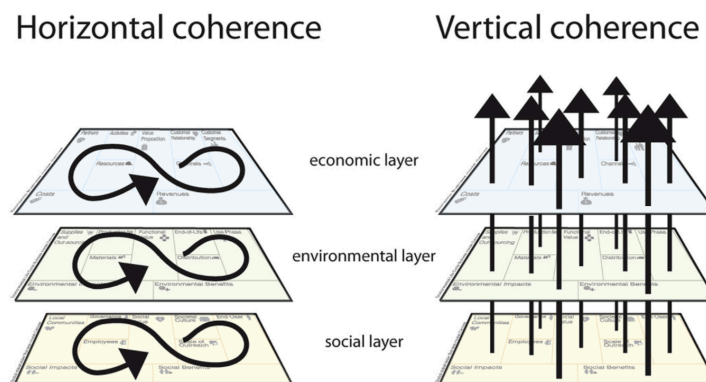


Source: Joyce et al. 2016

To do this, Joyce et al. (2016) developed the Triple Layer Business Model Canvas (TLBMC) as a tool to holistically understand the economic, environmental, and social concerns of a business,

and how they are interconnected. This holistic understanding is achieved by developing additional business model layers, integrating the environmental and social impacts of a business, and aligning them with the financial layer from the original BMC. The new environmental and social layers are constructed from lifecycle and stakeholder perspectives, ensuring that all environmental and social resources of an organization are accounted for in the business model. By creating additional environmental and social layers from the original BMC, organizations can see connections across the layers themselves. This allows them to see how those connections affects value creation, while gaining a holistic perspective of how value is created through connections between the different layers. These connections in the TLBMC are referred to as *horizontal coherences* and *vertical coherences*. The horizontal coherences specifically look at the integration of the variables across each layer of the TLBMC, and seeking to understand how these connections between variables leads to value creation on each layer. Therefore, allowing the economic, environmental, and social value that a business produces to be explored individually. The vertical coherences seek to understand the integration of variables, but allow for variables in different layers to be connected, giving a more complete understanding of how the business creates value.

Figure 2. Horizontal and Vertical Coherences of the TLBMC



Source: Joyce et al. 2016

The TLBMC can be utilized as a tool to explore innovation in three ways: representation, creation, and validation (Joyce et al. 2016). First, TLBMC can be used as a visual representation of an organization's model, helping to make explicit those key functions. Secondly, TLBMC can

be used as a creation tool, to help organizations explore the potential impacts of changing key functions of the business model. Lastly, organizations can use the TLBMC to validate their business model through a holistic approach. Once an organization chooses how it wants to best utilize the TLBMC, an analysis of the horizontal and vertical coherences in the three layers of the business model provide the insights needed to innovate its core functions.

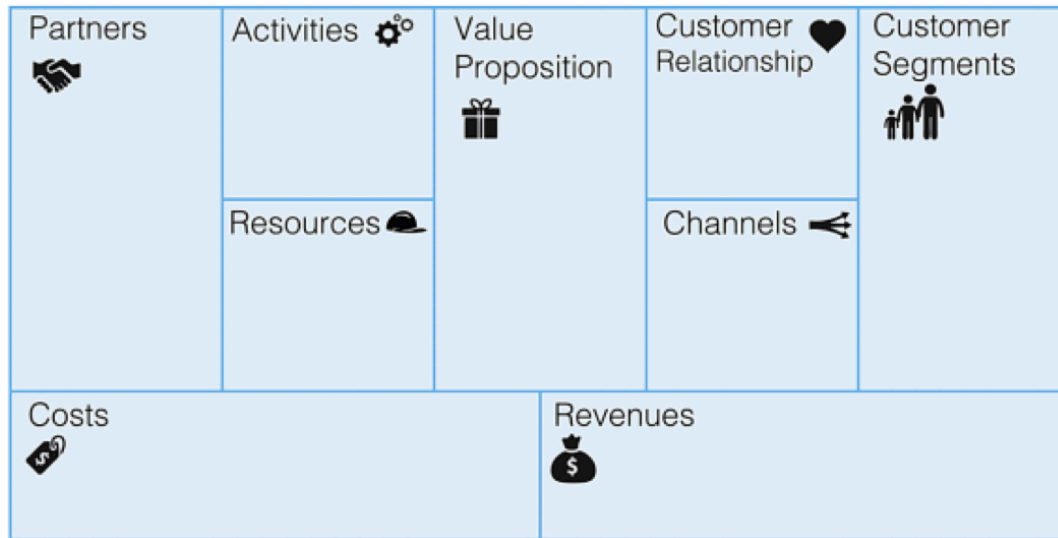
While the TLBMC is a useful tool for analyzing sustainable business models, the tool has its limitations. First, the TLBMC is simply a tool for conceptualizing different aspects of a business model, but it cannot explore or assess potential innovations that businesses can take (Joyce et al. 2016). Those utilizing the tool must do this analysis. Additionally, the TLBMC is a tool that helps businesses visualize the different aspects of their organization, but because of such a high-level approach, the tool can only provide a high-level summary for the analysis (Joyce et al. 2016). In order for innovation to occur, more detailed accounts of each variable may be needed.

2.5. TLBMC Components

As the TLBMC is a visualization tool, it clearly divides up the three layers of the business model into components, with each layer having seven components, as well as sections to understand the overall layer cost and benefits. Below is a description of what each of the components seeks to understand about a business.

2.5.1. TLBMC Economic Components (Osterwalder and Pigenur, 2010)

Figure 3. Economic Layer of TLBMC

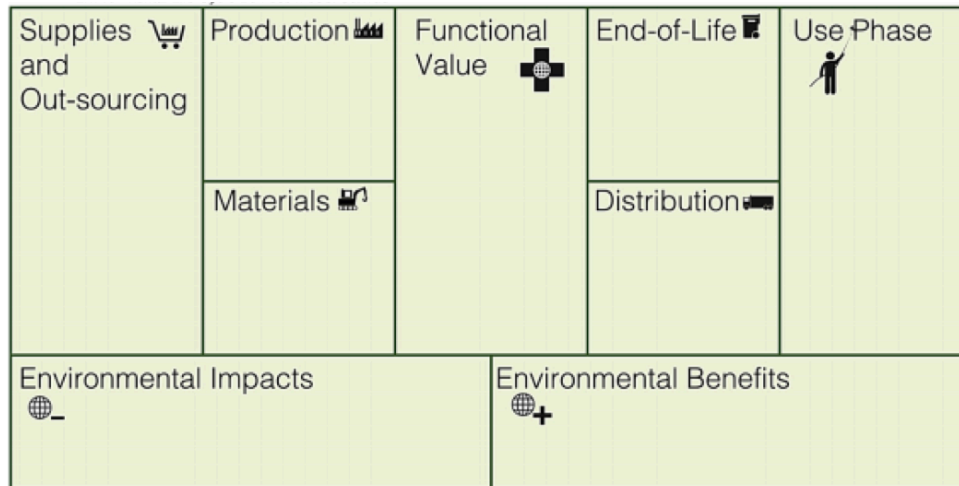


Source: Osterwalder and Pigenur, 2010

- **Value Proposition:** The value delivered to the customer of the organization, or rather, what are the problems that the organization is attempting to solve for the consumer?
- **Activities:** The key activities required by the organization to fulfill the value proposition. This can include of manufacturing, production, distribution, and customer relationships.
- **Resources:** The key resources that are required by the value proposition, encompassing physical, intellectual, human, and financial resources of an organization.
- **Partners:** Who are the key partners or suppliers to an organization, and what are the key activities that are sourced from these partners?
- **Customer Segments:** The people or groups of people that a business is trying to create value for.
- **Customer Relationship:** The type of relationship that the different customer segments expect the organization to establish and maintain with them.
- **Channels:** The ways by which customers can and want to be reached regarding the product or service of an organization.

2.5.2. TLBMC Environmental Components (Joyce et al. 2016)

Figure 4. Environmental Layer of TLBMC



Source: Joyce et al. 2016

- **Functional Value:** The functional value describes the most central or important output of an organizations service or product
- **Production:** The production component of the TLBMC is intended to account for all actions taken by an organization to create value.
- **Materials:** Materials refers to the natural resources that an organization uses to create the functional value.
- **Supplies and Outsourcing:** This component of the TLBMC accounts for all the materials and production activities that are sourced from outside organizations to create the functional value of a product or service.
- **Distribution:** Distribution focuses on how the functional value of the product or service is delivered to the customer segments, and considers the transportation modes, the distances being travelled, and the weights of what is being transported.
- **End of Life:** The 'End of Life' component of the TLBMC refers to when the customer chooses to end the consumption of the functional value, and often focuses on the any reuse or disposal of the product.
- **Use Phase:** The 'Use Phase' is a component that seeks to understand the environmental impact that consumers face when consuming the functional value of the product or service being offered.

2.5.3. TLBMC Social Components (Joyce et al. 2016)

Figure 5. Social Layer of TLBMC



Source: Joyce et al. 2016

- **Communities:** Communities focuses on the social relationships that an organization makes with its suppliers and their local communities, considering their culture needs and realities.
- **Social Value:** The ‘social value’ component of an organization refers to its mission to create benefits for all stakeholders within the organization and society.
- **Governance:** An organization’s structure and decision making policies are captured through the governance component, understanding how these components affect the organizations ability to create value.
- **Labor:** Considerations for employees and other labor must be made within the TLBMC as they can be considered a core organizational stakeholder. Therefore, the ‘labor’ component looks to understand the salient demographics of these stakeholders, and how they can benefit from the value creation taking place within the organization and its supply chain.
- **Societal Culture:** The ‘societal culture’ component of the social layer is a way to account for the potential impact an organization can have society, possibly creating a culture of accountability, pro-activeness, and self-reliance.
- **Scale of Outreach:** This component is incorporated into the TLBMC to understand the types relationships that an organization establishes through their actions, considering the

impacts of creating long-term, integrative relationships, or the different geographical impacts an organization creates.

- **End User:** The ‘end user’ component of the social layer of the TLBMC focuses on the customers who consume the value proposition, what needs the value proposition address for them, and how that contributes to their quality of life.

2.5.4. TLBMC Costs and Benefits

As mentioned previous, in addition to the seven components that each layer of the TLBMC accounts for, each layer also includes areas for costs and benefits, enabling an organization to explicitly state and understand the financial, environmental, and social impacts that it creates with the product or service it provides. While the costs and benefits are included with other variables in the visualization tool, they are the result of coherences across and between the layers of the TLBMC. Therefore, the costs and benefits for each layer have been separated from the variable components. The cost and benefit components of each layer of the TLBMC are described below:

- **Economic Costs:** This section of the TLBMC looks at the most important costs in the business model. It seeks to understand the key resources and activities that have the highest financial cost.
- **Economic Benefits:** The economic benefits of an organization refers to how the organization creates financial value, and the revenue streams it receives from the value proposition.
- **Environmental Costs:** Environmental Costs focuses on the ecological impact of an organization’s actions on their natural resources. This can encompass such things as water and energy consumption, as well as the human health of stakeholders and consumers.
- **Environmental Benefits:** This area focuses on the ecological value that an organization creates through environmental impact reductions and regenerative ecological practices.

- **Social Costs:** The ‘social costs’ component seeks to understand the social outcomes of an organization, looking at indicators such as working hours, cultural heritage, and community engagement, and seeing how value creation in an organization negatively impacts them.
- **Social Benefits:** Opposite of social costs, the social benefits component of the TLBMC focuses on the positive social value that its actions creates.

2.6. Aim of Study and Research Questions

This research will focus on understanding the business model principles of urban agriculture enterprises in South Africa, and what principles lead to sustainable outcomes. As mentioned previously, there is a great deal of literature discussing individual impacts urban agriculture can have on sustainable development, but very little research on the businesses themselves, and how they can sustainably create value. Therefore, it is the goal of this research to help fill that research gap, specifically in the Global South. To conduct this research into urban agriculture business models, a number of questions were formulated. The main research question of this research is:

What are the key business model principles for urban agriculture enterprises to generate sustainable value in the Free State of South Africa?

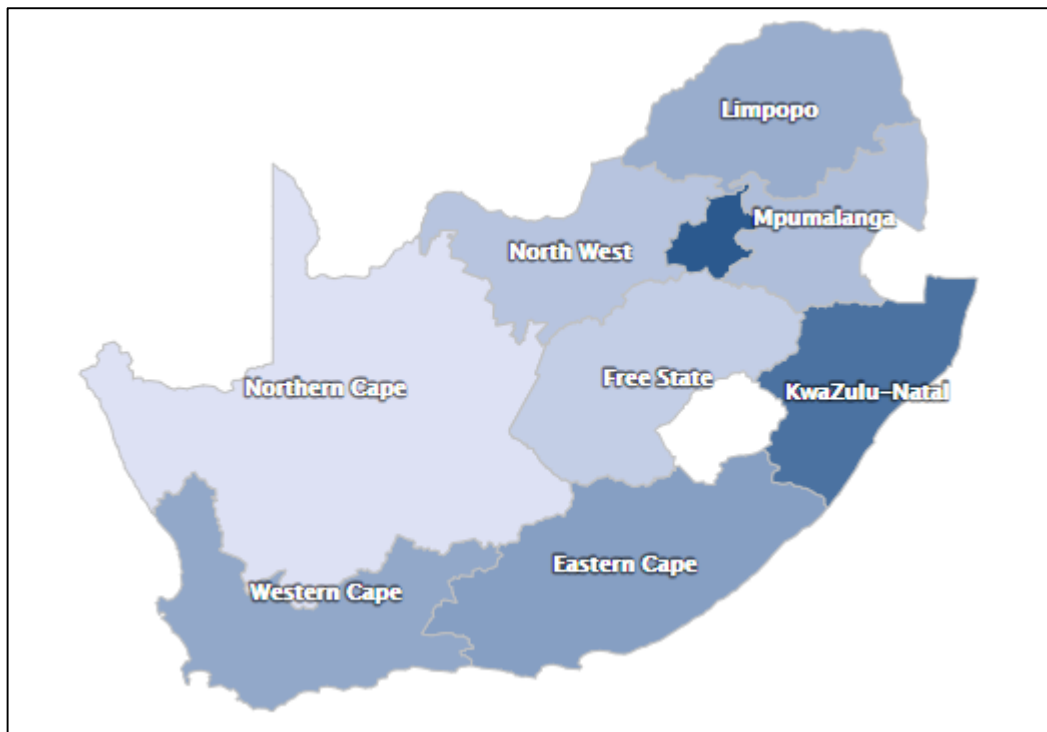
Sub Questions:

- What are the different variations in business models for practitioners of urban agriculture enterprises in the Free State?
- What are the different types of urban agriculture enterprises that these business model variations form?
- What are the different impacts on sustainability that the different business model variations produce?
- What coherences exist between the variations in business models and the impacts that the urban agriculture enterprises create sustainable impacts?

3. Regional Thematic Context

3.1. The Free State of South Africa

Figure 6. Map of the South African Provinces (Free State center)

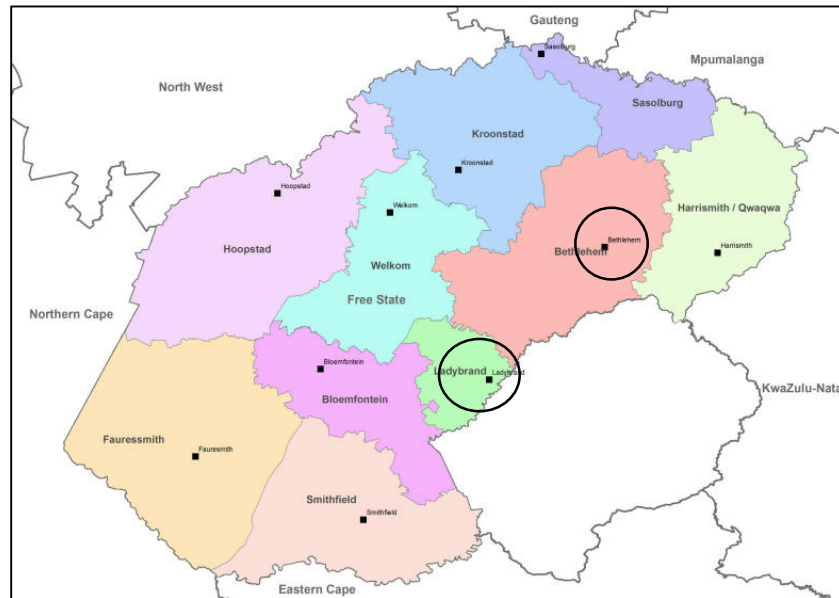


Source: www.statssa.gov.za

The Free State of South Africa is located in central South Africa, and has a total population of 2,759,644 people, representing only 5.5% of the total population of South Africa (SA Stats 2011). The province is well known for its agriculture activities, as its farming operations account for 56,000 hectares of the land usage (SA Stats 2011), and is one of the main production areas for maize, which is consumed in large amounts in South Africa. Further, there are a significant number of agriculture households (201,286), in which most of them (116,143) have a household income less than R 38,400 (2385 euros) per year, or no household income at all (53,057) (SA Stats 2011). Lastly, the Free State has been undergoing a dramatic urban expansion, with the province's rate of urbanization having risen from 68.6% in 1996 to 79.2% in 2008 (SA Stats 2011). With agriculture being a prominent feature in the province due to its fertility, and a

majority of agricultural households having limited or no income, the Free State can be seen as a promising location to begin an examination of urban agriculture enterprises.

Figure 7. Municipalities of the Free State



Source: Department of Agriculture, Forestry, and Fisheries for the Republic of South Africa

3.2. Mangaung and Bloemfontein

While this research is taking place in the Free State, the focus must be kept in the urban areas of the province. Therefore, research is taking place in and around Bloemfontein, which is part of the Mangaung Municipality. The Mangaung municipality is the most populated (747,431) and urbanized municipality (90.6% urban) in the Free State (SA Stats 2011). Of that, Bloemfontein is the largest city in the Free State with 256,185 residents and being 100% urbanized (SA Stats 2011).

Figure 8. Map of Mangaung Municipality



Source: Municipalities.co.za

Looking at the population demographics of Mangaung and Bloemfontein, the results are what would be expected for such an urban area in South Africa. Mangaung is primarily Black African (83.3%), but Bloemfontein becomes slightly more diverse with Black Africans representing just over half the population (56.1%) being the metropolitan center of the whole municipality, with whites (29.8%), coloureds (12.8%), and Indians or Asians (0.8%) making up almost all of the rest of the population (SA Stats 2011) . Overall, Mangaung has an unemployment rate of 27.7%, which is right at the national average for South Africa, and approximately 20% of the population lives below the poverty line of 992 rand/m (SA Stats 2011). Approximately 60% of households have an average income less than Rand 38,200 (SA Stats 2011).

3.3. Matjhabeng Local Municipality

While the research was initially meant to be throughout Mangaung, and in and around Bloemfontein, the sampling technique used to find urban agriculture enterprises eventually lead to case studies to be in the Matjhabeng Local Municipality, specifically located in and around the

Kutlwanong community located outside of Welkom. Due to the large mining industry that is around Welkom, the Matjhabeng Municipality is the second most populated municipality, after Mangaung, in the Free State, with a population of 406,461 (SA Stats 2011).

Figure 9. Map of Lejweleputswa District, including Matjhabeng Municipality (right)



Source: Municipalities.co.za

While this research was not initially planned for the Matjhabeng Municipality, the demographics of the population are like that of Mangaung Municipality. Matjhabeng has an overall population of 406,461, with the Black Africans representing 91% of the local population (SA Stats 2011). Comparatively to the other municipalities in the Free State, Matjhabeng is the most populated municipality after Mangaung. Additionally, the Matjhabeng Municipality is an urbanized municipality, with 97.7% of the area being considered urban areas (SA Stats 2011), which is very like the degree of urbanization of Mangaung stated above.

Looking further at the people that live in the Matjhabeng Municipality, unemployment also is quite high (36%), with 99,650 people between the ages of 15 and 64 employed, as opposed to 176,973 people unemployed, discouraged work seekers, or not economically active (SA Stats 2011). The youth unemployment rate is even higher at 49.7% (SA Stats 2011). When looking at

average household income in Matjhabeng, 64.7% of households have an income below Rand 38,200 (SA Stats 2001).

3.4. Urban Agriculture in South Africa, Mangaung, and Bloemfontein

When you look at urban agriculture trends and happenings in South Africa, there appears to be two different realities. Often you will find government entities, on all levels, are keen to develop urban agriculture policy and improve conditions for the poor, but the results on the ground are often less ideal (Nel et al 2009). If there is policy in place regarding urban agriculture, it is often applied at the city or municipality level. The city of Cape Town and the municipality of Gauteng have had the most success at enacting urban agriculture policies and projects (Nel et al 2009).

When looking specifically at Mangaung and Bloemfontein, urban agriculture has established itself within the area to a degree. Significant partnerships have developed between community based agricultural projects and the municipality, as well as the University of the Free State (Nel et al 2009). Additionally, in other research, Mangaung was shown to have more people involved in long term urban agriculture than other urban centers in South Africa (Cloete 2009).

While the desire and cooperation seems to be in place, results have been mixed. Analysis of the urban agriculture in the region reveals that while projects have developed, policy support is still underdeveloped (Nel et al 2009). The most promising agriculture projects found in Mangaung and Bloemfontein involved a partnership with the University of the Free State, helping to settle stock farmers on a university experimental farm (Nel et al 2009). Additionally, the university has provided training in crop production, especially independent greenhouse projects supported the municipality (Nel et al 2009). This is important as it shows the potential for urban agriculture to interact and integrate itself with both the formal and informal economies within Bloemfontein.

4. Methodology

As explained earlier, this research will be an analysis of urban agriculture enterprises, and the key business principles these enterprises employ that lead sustainable impacts. Due to this, a research tool must be employed that can account for all the inputs and outputs of a business. Therefore, several research methods and tools were employed to gain an understanding of the different urban agriculture enterprises within the research area.

4.1. Participatory Action Research

To begin the research, urban agriculture projects that are connected to UFS will be visited as part of Participatory Action Research (PAR). These case study urban agriculture projects found in Bloemfontein and Mangaung through the university should provide the best examples of urban agriculture within the region, based on previous research conducted by the Cloete (2009), and others working at the university. With access to these case studies through the university, they will provide the best opportunities for PAR research to be conducted and to get a clear understanding of the context research will be taking place in. Secondly, the case studies will hopefully be the source for finding other urban farmers in Bloemfontein that may not be working with the university or people who are beginning to engage with urban agriculture. This will allow for opportunistic and snowball sampling approaches to be employed for finding participants for later interviews, as well as other useful sources of information within the municipality.

4.2. Case Study Analysis

Next, a case study analysis will be conducted of the urban agriculture enterprises found through UFS, as well as the snowball sampling approach. To begin the case study analysis, the history and goals of the project will be recorded through semi-formal interviews to understand its development and potential growth. These initial semi-formal interviews will provide the opportunity to gain a deeper understanding of urban agriculture projects, and determine whether they will be suitable for this research study. This will be determined by seeking to understand if the project is purely used for subsistence or has business aspect to it.

Through these semi-formal interviews, the goals and challenges currently faced by the projects will be discussed and recorded. Based on previous research, these urban agriculture case study locations found through UFS should be the most developed projects within the region, the successes and failures of these projects should be examined to update and enhance future research beyond Bloemfontein, Mangaung, and the Free State. From these semi-formal interviews, case study narratives will be created, and be used to determine case study viability within this research.

4.3. In-Depth Interviews

Once the basic information of these case studies is collected through semi-formal interviews, and case studies are determined to be urban agriculture enterprises, in-depth interviews will be conducted to collect the specific TLBMC components for each of the case studies. To collect and understand the TLBMC components of these case studies, a Life Cycle Thinking approach will be utilized to gain a holistic picture of urban agriculture projects in the Free State. Life Cycle Thinking is the basic concept of considering the entire product system life cycle, preventing individual parts of the product life from being addressed without consideration for the impact that could have on other aspects of the product (Finkbeiner et al. 2010).

4.4 Life Cycle Sustainability Assessment Tool

For this research to follow a Life Cycle Thinking approach, the in-depth interviews for the case study analysis will utilize an interview guide that is built around the Life Cycle Sustainability Assessment (LCSA) tool. A LCSA tool is a product assessment tool that evaluates all parts of its production for environmental, social and economic impacts, and enabling decision makers to move towards a more sustainable product development life cycle (Life Cycle Initiative 2018). While the LCSA tool is the overall framework that this research will be conducted under, LCSA is comprised of three distinct sub-frameworks: Life Cycle Assessment (LCA) for environmental impacts, Life Cycle Costing (LCC) for economic and financial impacts, and Social Life Cycle Assessment (SLCA) for all social implications of a product's life cycle. Together, these three

sub-frameworks clarify the different tradeoffs a product's life cycle, creating awareness within a value chain, and allowing both consumers and producers make more informed decisions on cost efficiency, eco-efficiency, and social responsibility (Life Cycle Initiative 2018). In the case of this research, the three frameworks will look at the different tradeoffs of urban agricultures projects, and the various ways that the produce value for consumers. These three sub-frameworks are discussed in more detail in the following sections.

Figure 10. LSCA Approach

$$\text{LCSA} = \text{LCA} + \text{LCC} + \text{SLCA}$$

LCSA = Life Cycle Sustainability Assessment
LCA = Environmental Life Cycle Assessment
LCC = LCA-type Life Cycle Costing
SLCA = Social Life Cycle Assessment

Source: Finkbeiner et al. 2010

4.4.1. Life Cycle Assessment Framework

The first sub-framework, Life Cycle Assessment (LCA), encompasses the environmental impacts associated with the life cycle of a product. LCA assesses this impact by looking at environmental impacts in three categories: resource use, human health, and ecological consequences (ISO 1997). To do this, a LCA framework 1) compiles an inventory of all relevant inputs and outputs of a product system; 2) evaluates the potential environmental impacts associated with that product system; 3) and interprets the results of that evaluation in relation to the objectives of the overall analysis (ISO 1997). With those interpretations in hand, LCA enables decision makers to identify opportunities to improve the environmental aspects of products within their life cycle, as well as allowing decision makers in both governmental and non-governmental organizations to strategically plan product process design or redesign (ISO 1997). While most LCA methodologies include a quantitative component, this iteration of the framework will utilize

qualitative questions to understand the full extent of the environmental impacts of urban farming enterprises, and used to determine the ecological value that the enterprise creates.

4.4.2. Life Cycle Costing Framework

Life Cycle Costing (LCC), the second sub-framework, is an analysis that seeks to represent the sum of all costs in a product's life cycle, as well as any costs directly linked with activities covered by actors in a supply chain (Azapagic 2017). To fully understand all the costs of urban agriculture projects, and to see what can be changed to improve the economic success of these farms, qualitative questions will be used to understand the initial capital costs, ongoing maintenance and energy costs, as well as the profits made from the food yields. Once this data is collected, it can be synthesized to give a full picture of the economic status of the farming project and determine what the opportunities and challenges for growth are.

4.4.3. Social Life Cycle Assessment Framework

The final sub-framework, the Social Life Cycle Assessment (SLCA), is meant to assess the impact and product's life cycle, or any associated action taken by an entity in the value chain, has on society. Particularly, the SLCA analyzes the social benefits of the product life cycle and the "degree to which societal values and goals in the particular area of life or politics can be achieved" (Finkbeiner et al. 2010). Noticing that many social issues, or aspects of social issues, are not easily quantifiable, SLCA tends to be made up of qualitative social indicators for a system or activities of an organization, focusing on things such as operating principles, procedures and management practices (Finkbeiner et al. 2010). Insights into these indicators are gained through qualitative questions in the interviews.

By utilizing these three frameworks and a life cycle approach, the interview guide will be developed for the in-depth interviews with the urban agriculture enterprises selected to be case studies. From these interviews, several questions can be answered. First, and most apparent, the TLBMC variables for each case study will be gathered. Next, using these variables, in conjunction with the narrative descriptions collected, a typology will be developed to categorize

the case studies. By creating a typology of urban agriculture enterprises in the Free State, key principles can be determined for all the typologies present in this study, better informing future research into urban agriculture enterprises. Finally, an analysis of the TLBMC variables in each case study will be conducted, specifically looking at the coherences between the different variables, and how that leads to the different impacts for each case study.

5. Results Section

Through the University of the Free State, and the snowball sampling approach, a total of seven urban agriculture projects were identified. After conducting semi-formal interviews with practitioners at each of the project sites, four case studies were determined to be urban agriculture enterprises or businesses, while the remaining three projects were determined to be strictly subsistence focused, and only were directed at benefitting the household. The case study analysis of the four urban agriculture enterprises are detailed here in this chapter.

5.1. Case Study Narratives & TLBMC Variables

In this section, the four case studies selected for this analysis will be given brief descriptions or narratives. Following the narrative for each case study, the variables of each layer of the TLBMC will be presented individually for each of the case studies. These individual descriptions of the TLBMC variables for each case study will be utilized later in this chapter to inform the typology assessment, as well for section discussing the impacts and coherences of each case study.

5.2. Qala Phelang Tala (QPT)

5.2.1. Narrative

The Qala Phelang Tala (QPT) Food Garden is a non-profit organization run by Thabo Olivier. Mr. Olivier, a local politician, started QPT back in 2012 to “*show that it is possible to develop low-income, innovative, affordable, and implementable strategies*” regarding one’s own food security. The food garden is in the Bayswater suburb of Bloemfontein, and is located in Mr. Olivier’s backyard.

Specifically, the purpose of QPT’s food garden is for Mr. Olivier to experiment with low cost, high yield, and sustainable agriculture techniques. He uses this backyard garden as a testing ground, but more importantly, as a knowledge base for the skills and techniques he shares at trainings and events that QPT puts on for impoverished communities throughout the Free State. Through these trainings and events, QPT encourages people to implement their own backyard

gardens and take charge of their own food consumption, thus impacting food security and poverty. Once QPT has successfully empowered one person or a group of people in a community, Mr. Olivier hopes that other people will see the success of these techniques, and begin to their own backyard garden, thus multiplying the effect of QPT's work.

The most important aspect of QPT's work is how the techniques are easily transferable to the communities from the testing ground, and so the QPT food garden is solely used to that end. The food garden intentionally has low implementation costs, and utilizes recycled materials so that the techniques can be replicated by anyone that is willing to make their own backyard food garden. Originally, the garden began as a 20 square meters on the side of Mr. Olivier's backyard, but it has now expanded to most of the 200 square meters. The garden includes trellises for sky gardening, a chicken coop, a solar dehydrator, and a solar powered gray water system.

Figure 11. Mr. Olivier's Sky Garden Made from Recycled Material



Source: Qala Phelang Tala Facebook

Through trial and error, Mr. Olivier has perfected his sustainable techniques for creating low cost, high yield gardens, and has created a fully organic operation. Using triple cropping methods and the sky gardens, Mr. Olivier stated that his garden had the highest yield of vegetables per square meter in South Africa by the Kuala Foundation in 2014, showing how successful his methods can be despite the simple and low cost implementation. This success has lead QPT to gain more recognition in the realm of sustainable food security, with QPT assisting many community food projects throughout the Free State. Additionally, Mr. Olivier is asked to make presentations at universities and community empowerment events throughout South Africa.

5.2.2. Economic Business Model Variables

Figure 12. Qala Phelang Tala Economic Variables

Partners	Activities	Value Proposition	Customer Relationship	Customer Segments
No consistent partners	Training & Consulting Garden Activities Travel	Educational Training & Consulting for UA (Long Term Food Security)	Activist Relationship	Impoverished Communities Politicians Activists
Student Groups only when needed in Mangaung Municipality	Resources UA garden resources Garden (as intellectual resource) Fuel		Channels Through trainings, consultations, and presentations	

Source: Developed by Researcher

The value proposition that QPT's food garden offers is to providing educational training and consulting for small scale, sustainable agriculture, and almost all costs go towards that endeavor. This means the customer relationship that QPT holds is an activist or issue expert organization in sustainable UA, as the trainings and consultations can be defined as services rather than providing food products.

QPT's activist customer relationship targets several customer segments. Primarily, QTP's services are directed at impoverished communities in Mangaung. Additionally, due to Mr. Olivier's political role and understanding of how government operates, QPT also seeks to show politicians and administrators that projects implemented through the government are poorly planned, mismanaged, and susceptible to corruption. This has led QPT to be consulted on newly emerging UA projects in the Free State

Since the value that QTP strives to create is educational and expertise services for sustainable UA, most of the activities conducted to fulfill that value are traveling to do presentations and trainings in communities and at organizations throughout South Africa. In addition, there is the testing of sustainable agriculture methods, harvesting of the garden, and food preservation activities that occur. However, these agriculture activities come with minimal time commitment due to the simple, sustainable techniques utilized in the food garden, and shared in these educational trainings.

Through these educational trainings and consulting opportunities, QPT delivers the value of their service. Therefore, the trainings and consultations can be considered the channels that QPT uses to reach their different customer segments. Other than fuel consumed for travel between community training events, the resources that Mr. Olivier's project requires are seed, water, garden infrastructure, and preservation materials, all of which are acquired at low costs, or sourced from within the project, as seen with the gray water system. The most important resource for QPT's value creation is the intellectual resource that the food garden in Bayswater provides. Without this resource, QPT could not effectively train communities and organizations to utilize these techniques. QPT trainings emphasize experiential learning, so therefore QPT must have initial experience with these methods for the trainings to be effective.

One interesting aspect of QPT is the partner organizations it interacts with. Due to his position as a politician within the Mangaung Municipality, Mr. Olivier is prevented from working directly for the municipality on any projects within the Mangaung. Therefore, that directly applies to any work QPT would like to do in Mangaung. To work around that, Mr. Olivier partners with local student organizations from local universities to gain access to local communities, and get opportunities to spread his knowledge. Outside of Mangaung Municipality, that restriction goes

away for QPT, enabling the organization to work on projects sponsored or initiated by government entities.

5.2.3 Environmental Business Model Variables

Figure 13. Qala Phelang Tala Environmental Variables

Supplies and Out-sourcing	Production	Functional Value	End-of-Life	Use-Phase
Fuel Preservation Materials Mechanical Components	Low Cost, Organic Triple Cropping Recycling components	Knowledge of Sustainable UA	When people choose to use the UA knowledge Potential re-use and sharing of knowledge	Consumption of UA knowledge
	Materials UA garden resources Fuel for travel		Distribution Knowledge Transfer of UA Techniques	

Source: Developed by Researcher

The functional value that QPT provides is the knowledge output of sustainable UA techniques. This functional value is achieved through a two-part process. First, QPT creates the knowledgebase within the food garden. Secondly, QPT transfers that knowledge to the different customer segments of the business.

From a production standpoint, QPT's food garden utilizes organic vegetable cultivation techniques that maximize the growth capability of the plants, such as triple cropping, and uses organic nutrients and pesticides exclusively. Additionally, the production in the garden incorporates sustainable food processing practices, specifically preserving fruits and vegetables by processing them in a solar dehydrator or canning them in jars. Most importantly in the garden production is how it is completely run off a gray water system, which collects rain water as well as household water, enabling QPT to avoid high costs for water.

While the customer segments do not directly benefit from the production activities in QPT's food garden, the garden is the intellectual resource that QPT bases its training techniques on, and thus is an important part of QPT's production, which has no environmental impact. From there, QPT distributes this knowledge through trainings and consulting opportunities, which creates some environmental impact from the fuel consumed to travel to these opportunities.

The materials that QPT uses to create value can be divided between the garden activities and the training-consulting opportunities. For the garden, the project provides all the electricity, water, nutrients, and pesticides required for the garden to operate. QTP's garden utilizes a gray water system for irrigation, and the food dehydrator and gray water system are run off solar energy and built from recycled materials. The pesticide used to protect the plants is made from an organic mixture of hot peppers, garlic, olive oil, and water. Lastly, the manure is made from droppings collected from the rabbits and chickens, thus allowing these systems to be closed loops and self-sustaining. In addition to those, fuel is needed for the travel activities.

QPT's food garden sources few products from outside entities, mostly being recycled materials acquired from abandoned food security projects. The only materials that are out-sourced are containers for the food preserves, and mechanical components for his gray water irrigation system and solar dehydrator, most of which were built from recycled parts. Occasionally, the project does source seeds from vendors overseas, but often seeds are recycled from a previous harvest. For QPT's trainings and presentation, the distribution of the functional value, the only outside resources or services consumed is the fuel consumption from travel, which are minimal environmental costs.

Since the functional value is the sustainable techniques, there are no environmental costs derived from the consumption of that knowledge. The consumers of the knowledge face no disposal costs, and this knowledge can be potentially shared by the new practitioner. This indicates positive end of life and use phase components to the business model of QPT, as these trainings can only generate positive ecological value if implemented correctly.

5.2.4. Social Business Model Variables

Figure 14. Qala Phelang Tala Social Variables

Local Communities	Governance	Social Value	Societal Culture	End-User
Impoverished Communities	Private ownership	Poverty Alleviation	Culture of Self Reliance	Impoverished Communities
Politicians	Labor	Food Security	Scale of Outreach	Government Officials
UA Activists	Mr. Olivier & his family		Local, Provincial, and National levels of outreach	Activists

Source: Developed by Researcher

Seen in the economic layer, the QPT food garden was not created with the purpose of directly supplying food to communities or income generation on the household level. The project is more focused on transferring the knowledge gained from the garden, making the social components of the project particularly important to QPT. Most important to the social layer of QPT's business model is the societal culture of self-reliance. Specifically, QPT's work strives to help people to be less dependent on government aid and intervention programs, by providing them the knowledge to produce their own food.

The social value that QPT strives to create is poverty alleviation and food security for poor communities, by offering knowledge to them directly, or inspiring and training others to do what QPT is doing. If people can sustainably produce their own food, this will allow them to utilize their income in other ways, allowing them to invest in themselves or projects that seeks to improve the community in some capacity.

For the governance of QPT, Mr. Olivier is completely in charge and the sole decision maker within the QPT food garden project. QPT uses his property for the food garden and is the person who conducts the training or consulting opportunities. Therefore, he has sole decision-making

authority within the garden project. However, due to his role as a politician, Mr. Olivier decisions in how to engage with new community projects are sometimes forced due to ethical issues that could potentially arise if the project is based in Mangaung Municipality. Outside of Mangaung, though, Mr. Olivier's work is no longer restricted.

While Mr. Olivier is the sole decision maker, and QPT's food garden is low maintenance and low cost, Mr. Olivier's family does partake in the construction, maintenance, and harvesting of the food, as well as assisting Mr. Olivier with his lectures and trainings. While his family members do not get money from the work they do for QPT, they do qualify as labor, and therefore gain the same skills shown in trainings, while also gaining professional development skills by helping conduct the trainings and consultations. This is in addition to the food and nutritional benefits they gain by having access to fresh food.

Another important aspect of the social dimension of QPT's business model is the scale of outreach, and the different communities the project interacts with. As mentioned previously, the main group of people that QPT interacts with is impoverished communities. But due to his role as a politician, and the success that he has had since the beginning of his work in 2011, Mr. Olivier has outreach on local, provincial, and national levels. Outside of his work in his local community of Bloemfontein, Mr. Olivier has assisted on other projects within the Free State, and has built a quite extensive social network of politicians, public administrators, activists, and community and business leaders who are interested in QPT's work.

While people in impoverished communities are the main end-user of QPT's trainings and consultations, politicians, government administrators, and other food security activists also have needs addressed from that value proposition. Since QPT methods seeks to empower households, and then eventually communities, those realities must be realized, and correspondingly acted upon, by leaders and activists within the community.

5.3. Likhanyiso Greening Project

5.3.1. Narrative

The Free State Likhanyiso Greening Project is an UA initiative located in Matjhabeng Municipality, specifically in the Kutlwano Township. Initiated in 2014 by the Free State Department of Environmental Affairs (DEA) and the municipal government, the project set out to accomplish three main objectives: (1) maintain an intensive food garden that strives to produce a maximum yield crop in the most ecofriendly and organic way; (2) build an eco-centre where skills food production can be transferred to community members and visitors; (3) create an open space where visitors and community members can relax and reflect in a green environment. Through these three objectives, the project hopes it can address help address food security, water conservation, and environmental rehabilitation within the community of Kutlwano.

Specifically, Likhanyiso sells reduced price vegetables in Kutlwano, while also exposing the community to sustainable, environmentally friendly techniques of backyard vegetable cultivation, creating both short and long term initiatives to address food insecurity while promoting water security and environmental conservation.

The project is adjacent to Phehello High School, in the center of the Kutlwano Township, on approximately one full hectare of land. Of that space, the food garden uses almost 350 square meters, being built on multiple levels with sky gardens and trellises covered by large shade tunnels, producing more vegetables than would be generated using traditional vegetable cultivation techniques. The garden does also include a gray water system to help with water recycling, but is meant to only supplement the total water needs of the project, as most of the water comes from the municipality. Through this food garden, the project produces pumpkins, green beans, spinach, tomatoes, and peppers, among many others, which are sold in Kutlwano at reduced prices, providing short term food security to the community.

The eco-centre, adjacent to the food garden, provides a classroom and administrative offices for the workers of the Community Work Program (CWP), the government organization that implements and supervises the activities of Likhanyiso. Through the eco-centre, the techniques are shared with community members who are interested in implementing their own backyard gardens. The garden serves as an example and a training tool for the trainees, who learn all that is needed to set up sky gardens and gray water systems, as well as techniques such as triple cropping and nutrient management. With this knowledge transfer, the activities conducted in the eco-centre seeks to empower the community to address their own long term food security, in addition to the short-term food security the food garden provides.

5.3.2 Economic Business Model Variables

Figure 15. Likhanyiso Economic Variables

Partners	Activities	Value Proposition	Customer Relationship	Customer Segments
Several Partners Project Under Authority of Municipality	Training & Consulting Garden Activities Urban Greening	Intensive Food Garden (Short Term Food Security)	Community Based Food Project Issue Experts	Kutlwanoong Community
	Resources UA garden resources (seed, water, recycled materials) Fuel	Knowledge Transfer of Sustainable UA (Long Term Food Security) Community Greening	Channels Community Outreach via word of mouth	

Source: Developed by Researcher

Likhanyiso's value proposition is broken up into three areas. First is to maintain an intensive food garden that serves to support short term food security in Kutlwanoong. Second is to facilitate knowledge transfer of sustainable agriculture techniques through community events. Lastly, Likhanyiso seeks to provide a green space for the surrounding community of Kutlwanoong.

The Lukhanyiso has several partner organizations. The municipality provides funding for Lukhanyiso on a yearly basis, and the DEA provides training opportunities for the CWP employees. Another important aspect of the economic layer for Lukhanyiso is the customer relationship that the Lukhanyiso Greening Project has with the surrounding community. While the CWP workers are government employees, they are assigned work sites in their own communities, making the work that they do have a direct impact on their own families and neighbors. The CWP workers understand the importance of the work they do for Kutlwanong, and directly benefit from having cheap, organic vegetables available for consumption. Thus, Lukhanyiso has a customer relationship of community based food project, as well as issue experts from the training they receive

While their main customer segment is the Kutlwanong community, the workers also understand the importance of showcasing the successes of the project so that they can gain opportunities from government organizations to expand the project.

Of Lukhanyiso's three main objectives, the garden maintenance and the skills training courses comprise most of the activities. The garden space is approximately 350 square meters, but due to the use of triple cropping and sky gardens, the capacity of the garden is much greater than that number entails, and requires more than a few people to manage. The training events occur in the eco-centre, where the community is encouraged to utilize household food production of traditional and under-utilized food crops, while utilizing sustainable technologies and practices. While these trainings are a substantial knowledge transfer, Lukhanyiso only conducts trainings once in the spring, and a few times around when crops are ready to be harvested, meaning the activities needed for that value creation are infrequent.

While the initial resources were significant due to the building of the eco-centre and irrigation system, currently the project only requires seed, water, and recycled materials for garden infrastructure to operate, and then petrol needed to distribute the food. Lukhanyiso's garden utilizes low cost, organic vegetable cultivation techniques, and uses many recycled materials. However, comparatively to a backyard garden, the resources requirements are still greater due to the project's size. Additionally, the eco-centre requires energy as well to operate, but solar panels provide all the energy requirements.

The channel that Lukhanyiso uses to reach the customers is through community outreach. The CWP workers come from the Kutlwanong community, so they know who is in need in food. Knowing who is vulnerable, the workers bring food they grow into the community, and sell it to those in need. Once they have engaged the community by helping provide food security, people are encouraged to visit Lukhanyiso, spend time in the green environment, and attend the trainings that they conduct.

5.3.3. Environmental Business Model Variables

Figure 16. Lukhanyiso Environmental Variables

Supplies and Out-sourcing	Production	Functional Value	End-of-Life	Use-Phase
Water Resources Labor (From CWP)	Sustainable Vegetable Cultivation Trainings	Enable Kutlwanong to have better access to nutritious food	When the food is consumed Using of the Sustainable UA knowledge	Consumption of UA knowledge (No Negative Impact) Consumption of Organic Food (No Negative Impact)
	Materials UA garden resources (seed, recycled materials, electricity)	Food from the Garden (Short Term Food Security) Trainings (Long Term Food Security)	Distribution Food Distributed House to House Trainings for knowledge transfer	

Source: Developed by Researcher

The functional value of Lukhanyiso is to enable the surrounding community by giving them increased access to cheap, nutritious vegetables and fruits, whether that be access be from the food garden at the site or through the techniques that are shared during training events.

The production activities are the maintenance and harvesting of the food garden, done utilizing sustainable techniques, and the training programs for the community, both of which have no clear environmental costs.

The seed and recycled items used for the garden infrastructure are all the materials acquired from within the Lukhanyiso project that are used to create the functional value. For the community training events require energy to power the building and facilitate the knowledge transfer, but that is sourced from the solar panels on the eco-centre.

Currently, Lukhanyiso only outsources for the required water and labor. The water requirements to operate the food garden are approximately 19.7M liters of water needed every year, based on FAO (2014) water irrigation estimation method. However, the building of the eco-centre would have required substantial outside materials, as it is meant to be a modern, environmentally friendly building, including a solar electrical system.

The food produced in the garden is distributed for sale in the community as some members of the community, especially the elderly, are unable to travel to Lukhanyiso. Therefore, the CWP workers go to the households they know need assistance. For community training events, the CWP employees use word of mouth within the community to share information about upcoming events being put on at Lukhanyiso.

The end of life component of Lukhanyiso's business model is greater access of the low-cost vegetables, both from the food garden and the utilization of the sustainable vegetable cultivation techniques, by members of the community. Therefore, there is not a significant energy or resources needed for these products and services to be utilized. Additionally, the food waste can be utilized, and the techniques can be shared further throughout the community.

Use phase of Lukhanyiso's business model is also environmentally friendly, as the consumption of vegetables entail minimal environmental impacts, and the correct utilization of the sustainable techniques can only create positive ecological impacts.

5.3.4. Social Business Model Variables

Figure 17. Lukhanyiso Social Variables

Local Communities	Governance	Social Value	Societal Culture	End-User
Kutlwanong Community, on two levels	Complex due to Municipal Partners	Poverty Alleviation	Culture of Self Reliance	Community Members of Kutlwanong
Impoverished households	Labor	Food Security	Scale of Outreach	
CWP Workers	CWP Workers	Effected Doubled Due to CWP Workers	Local and Provincial Levels of Outreach	

Source: Developed by Researcher

The societal culture of Lukhanyiso is a culture of self-reliance, which eventually can lead to poverty alleviation. While the project directly produces vegetables, the training component of their activities shows they do not intend to feed the community in a permanent capacity. The food garden is meant to be a food safety net for community members in times of economic hardship.

Lukhanyiso provides social value as it capacitates the community of Kutlwanong to be more food secure, with the trainings and the reduced-price vegetables. Since the community is more food secure, they can utilize their income in other areas, helping alleviate poverty in the community as well. These social values can also be applied to the CWP, as they receive the same trainings and skills as the community, can purchase the food grown at the Lukhanyiso site, and receive a stipend for their work, providing further poverty alleviation since they are Kutlwanong.

The communities affected by Lukhanyiso are based in the Kutlwanong community, but on different layers. On one level, the community gains greater access to nutritious food through the food garden, as well as the trainings that are conducted. Also, since CWP targets unemployed and underemployed people, they are provided with a job safety net as the stipend can provide

workers with financial resources while they look for future employment opportunities. The workers also receive training and professional development while working at Lukhanyiso, which can be utilized for future employment opportunities.

The governance structure of Lukhanyiso is complex as it is under the authority of the municipality and the CWP is a government sponsored work program, limiting the CWP workers to direct the project in their own way. As the workers understand the needs of the community, they should have more decision-making power since they are being directly affected. Additionally, even if new programs are approved for Lukhanyiso by the municipality, the workers must first receive training from the DEA before they can be shared with the community.

The labor at the site has diminished greatly since the initiation of the project, from 82 to 40 CWP workers. The reduction in labor is because there were more workers needed during the implementation of the project, as they were needed to construct the eco-centre and the garden infrastructure. Now, most the 40 employees at the site work two days a week as part time employees, which is a standard work schedule for CWP employees. While jobs have been lost since the implementation of Lukhanyiso, these CWP workers are individuals who would otherwise be unemployed, and working for CWP provides them with a small stipend between 81 and 106 Rand for each day of work. Additionally, the CWP workers receive training to work on the site, which is professional development, and can help them get long term employment after working for CWP.

The project conducts most of its outreach on a local scale and work within the Kutlwanong township only, as that is where they trying to create the most value. However, they also participate in provincial farming competitions put on by the DEA, interacting people from other greening projects throughout the Free State and showcasing their successes to the provincial government to get more training or opportunities for Lukhanyiso, and potentially learn from other greening projects that participate.

In the end, the community members of Kutlwanong are the end users of the value proposition, as they attain greater access to cheap, nutritious food, directly from the food garden at the Lukhanyiso or from constructing their own backyard gardens using the knowledge from the

trainings. With these added sources of food, community members can improve their diets and save money, which can be converted into additional financial, environmental, or social benefits.

5.4. Germinating Seeds for Success

5.4.1. Narrative

Germinating Seeds for Success (GSS) is a personal backyard UA project run and maintained by Nceba Moilola. The project is in the Phase IV neighborhood in Mangaung township outside Bloemfontein. Nceba, only 18 years old now, began his backyard garden project starting in 2015 after being exposed to UA at a youth leadership event in his community. Once he was exposed to the concept and he constructed his own backyard garden, Nceba began selling vegetables to the local Spar as a local organic farmer. However, Nceba has since begun selling directly to his community, which represents the main purpose of GSS.

As GSS is a personal backyard project, and Nceba seeks to help people in his community suffering from food insecurity, the project specifically focuses on growing vegetables and selling them at a reduced price. Nceba utilizes triple cropping, sky gardens, and a gray water system to help maintain his garden, and produces pumpkins, spinach, and tomatoes among others. While Nceba does sometimes train other people in his community to use the same sustainable techniques in their own backyard, he does this infrequently, as he is living at CUT during the weeks, only going home on the weekends to maintain the garden. Instead of giving trainings, Nceba uses GSS as an example, hoping that he can inspire people in his community to follow his lead, and create their own backyard gardens.

As mentioned before, the GSS food garden is in the backyard of Nceba's home, approximately 60 square meters in size. Most of the materials utilized for garden infrastructure are found from recycled materials in the Phase IV neighborhood. GSS has low costs by using recycled materials and using high yield agriculture techniques, thus making a profit despite the small scale of the project and selling vegetables at reduced prices.

5.4.2. Economic Business Model Variables

Figure 18. Germinating Seeds for Success Economic Variables

Partners	Activities	Value Proposition	Customer Relationship	Customer Segments
No Partner Organizations	Garden Activities (Sustainable UA)	Affordable, Nutritious Vegetables	Community Supplier of Organic Vegetables	Phase IV Community
	Resources UA garden resources (seed, manure, recycled materials)		Channels Word of Mouth	

Source: Developed by Researcher

Nceba began GSS when he was 16, and was originally working with Spar to sell his vegetables. However, understanding that working with Spar took a lot of time, and that he could make more money if he sold directly to the Phase IV community, Nceba ended his partnership with Spar. Therefore, Nceba operates his business solely on his own, without utilizing partnerships to sell his vegetables.

The activities necessary for GSS's value proposition is only organic, low maintenance vegetable cultivation. GSS utilizes triple cropping and sky gardens to maximize the space to grow, which requires creating of the garden infrastructure to manage those techniques properly, but the techniques are quite simple and low maintenance. Additionally, Nceba uses the GSS garden as an example to show his community the potential food that they have by growing vegetables in their backyard.

The food garden requires a few resources to be operational, with seed being the only resource that Nceba needs to purchase. Manure and recycled materials needed for the garden infrastructure are acquired in the community for free, while the water used for his plants comes from water recycling of gray water.

The value proposition of Nceba's business is to offer his community affordable, nutritious vegetables. While it is a simple proposition, GSS food garden is extremely valuable to the community since the closest supermarket is an hour away by foot, greatly limiting their regular access to nutritious, healthy foods.

Since Nceba now only sells his produce to his local community, he maintains a customer relationship as a community supplier of cheap vegetables. As he is currently studying at CUT, he does not intend to expand GSS in any capacity, but continues to maintain his food garden to help both community members who are food insecure, as well as maintain food security for him and his family.

The only customer segment of GSS is the community of Phase IV. It should be noted that while Nceba's goal is to sell his vegetables to the community at a reduced price so that they can utilize their income in other ways, some of the vegetables do go to his family, allowing them to also benefit and spend their money on other endeavors as well.

Due to the small scale of the GSS, it utilizes only one channel for reaching community. By word of mouth and the use of the GSS garden as an advertisement, the Phase IV community has become aware of the food garden, and they travel to the food garden to purchase the vegetables. Previously, the channel would have been through his partnership with Spar, but that is no longer utilized.

5.4.3. Environmental Business Model Variables

Figure 19. Germinating Seeds for Success Environmental Variables

Supplies and Out-sourcing	Production	Functional Value	End-of-Life	Use-Phase
Seeds Manure for Nutrients (Comes from Grandfather)	Low Cost, Organic UA	Low cost, nutritious, organic vegetables	When people choose to consumed the vegetables	Consumption nutritious, organic vegetables
	Materials UA garden resources		Distribution No Distribution (Community Comes to GSS)	

Source: Developed by Researcher

The functional value that GSS provides is low cost, nutritious vegetables to the community of Phase IV, as that is the central output of the food garden.

The materials needed to complete the functional value of GSS's food garden are water, seed, nutrients, pesticides and recycled materials for garden infrastructure. The only parts of GSS's project that are outsourced supplies are the new seeds that he must purchase when he wants to start growing any new vegetable. Often though, Nceba recycles the seeds from the previous year's harvest, allowing him to minimize the cost of seeds for the GSS project. Additionally, Nceba acquires manure for nutrients from outside of GSS project, but attains that for free from

his grandfather who owns several cows. Previously, the GSS food garden also needed water sourced from the municipality, but Nceba has now transitioned to recycling gray water to reduce the project's reliance on that water source. GSS does not use any chemical pesticides, instead utilizing an organic homemade pesticide.

The production process of Nceba's food garden is quite simple, being completely organic, and utilizing only recycled materials to build the infrastructure needed for the sky gardens and triple cropping.

For distribution, community members come to the GSS food garden to buy the vegetables from Nceba, meaning there are no negative impacts from this component.

The same goes for the use-phase, as there is no negative environmental impact from consuming the vegetables. Same goes for the end of life component, as there is no additional energy needed to consume this food compared to food bought at other locations. Any waste that is produced can be composted since it is all organic material.

5.4.4. Social Business Model Variables

Figure 20.

Local Communities	Governance	Social Value	Societal Culture	End-User
	Labor		Scale of Outreach	
Phase IV Community	Simple <u>Nceba</u> has full ownership	Poverty Alleviation Food Security	Culture of Self Reliance Local Level of Outreach Only	Phase IV Community Members
	<u>Nceba</u> is the only labor			

Source:

Most importantly, the societal culture that GSS creates is one of self-reliance, and that taking control of one's own food security is not as difficult, or costly, as it may seem if implemented correctly.

While GSS does make a profit from the vegetables it sells, Nceba chooses to sell them at a reduced cost, as he knows that the people in his community lack easily accessible vegetables, and often live in poverty. Therefore, his project provides social value in the form of poverty alleviation and access to nutritious vegetables to the Phase IV community. Additionally, by showing other people the success of the garden, GSS is creating environmental awareness in the community.

The Phase IV neighborhood is the only community interacted with by GSS, as they are the only group of people whose needs are being considered by GSS. However, based on the success that GSS has had in selling its produce, that relationship is quite strong.

The governance component of GSS's business model is simple, as Nceba is the sole owner and practitioner, as well as the direct financial beneficiary of GSS. This gives him the ability to direct GSS the way he pleases, which currently is maintaining its current levels of production while he attends CUT.

With that simple structure, all the benefits from GSS that would go to labor in a larger business go to Nceba. Unlike some of the boys his age from Phase IV, who often get drawn into crime due to the lack of economic activity, Nceba has a legitimate income at 18 years old. He also uses his garden to show the younger children of his neighborhood that there are alternatives to crime, becoming a positive community leader, and potentially leading him to greater opportunities to help his community.

The scale of GSS's outreach is only on the community level, as he has no other distribution channels for his vegetables. As he is attending CUT now, there would be no desire to expand the garden project now.

The end-users, or members of Phase IV, are provided with both a cheap source of organic vegetables, and the inspiration, and sometimes knowledge, to replicate Nceba's food garden in

their own back yard, helping to address the community's food security and poverty alleviation needs.

5.5. Lesedi Meraka Village

Figure 21. Scenes From Event at Lesedi Meraka Village (In July 2018, After Fieldwork)



Source: Qala Phelang Tala Facebook

5.5.1. Narrative

The Lesedi Meraka Village is a non-profit organization located in the Roodewal Small Holdings rural area outside of Bloemfontein. Mary Mofama, the person who operates and manages the village, constructed the village on her property to help address the food and health needs of community members in the community, as well as creating a space to encourage cultural integration and community resilience for Roodewal.

Figure 22. Lesedi Meraka Village from Above



Source: Qala Phelang Tala Facebook

Lesedi has two primary components to fulfill those goals. First, Lesedi will feature a large food garden, seedling nursery, herbal garden, and livestock pen for chickens and pigs. Approximately, the whole village will encompass 1.5 hectares, with the garden components covering one hectare. Utilizing permaculture techniques to grow pumpkins, spinach, and many other traditional vegetables, Lesedi hopes they can harvest enough food to sell to the Roodewal community to reducing food insecurity which effects many people there. Additionally, the herbal garden will be used to provide herbal remedies to those who suffer from HIV and Tuberculosis in Roodewal.

Figure 23. Lesedi Meraka Village Before Event



Source: Qala Phelang Tala Facebook

Secondly, Mary developed the Lesedi village as a ‘meraka’, a Southern Sesotho word describing a space where cultural traditions and knowledge are passed down from generation to generation. With the meraka, Mary hopes that Lesedi can bring together the different groups in Roodewal, expose them to the realities faced by those different groups, and help the community become more resilient towards addressing those realities.

Figure 24. Mary Mofama (left) and her family



Source: Qala Phelang Tala Facebook

While Mary is the primary operator of Lesedi, the project does work with several partner organizations, such as the UFS, QPT, and other local organizations. By working with UFS, Lesedi also works with the Re-Future Project, an organization that seeks to ‘embed’ contemporary artists within international development scenarios and understand how to best utilize their creative capacities. Through partnering with these organizations, Mary hopes that

Lesedi will attract people from all over the Free State and South Africa, potentially generating revenue through by hosting events. Lastly, Lesedi frequently relies on volunteers through non-profit organizations in Mangaung to be the labor for the Lesedi. By utilizing these groups for labor, Lesedi exposes the project to others in the municipality, gaining exposure for the project. However, by utilizing volunteers to help construct the gardens and the village buildings, the skills and passion that people come with varies, and has hindered the implementation of the project in some capacity, specifically the garden aspects.

5.5.2 Economic Business Model Variables

Figure 25. Lesedi Meraka Village Economic Variables

Partners	Activities	Value Proposition	Customer Relationship	Customer Segments
Several Partners UFS Re-future Project Volunteer Orgs.	Garden Activities (Permaculture) Eco-building	Affordable, Nutritious Vegetables Medicinal Herbs Community Gather Space	Community Supplier of <u>Organic</u> Vegetables and Medicinal Herbs Food/Health Activist	Local Community of Roodewal Outside Organizations interested in Lesedi
	Resources UA garden resources (water, electricity, pesticides, fertilizer)		Channels Word of Mouth via Volunteer Orgs & Community Members Outreach via UFS & Re-future partners	

Source: Developed by Researcher

The value proposition of Lesedi is multi-layered. First, Lesedi strives to grow cheap, nutritious food that can be sold or given to members of Roodewal. Secondly, the presence of the herbal garden is to provide medicinal herbs to locals who suffer from HIV, TB, or other illnesses, and to expose them to alternative remedies that they may have not considered. Lastly, Lesedi will serve as a gathering place to expose people in Mangaung to the issues being seen in communities, and how her simple techniques can help address them.

The activities that Mary wants to utilize for the vegetable cultivation at Lesedi are that of permaculture, meaning there will not be intensive farming. Additionally, she is raising chickens and pigs on her land as another method of UA. Further, Lesedi is meant to be a gather place, which requires several eco-buildings to be constructed on the property.

The resources that Lesedi requires are seed, water resources, electricity, pesticides and fertilizer to operate the gardens. Of those resources, Mary had a bore hole built on her property for irrigating her plants, but the pump will require electricity. The remaining resources are going to be sourced from outside of the project, therefore incurring significant cost due to the size of her project. Currently, Mary envisions people coming to Lesedi to purchase food, but also would like to purchase a bakkie, or small pickup truck, to transport the food to other parts of the community. As it stands, that would be a significant cost to the project, on multiple levels.

The eco-buildings being constructed are made from natural building materials that can be sourced from the project such as hay, manure, dirt, and water, but they do require metal roofing, which is provided through the partnership with UFS.

The Lesedi Meraka Village has several different aspects, beyond just the food and herbal gardens, and therefore has several partner organizations involved in the project. The biggest partner is UFS, which is helping to develop the nursery and herbal garden, while QPT assists in the construction of eco-friendly buildings on the small holding. However, all the vegetable cultivation activities are conducted by Mary and volunteers from organizations in Bloemfontein. Currently those activities stand as tending to the seedlings and plowing out the different fields for planting to begin at the end of winter.

The customer relationship the project has is one of a local supermarket that gets its patronage from its surrounding community. However, Mary is hoping that the project will be so successful in providing food security, while exposing people to permaculture and herbal remedies, that it will attract people from outside of the community to visit as well. If people start visiting frequently, Mary hopes that the space can be used to hold events with other organizations in the region. Consequently, there is an additional food, health activist component to the customer relationship. Thus, the customer segments can be broken up into the local community, directly

benefitting from the food and herbal gardens, as well as outside organizations who wish to get involved in developing the village or utilize the space.

Lesedi reaches its customers via two channels. First, through the volunteer organizations from the surrounding community, Mary has developed a strong network of people who have become aware of Lesedi, and will surely direct people to the village once food is ready to be sold. Additionally, the partnership with UFS will help gain Lesedi exposure outside of the local community as they have already helped connect permaculture and natural building experts to Lesedi.

5.5.3. Environmental Business Model Variables

Figure 26. Lesedi Meraka Village Environmental Variables

Supplies and Out-sourcing	Production	Functional Value	End-of-Life	Use-Phase
Pesticides	Low Cost, Organic UA (Permaculture)	Low cost, Nutritious, Organic Vegetables	When people choose to consumed the vegetables	Consumption nutritious, organic vegetables
Electricity	Materials	Medicinal Herbs	Distribution	Consumption of the medicinal
Bakkie	UA garden resources		Initial Distribution done at Lesedi	
Fuel			Future Distribution Using Bakkie	

Source: Developed by Researcher

The production method that is utilized at Lesedi is permaculture. What this entails, in terms of environmental costs, is the work to maintain and grow the vegetables will be done with simple tools and simple methods, working within the existing limits of the natural ecosystem. Additionally, permaculture requires no mechanization. Instead, Mary intends to hire one person to tend to the gardens.

Despite using permaculture as the method of production, which is very environmentally friendly, Lesedi's larger food garden intends to utilize chemical pesticides, and the bakkie for transportation will require fuel once it is purchased. Additionally, electricity will be needed for the borehole. Therefore, there are a few supplies that need to be outsourced within the business model, both of which would lead to higher environmental costs.

The materials that Lesedi internally sources from the project to operate are recycled materials, seed, and water, which will be accessed with the completion of the borehole. Additionally, the feed for the chickens and pig will be sourced from organic waste collected from the project.

The functional value that Lesedi hopes to provide once operational is a source of low cost, nutritious vegetables and medicinal herbs to the Roodewal community. Additionally, by creating the gardens to facilitate that initial functional value, Lesedi will be able to attract people from beyond the Roodewal community and expose them to the issues the project seeks to address.

The end of life for Lesedi is the consumption of the foods and medicines. With that consumption is of food that can be composted or reused, leaving the consumer with little environmental impact.

The distribution aspect for Lesedi is a point of potential environmental impact. Lesedi wants to initially sell their harvest to the community of Roodewal, but eventually to other areas of the Mangaung. This distribution method would have an environmental impact, which should be considered avoiding if there was no substantial value creation for Lesedi.

The use-phase aspect of for Lesedi is that of any small scale agricultural business. The vegetables only require a small amount of energy to consume the vegetables, and some do not require any such as the spinach. The same can be said for the medicinal herbs Lesedi provides. Therefore, there is minimal environmental impact in the use phase.

5.5.4. Social Business Model Variables

Figure 27. Lesedi Meraka Village Social Variables

Local Communities	Governance	Social Value	Societal Culture	End-User
Roodewal 'Change Agents' from Re-Future's UFS partners	Complex due to Partners with Financial Control	Poverty Alleviation Food Security	Community Resilience and Action	Roodewal Visitors to Lesedi
	Labor Volunteers		Scale of Outreach Extensive due to partners Primarily in Free State	

Source: Developed by Researcher

One important aspect of the Lesedi business model is the governance structure. As Mary is the person to establish Lesedi, and is the owner of the land, she has significant control over the project. However, with the number of partnerships Lesedi has, Mary often must prioritize and manage against certain aspects of the village per the priorities of partners. Seen most clearly with the constructing of some of the natural-building structures, which is being implemented with the help of UFS, and the Re-Futures Program. The completion of buildings are priority as funding for this part of the project is tied to events being held in during the winter. Meanwhile, the gardens and nursery are still not ready for spring planting of crops.

Due to the partnerships Lesedi has, the number of communities, beyond Roodewal, that the Lesedi project can impact is numerous. The Re-Future project will give the project exposure to other 'change-agents' as well as those who are involved from UFS. Other organizations that attend events will also be motivated to continue to contribute to the Lesedi project and the legacy that Mary hopes it creates. Additionally, those who are not trained in the permaculture or natural building techniques will be exposed to those teachings through involvement with Lesedi.

The scale of outreach for Lesedi is extensive due to the partner organizations, as the project has exposure beyond the community level. These connections are with other organizations near Bloemfontein, but also with people and organizations throughout the Free State and greater South Africa due to UFS's presence.

The labor for Lesedi is one of the areas of difficulty they face in their business model. The labor is almost completely made of volunteers, who often are from different organizations from around Bloemfontein, such as different youth and women's homeless shelters. This means there are inconsistent skill levels from the labor, but more importantly, there is an inconsistency in the passion that the volunteers have. As previously mentioned, Mary would like to hire an employee to help her with the work at Lesedi, but while she is implementing the different parts of the project, she does not have the revenue available to spend on a salary. However inconsistent the labor is though, the different people and organizations that volunteer at Lesedi benefit from getting training in the different permaculture techniques being utilized in the food gardens, and get the exposure that Mary seeks to create with her project.

When looking at the Lesedi village, the societal culture is the most important part of the entire project. While providing food security and health benefits to the local community are important social values for Lesedi to generate, the value in community awareness and cohesion is more important results to Lesedi's long term goals. This community orientation and potential collective action is the social value Lesedi hopes to create. However, there are difficulties in achieving this. Roodewal has mixed demographics, and the white families who do not suffer from food insecurity or chronic illnesses have been slow to show Lesedi their support. Food and health security are not a perceived need by that part of Roodewal, and thus do not have needs addressed by the social value that Lesedi is creating within the community. The hope is that once the project is fully implemented, that all groups within the Roodewal community will come and share the village, to understand the different issues facing each group.

The end-user for Lesedi is the community of Roodewal, as they consume the value proposition of nutritious food and herbal remedies to address food security and health needs. Additionally, the greater Mangaung community can be considered part of the end-user component, as Lesedi

also seeks to make the village a space for sharing knowledge and cultures from the different groups in Mangaung.

5.6. Case Study Typologies

As this research seeks to understand the key principles for UA enterprises, in the Free State, to generate sustainable value, it is important to understand the different types of UA enterprises, and give accurate recommendations for the types present in this research. Therefore, this section aims to classify the case studies discussed throughout this chapter to determine the different types of UA enterprises in the Free State of South Africa.

Often, UA projects are categorized by the socio-economic profiles of the urban farmers, using categories such as location, product destination, size, and technological level (Orsini et al 2013). However, there is no consistent typology for UA systems, with researchers often developing their own approach based on the discipline of the researcher or the intended use of the study (Drechsel et al. 2005).

With that in mind, this research seeks to place the case studies into two separate typologies developed by the Advocates of UA and M. Dubbeling's (2004) Policy Initiatives and Main Types of UA. This typology set up was chosen because existing individual typologies tend to focus on only a few socio-economic aspects of a business, and therefore did not give a full picture of the case studies.

Seven TLBMC variable categories, as well as the size and location descriptions of each case study, have been chosen to categorize the UA projects into the two typologies. The variables are value proposition, activities, partners, functional value, production, societal culture, and governance structure. These variables were chosen from the TLBMC, and others were not, was because these variables had the greatest degree of variance, as seen in the first results section, and focus on the larger aspects of UA business models. Variables, such as end-user and use phase, may present differences between the case studies, but do not necessarily address key differences. Therefore, they were not utilized for this classification.

5.6.1 Typology #1 – Size, Location, and Management System

Advocates of Urban Agriculture (2004) created models of urban agriculture that help enable city planning and advocacy, focusing specifically on the size, location, and type of management of the project. In this typology, the authors create three models of urban agriculture, categorizing urban agriculture projects into *home gardens*, *community-based gardens*, and *commercial gardens and small farms* (Advocates of Urban Agriculture). These categories are defined below:

- *Home Gardens* – The gardens are usually small and adjacent to a house or apartment, managed by residents, with production primarily for home use. Small-scale income generation from produce or value-added products is possible.
- *Community-based Gardens* – The large garden plot is subdivided into several small plots. They are located on other city or community-owned land or on grounds of schools, churches, community centres, food pantries, and housing developments. They are either managed by member of the community or by the institution involved.
- *Commercial Gardens and Small Farms* – Plots vary in size, but are usually large than those in home or community gardens worked by households. They are usually located in vacant lots in commercial or residential areas either owned or leased by the producer

5.6.2. Typology #1 – Results

For the first typology, the case studies were categorized based on the size and location descriptions, and governance structure. Using these variables, two case studies were categorized as *home gardens*, one as a *community based garden*, and one as a *commercial garden*. These categorizations are discussed below.

Figure 28. Case Study Variables for Typology #1

TLBMC Variables

Case Studies				
	QPT	Lukhanyiso	GSS	Lesedi
Governance	<ul style="list-style-type: none">Self-Managed	<ul style="list-style-type: none">Overseen by MunicipalityOperated by CWP	<ul style="list-style-type: none">Self-Managed	<ul style="list-style-type: none">Self-Managed, but Partners Involved in decisions
Size	<ul style="list-style-type: none">200 sq meters	<ul style="list-style-type: none">350 sq meters	<ul style="list-style-type: none">60 sq meter	<ul style="list-style-type: none">1.5 hectares
Location & Garden Type	<ul style="list-style-type: none">Suburban Backyard Garden	<ul style="list-style-type: none">Municipal PropertyAdjacent to High School	<ul style="list-style-type: none">Township Backyard Garden	<ul style="list-style-type: none">Small Holding Property

Source: Developed by Reseacher

Qala Phelang Tala: QPT is a home garden as it is quite small (10m x 20m), in the backyard of Mr. Olivier's home, and Mr. Olivier's family operates the garden. Additionally, while the vegetables grown from the garden are not used by QPT, the vegetables generated by the garden are used in Mr. Olivier's house, and none of it is sold.

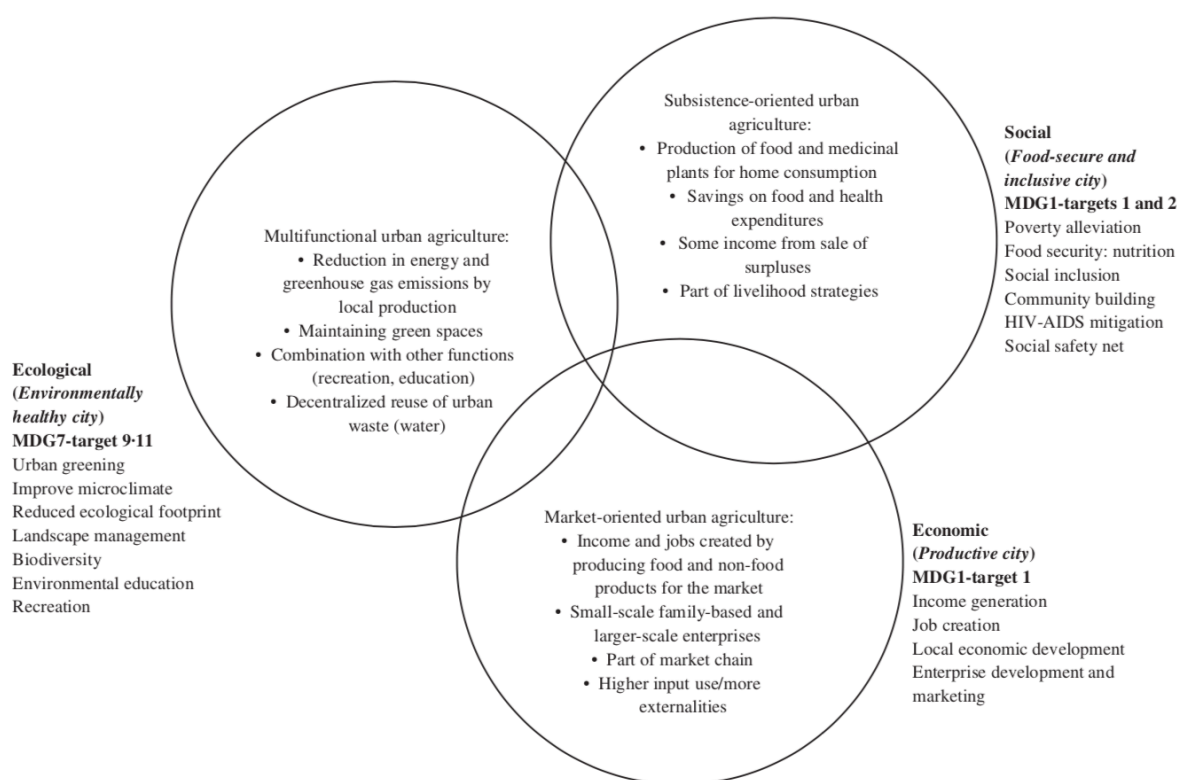
Lukhanyiso Green Project: Since Lukhanyiso is managed by the municipality and CWP, and is on land owned by the municipality next to a high school, this case study is categorized a community-based garden. While the project is not subdivided into smaller plots for community members to work themselves, the project is meant to help feed the community, and does have a income generation aspect for the community as the CWP workers come from the Kutlwanong.

Germinating Seeds for Success: As GSS is conducted in Nceba's backyard, and therefore small, and is managed by Nceba, GSS very clearly is a home garden. Additionally, GSS does produce income for Nceba, while he uses food surpluses for his household's food security.

Lesedi Meraka Village: While the garden activities occur in the backyard of Mary’s home, this project is in the commercial gardens category. Lesedi is located on a small holding owned by Mary, and the size is much bigger than a typical home garden. While the some of vegetables grown will be used for home consumption, a majority will be sold or given to people in Roodewal, potentially creating income generation.

5.6.3. Typology 2 – Main Policy Focus

Figure 29. Typology #2



Source: Dubbeling 2004

For the second typology, Dubbeling (2004) developed a typology for UA to understand the multiple functions it could have on sustainable development, allowing for the main policy dimensions of projects to be understood. To Dubbeling (2004), UA can be socially, ecologically, or economically focused, with those focuses denoting other classification aspects for projects. These categories are further defined below:

- *Socially Focused UA* – Socially focused UA projects often is subsistence-oriented agriculture, with the main purpose projects being food production and medicinal plants for household consumption. Due to this purpose, this type of UA is often practiced by the urban poor. Additionally, these types of UA projects can produce a small income with the sale of surpluses. While these projects show very low profitability, they often provide social benefits, such as social inclusion, poverty alleviation, community development, and HIV-AIDs mitigation
- *Economically Focused UA* – Economically focused UA is often market-oriented, with activities not only focusing on food production, but also growing of flowers or ornamental plants sometimes. Additionally, these projects are often embedded in chains of producers, providing inputs for larger enterprises. Market-oriented UA also create larger economic impacts than other types of projects, as well as being profitable. However, they also have larger negative impacts, such as soil and water contamination due to agrochemical usage.
- *Environmentally Focused UA* – With environmentally focused projects, UA is used in a multifunctional capacity, with food and income generation still provided from the project, but also trying to play a role in environmental management of urban spaces. This environmental management activities can include activities such as decentralized composting, reusing of organic waste and wastewater, leading these projects to utilize production methods linked with eco-sanitation and sustainable waste management.

Seven TLBMC variable categories, as well as the size and location descriptions of each case study, have been chosen to help define the urban agriculture projects discussed in this results section, and fit them into these two typologies. The chosen typologies are value proposition, activities, partners, functional value, production, societal culture, and governance structure. The reason why these variables were chosen from the TLBMC, and others were not utilized for the typology, was because the variables used clearly showcase the key differences between these urban agriculture case studies. Variables, such as end-user and use phase, may present differences between the case studies, but do not address key differences between them. Therefore, they were not utilized for this classification.

5.6.4. Typology #2 – Results

For the typology developed by Dubbeling, the TLBMC variables utilized were value proposition, activities, partners, functional value, production, and societal culture. Using these variables, two

case studies were categorized as Subsistence Focused UA, and two case studies were categorized as Environmentally Focused UA. No case studies were categorized as Economically Focused UA. These categorizations are discussed below.

Figure 30. Typology #2 Variable Components for Case Studies

		Case Studies			
TLBMC Variables		QPT	Lukhanyiso	GSS	Lesedi
	Value Proposition	<ul style="list-style-type: none"> Educational Training and Consulting for Food Security and Poverty Alleviation 	<ul style="list-style-type: none"> Short Term Food Security UA Trainings for community 	<ul style="list-style-type: none"> Affordable Nutritious Vegetables 	<ul style="list-style-type: none"> Nutritious Vegetables & Herbal Medicines Community Gathering Space
	Partners	<ul style="list-style-type: none"> Limited partnerships to gain access in Mangaung 	<ul style="list-style-type: none"> Partners with Municipality, CWP, and Free State D.E.A 	<ul style="list-style-type: none"> No Partners (Previously Partnership with Spar) 	<ul style="list-style-type: none"> Partners with UFS, Re-Futures Project, and Volunteer Orgs
	Activities	<ul style="list-style-type: none"> Garden Management Trainings & Consultations 	<ul style="list-style-type: none"> Garden Management Sale of Produce, Community Trainings 	<ul style="list-style-type: none"> Garden Management Sale of Produce 	<ul style="list-style-type: none"> Garden Management Sale of Produce Eco-building Community Engagement
	Functional Value	<ul style="list-style-type: none"> Knowledge Transfer of UA Techniques 	<ul style="list-style-type: none"> Affordable & Nutritious Vegetables 	<ul style="list-style-type: none"> Affordable & Nutritious Vegetables 	<ul style="list-style-type: none"> Affordable & Nutritious Vegetables Community Engagement
	Production	<ul style="list-style-type: none"> Sustainable, Organic UA Techniques Food Preservation Resource Recycling Trainings Travel 	<ul style="list-style-type: none"> Sustainable, Organic UA techniques Resource Recycling Trainings 	<ul style="list-style-type: none"> Sustainable, Organic UA techniques Resource Recycling 	<ul style="list-style-type: none"> Permaculture UA techniques (not organic) Resource Recycling
	Societal Culture	<ul style="list-style-type: none"> Self-Reliance Environmental Awareness Water Conservation 	<ul style="list-style-type: none"> Self-Reliance Environmental Awareness Water Conservation 	<ul style="list-style-type: none"> Self-Reliance Environmental Awareness Water Conservation 	<ul style="list-style-type: none"> Community Cohesion & Resilience

Source: Developed by Researcher

Qala Phelang Tala: With the value proposition and functional value of QPT's work directed at transferring sustainable UA techniques to different communities, QPT fits into Environmentally Focused UA. Even though the purpose of QPT's functional value and value proposition are for poverty alleviation and food security, leading some to categorize the enterprise as socially focused us, there is a distinct environmental education component to their work. With the production method being very clearly sustainable and organic, the knowledge transfer that QPT

delivers can be considered environmentally friendly training, that seeks to reduce the ecological foot print of local production in these impoverished communities.

Lukhanyiso Greening Project: Lukhanyiso presents the most difficult categorization. Lukhanyiso has a multi-functional value proposition, with food provided by the garden, long term food security provided by the educational trainings, as well as urban greening. This is clearly environmentally focused UA. However, the project also has job creation and income generation for the CWP, which are distinctly aspects of economically focused UA. While these aspects of Lukhanyiso cannot be ignored, the economically focused UA categorization does not apply to other aspects of Lukhanyiso, as the project is not a part of a market chain providing food to larger organizations. Therefore Lukhanyiso is better categorized as environmentally focused UA.

Germinating Seeds for Success: GSS is a socially focused UA project. GSS sole purpose is socially focused, as the value proposition is short term food security by providing affordable vegetables to the community, and freeing up financial resources for them. Additionally, Nceba uses the food surplus to support his household consumption. While socially focused UA typically is subsistence first and then sale of surplus after the fact, GSS still fits well within this categorization.

Lesedi Meraka Village: Lesedi also presents a very clear categorization. As Lesedi is an UA project, food production is a clear aspect of the enterprise. However, the value proposition and functional value of Lesedi also look to encourage community building and HIV-AIDs mitigation, which falls into the socially focused UA. While income generation, environmentally friendly production and recycling are all aspects of Lesedi, they are not the primary focus, and therefore do not lead to Lesedi being environmentally or economically focused UA.

5.7 Impacts of Case Studies and TLBMC Coherences

5.7.1 Qala Phelang Tala (QPT) Impacts

QPT Economic Impacts

While Mr. Olivier is keen to share QPT's sustainable agriculture practices, the expenses and costs from QPT's food garden come directly out of his pay check for his political role.

Other than fuel consumed for his travel between community training events, the materials that Mr. Olivier's project requires are seed, water, garden infrastructure, and preservation materials, all of which are acquired at low costs, or sourced from within the project, as seen with the gray water system.

Figure 31. Qala Phelang Tala Economic Costs and Revenues

Costs	Revenues
Fuel Consumption Largest Economic Cost Remaining costs are minimal	Revenue from Presentations and Consultations

Source: Developed by Researcher

Almost all the food that Mr. Olivier's project produces goes to his own household consumption, therefore there is not a strong income generation component to his vegetable cultivation activities. However, his work has been successful so much that he is sometimes asked to give a paid lecture or presentation at universities throughout South Africa, which can reach as high as 10,000 Rand (645 Euros) per presentation in some cases.

The overall economic impact of QPT is positive, as the only significant cost to the project is the fuel to travel. The income generation from the consultations and presentations that Mr. Olivier conducts are significant enough to cover the fuel costs. Additionally, he sees his outreach into communities through these trainings and consultations as a way for him to help get himself, and

his party, more votes on election day, and therefore feels alright in allocating his income for these purposes.

QPT Environmental Impacts

Since QPT seeks to alleviate poverty and bolster food security in communities, the main service that this project provides is educational lectures and trainings to impoverished, government-dependent communities. This means that there is little negative environmental impact for the communities that he reaches. QPT's sustainable techniques for small scale agriculture can only have a positive effect as knowledge transfers have no inherent negative environmental costs. However, the fact that QPT must travel to many of these communities highlights the biggest environmental impact his project creates, which is consumption of fossil fuels for transportation.

Figure 32. Qala Phelang Tala Environmental Costs and Benefits

Environmental Costs	Environmental Benefits
Fuel for Travel	Empowering Communities to use Backyard Gardens
Knowledge Transfer has no environmental costs	Better Health
	Potential Ecological Value Generation

Source: Developed by Researcher

On the otherside, QPT's food garden and training activities produces far larger environmental benefits than environmental costs. Since his approach focuses on empowering households in the community through small scale agriculture practices, which eventually can strengthen the community at large, his trainings capacitate the entire community to partake in these sustainable backyard vegetable gardens, and potentially produce positive ecological value themselves. Additionally, by having better access to food, these households will have a better nutritional status

As there are no significant environmental costs for QPT other than traveling to communities, and the project produces several environmental benefits for the communities and groups it interacts

with, the enterprise can be clearly seen as being environmentally sustainable. The project could be even considered environmentally regenerative, as there is great potential for more environmental awareness if enough people and communities are capacitated by QPT’s work.

QPT Social Impacts

While social value and societal culture that Mr. Olivier’s project brings to communities are very apparent social benefits for the communities, they also create consequences, or social costs, with the dialogue within his presentations and work at large. Most directly, his presentations and work advocate for individualism and self-reliance, which in turn could potentially create animosity towards government or QPT’s work. Mr. Olivier’s presentations and trainings do not criticize the government, but distinctly says that waiting for government to help is not worthwhile, pointing to the South African government’s ineffectiveness. Additionally, Mr. Olivier is an African National Congress (ANC) councilor, and therefore, communities are sometimes unwilling to trust what he is saying just based on his political affiliation. While these instances are rare, and usually only occur with people from the Economic Freedom Fighters (EFF) party, it is still a negative social result as it would be creating social division.

Figure 33. Qala Phelang Tala Social Costs and Benefits

Social Costs	Social Benefits
Presentations and Trainings Can Create Animosity and Political Divide	Communities are Empowered to Take Control of their Food Access

Source: Developed by Researcher

Additionally, while much of his work has been successful in helping to alleviate poverty and food security in communities, he has not always received praised from politicians who often seek to prevent him from gaining more political authority, which would be at their own expense. However, the social benefits that Mr. Olivier’s project generates with a culture of self-reliance vastly out-weighs these previously mentioned potential social costs the project generates. QPT’s culture of self-reliance has successfully empowered communities before, and it does not seem

that the social costs will be overtake those benefits Overall, the QPT food garden can be considered socially beneficial with the value that it creates.

5.7.2. Qala Phelang Tala Coherences

Figure 34. QPT Economic Layer

Partners	Activities	Value Proposition	Customer Relationship	Customer Segments
No consistent partners	Training & Consulting Garden Activities Travel	Educational Training & Consulting for UA (Long Term Food Security)	Activist Relationship	Impoverished Communities
Student Groups only when needed in Mangaung Municipality	Resources UA garden resources Garden (as intellectual resource) Fuel		Channels Through trainings, consultations, and presentations	Politicians Activists
Costs		Revenues		
Fuel Consumption Largest Economic Cost Remaining costs are minimal		Revenue from Presentations and Consultations		

Source: Developed by Researcher

QPT Economic Horizontal Coherence

While the project is economically sustainable, the most important economic horizontal coherence seen in QPT begins with the resources that the project utilizes. The resources that the QPT food garden uses are low cost, as many of them are sourced from within the project for free or are recycled materials that Mr. Olivier acquires from junk yards and abandoned food projects around Bloemfontein. What this means is that most of financial resources for QPT can be allocated to travel and giving the trainings, presentations, consultations to impoverished communities as well as other organizations. Therefore, QPT can utilize its money mostly for fuel (resource) to travel

and give presentations and trainings (activities), allowing Mr. Olivier to have an issue expert customer relationship through his presentations and trainings with the different customer segments he works with. This coherence is key to QPT being successful in (reference goals in narrative) because with more expensive resources required for the QPT garden, the project would have less money to allocate to travel, but also be limiting the customer segments that could be reached due to the higher financial costs would not be feasible for the most impoverished communities.

Figure 35. Qala Phelang Tala Environmental Layer

Supplies and Out-sourcing Fuel Preservation Materials Mechanical Components	Production Low Cost, Organic Triple Cropping Recycling components	Functional Value Knowledge of Sustainable UA	End-of-Life When people choose to use the UA knowledge Potential re-use and sharing of knowledge	Use-Phase Consumption of UA knowledge
	Materials UA garden resources Fuel for travel		Distribution Knowledge Transfer of UA Techniques	
Environmental Costs Fuel for Travel Knowledge Transfer has no environmental costs			Environmental Benefits Empowering Communities to use Backyard Gardens Better Health Potential Ecological Value Generation	

Source: Developed by Researcher

QPT Environmental Horizontal Coherence

An interesting horizontal coherence in the environmental layer for QPT is the trade-offs between the use-phase, end of life, and distribution components of the business model. As QPT's main output is the knowledge to construct and maintain a low cost, high yield, sustainable food garden, there is no negative environmental impacts for consumers. The consumption of the

knowledge and establishing of a sustainable food garden can only be ecologically positive, if implemented correctly, while using this knowledge has no disposal costs, and can potentially be shared or ‘reused’ with other members of communities or organizations. However, for that output to occur, QPT must distribute that output by traveling to communities and organizations throughout the Free State and South Africa, requiring significant fuel, which does have a negative environmental impact. Therefore, for the use-phase and end of life components to be ecologically positive, QPT must incur negative environmental costs from fuel consumption in order to share that knowledge, or the functional value of their services. While there are both environmental costs and benefits within this coherence, with the potential re-use of the knowledge gained through the functional value, this coherence can be considered ecologically beneficial within QPT’s business model. What is important to take away from this coherence is that there are going to be inherent environmental impacts in any enterprise, even for small scale urban agricultural projects that focus on sustainability. However, even with those environmental costs, long term environmental benefits can still be generated, eventually outweighing those initial costs.

Figure 36. Qala Phelang Tala Social Layer

Local Communities	Governance	Social Value	Societal Culture	End-User
Impoverished Communities	Private ownership	Poverty Alleviation	Culture of Self Reliance	Impoverished Communities
Politicians	Labor Mr. Olivier & his family	Food Security	Scale of Outreach	Government Officials
UA Activists			Local, Provincial, and National levels of outreach	Activists
Social Costs Presentations and Trainings Can Create Animosity and Political Divide			Social Benefits Communities are Empowered to Take Control of their Food Access	

Source: Developed by Researcher

QPT Social Horizontal Coherence

One of the reasons QPT is socially beneficial is because Mr. Olivier is a politician, and utilizes social media to showcase the successes of his backyard garden, QPT has a very large scale of outreach. This horizontal coherence allows QPT to interact with many different groups, from impoverished communities who directly benefit from his teachings, to politicians and academics who can utilize his teachings to benefit the groups they interact with. While scale of outreach does create social value in the form of poverty alleviation and food security to impoverished communities, directly through QPT or indirectly from other organizations, more importantly it allows for the broad dispersion of a societal culture that emphasizes individualism, resiliency, and sustainability. Simply put, the scale of the outreach enables the social value to reach multiple communities, leading to a broad reaching societal culture. This is a key coherence for QPT to be successful because this individualistic, resilient, and sustainable societal culture is the key for impoverished communities to have long term poverty alleviation and food security, as it encourages them to be less reliant on government organizations that often fail to deliver services promised to communities.

QPT Vertical Coherence #1

As mentioned before, there is a strong coherence between the low cost of resources of the food garden, allowing for fuel for travel to be the main economic cost of QPT. Taking this further though, since traveling to the different communities and organizations is how QPT distributes the sustainable urban agriculture techniques, this maximizes QPT's ability to distribute the knowledge transfer or their functional value. By maximizing the distribution of these skills and methods through the different consultations, trainings, and presentations, QPT can reach all the different customer segments and communities affected the project. This leads to broad reaching social value, as impoverished communities gain skills that can improve their food security and financial resources, while politicians and activists can gain insight into how to effectively help at risk households in South Africa. Therefore, because the production and garden resources are low cost, travel is possible and can help facilitate the distribution of the functional value of QPT, allowing for the creation of social value for several communities.

QPT Vertical Coherence #2

Another vertical coherence for QPT also focuses on the low costs of the resources and simple production method required for the food garden. Since the primary customer segment for QPT is impoverished communities, by having the resources and production methods be low cost and easily implementable, this enables the knowledge or functional value to be easily transferable to these communities. This is key to QPT business model because with a more complex or expensive type of food garden, more barriers would exist, either preventing or discouraging this primary customer segment from engaging with small scale, urban agriculture. If this occurred, the social value and societal value of QPT would not be as large. Simply put, this coherence between the resources and production methods enables the functional value to be easily transferable to all types of potential practitioners of urban agriculture, including the main customer segment, leading to broad social value and societal culture of self-reliance.

5.7.3. Lukhanyiso Greening Project Impacts

Lukhanyiso Economic Impacts

Fortunately, as the Lukhanyiso project is under the authority of the municipal government, both water and labor are paid out of separate budgets, leading the only substantial regular financial costs being seed and fuel needed for the transportation of the food to members of the community. It should be noted that the non-profit implementing the project was originally given 5,000,000 Rand to cover all labor and materials needed within the first year, showing the significant investment being made by the partner organizations. Additionally, the infrastructure of the project site, such as pipes and fences, often need to be repaired due to vandalism or deterioration.

Figure 37. Lukhanyiso Greening Project Economic Costs and Revenues

Costs	Revenues
Seed	
Fuel	
Startup Costs, Labor, and Water paid by partners	10,000 Rand/year from vegetable sales

Source: Developed by Researcher

From the revenue side, the project generates about 10,000 Rand a year from the vegetables that they sell to the community at a reduced cost, which goes to covering seed, petrol, and adhoc repairs to the infrastructure in and around site. If the labor and initial startup costs, which are covered by the partner organizations, are not considered in the overall economic impact, Lukhanyiso, on its own, can be considered economically beneficial with the value that enterprise creates. There are very few costs due to the low cost, high yield food garden, and a constant revenue stream despite selling the produce at a reduced price to community members, which is reinvested back into the project.

Lukhanyiso Environmental Impacts

The aspect of the environmental layer of Lukhanyiso's business model that has a significant environmental cost is the water usage. With the garden being almost 150 square meters in size, having multiple layers used within that space, the water requirements are significant, being approximately 19.7M liters of water needed every year (approximation method from FAO). The water supply comes from bore hole installed by the municipality in an adjacent field when the project began, meaning there are no significant water transportation costs or impacts, but it is a community source for water, and is subject to regulation in times of drought.

However, the project does have several environmental benefits because of the activities. The training methods being taught to the community are all sustainable, organic, and environmentally friendly techniques. Through this transfer of skills, community members should understand the

environmental capacity and needs of their home garden to be successful, and thus will become more aware of the need to protect their local environment.

Figure 38. Lukhanyiso Greening Project Environmental Costs and Benefits

Environmental Costs	Environmental Benefits
Significant Water Consumption	Environmental Awareness & Health Benefits

Source: Developed by Researcher

Overall, the Lukhanyiso project has a neutral environmental impact. The environmental benefits that result from the activities are quite clearly environmentally beneficial, as the gardening uses sustainable techniques, and the trainings provide residents with the same knowledge, hoping that they will utilize it and become more aware of the environmental consequences of their actions. However, the amount of water used by Lukhanyiso is concerning, especially in South Africa which has experienced substantial drought over the last few years. Until the project finds a more sustainable water system to utilize, or the environmental benefits of the project are spread to enough people, this overall neutral impact will not change.

Lukhanyiso Social Impacts

While the project does strive to make create a culture of self-reliance, through teaching people to produce their own food, but the fact that the produce from the food garden is sold may inhibit that effect to a certain extent. People from the Kutlwanong community may choose to not utilize this knowledge, and therefore remain dependent on the project for their food needs. This is the one potential social cost that could be incurred from the project, but is worth considering as it directly goes against the stated goal of the initiative.

Figure 39. Lukhanyiso Greening Project Environmental Costs and Benefits

Social Costs	Social Benefits
Potential Dependence by Kutlwanong for Food Security from Lukhanyiso	Nutritious Food Consumption Techniques for Long Term Food Security Benefits Doubled with CWP as Labor

Source: Developed by Researcher

The social benefits that can be reaped by project participants are vast, as community members can become more self-sufficient in regards to the food consumption, receive training in sustainable and environmentally friendly agriculture techniques, and in some instances gained additional income. Additionally, the CWP employees gain the training skills that they learn from being a part of Lukhanyiso, and can still employ those same techniques even after they leave the CWP for potentially other jobs. Due to this, Lukhanyiso can provide both short term, and potentially long term food security and poverty alleviation, if those skills are acted upon. Therefore, the Lukhanyiso project is overall socially beneficial with the value that it produces as a business.

5.7.4. Lukhanyiso Coherences

Figure 40. Lukhanyiso Greening Project Economic Layer

Partners Several Partners Project Under Authority of Municipality	Activities Training & Consulting Garden Activities Urban Greening	Value Proposition Intensive Food Garden (Short Term Food Security) Knowledge Transfer of Sustainable UA (Long Term Food Security) Community Greening	Customer Relationship Community Based Food Project Issue Experts	Customer Segments Kutlwanong Community
	Resources UA garden resources (seed, water, recycled materials) Fuel		Channels Community Outreach via word of mouth	
Costs Seed Fuel Startup Costs, Labor, and Water paid by partners			Revenues 10,000 Rand/year from vegetable sales	

Source: Developed by Researcher

Lukhanyiso Economic Horizontal Coherence

As mentioned above, much of the costs for the project are covered by the partners, and thus highlights a key coherence in the enterprise. With both the municipality and the Department of Environmental Affairs as partners to the Lukhanyiso project, they supply many of the most expensive resources for the project. Specifically, the partners pay for the labor costs from CWP, give free access and usage to the municipality's water system start, not to mention paying for all the initial startup costs to the project, which were budgeted for 5M Rand. With these resources not being paid for by Lukhanyiso, the project to has minimal overall costs, and can focus its financial resources to growing and maintaining the garden, with seeds and garden infrastructure being the biggest resources that Lukhanyiso directly purchase. By focusing on maintaining the garden for low cost, Lukhanyiso can sell reduced price vegetables to the surrounding community of Kutlwanong, bringing money back into the project. Therefore, Lukhanyiso's partner

organizations' resource contributions to the project enable it to provide the value proposition of short term food security while still generating revenue. What is important to take away from this coherence is the potential benefits and successes that partner organizations can have on an urban agriculture enterprise, especially for community oriented enterprises looking to have a broad impact.

Figure 41. Lukhanyiso Greening Project Environmental Layer

Supplies and Out-sourcing Water Resources Labor (From CWP)	Production Sustainable Vegetable Cultivation Trainings	Functional Value Enable Kutlwanong to have better access to nutritious food Food from the Garden (Short Term Food Security) Trainings (Long Term Food Security)	End-of-Life When the food is consumed Using of the Sustainable UA knowledge	Use-Phase Consumption of UA knowledge (No Negative Impact) Consumption of Organic Food (No Negative Impact)
	Materials UA garden resources (seed, recycled materials, electricity)		Distribution Food Distributed House to House Trainings for knowledge transfer	
Environmental Costs Significant Water Consumption			Environmental Benefits Environmental Awareness & Health Benefits	

Source: Developed by Researcher

Lukhanyiso Environmental Horizontal Coherence

Directly relating to that overall neutral environmental impact, an interesting horizontal coherence in the environmental layer of Lukhanyiso's business model centers around the supplies acquired from outside of the project. To get the food garden and the eco-centre operational, the Department of Environmental Affairs invested 5M Rand (321,000 Euros) to cover all startup costs including labor. These costs included building the eco-centre, which includes a solar panel system, the irrigation system being hooked up to the municipal water supply, and the

construction of a protective fence around the project site. All together, these startup costs and activities represent a sizeable environmental impact, as construction would require a large amount of electricity and fuel. However, while the environmental costs to start the project were significant, these costs went towards aspects of the project that have environmental benefits, or help reduce environmental costs. Food garden helps ensure short term food security in the Kutlwanong community, while the eco-centre is used to help train the local community in sustainable vegetable cultivation techniques, seeking to create long term food and nutrition security. Additionally, the eco-centre provides all the electricity needs for the projects as it was built with a solar panel unit. The only outside resource still required by the project that has a significant environmental cost is the water usage from the municipality, but with the implementation of the grey water system, it should help minimize that usage to an extent. Therefore, while the outsourced materials needed to get the Lukhanyiso project going had significant environmental costs, the production methods and functional value that were derived from those startup costs lead to environmental benefits. With time, and the more people that Lukhanyiso empowers through their trainings, the more those initial environmental costs will be cancelled out.

Figure 42. Lukhanyiso Greening Project Social Layer

Local Communities	Governance	Social Value	Societal Culture	End-User
Kutlwanong Community, on two levels	Complex due to Municipal Partners	Poverty Alleviation	Culture of Self Reliance	Community Members of Kutlwanong
Impoverished households	Labor	Food Security	Scale of Outreach	
CWP Workers	CWP Workers	Effectuated Doubled Due to CWP Workers	Local and Provincial Levels of Outreach	
Social Costs			Social Benefits	
Potential Dependence by Kutlwanong for Food Security from Lukhanyiso			Nutritious Food Consumption	
			Techniques for Long Term Food Security	
			Benefits Doubled with CWP as Labor	

Source: Developed by Researcher

Lukhanyiso Social Horizontal Coherence

One important reason for that overall social beneficial designation involves the labor utilized for the project. Since the CWP makes up the labor component of the project, the social value of immediate food security and poverty alleviation affects multiple communities within Kutlwanong, as the CWP employees are people already living within the Kutlwanong community, and can receive pay and reduced price food from the Lukhanyiso project. At the same time, the social value of long term food security and poverty alleviation through training promotes a culture of self-reliance on both those levels because the CWP workers will also gain the skills and knowledge to create their own backyard food gardens in the future, helping to stabilize their livelihoods after they leave the Lukhanyiso project for more permanent jobs. And by gaining these skills, all groups within the Kutlwanong community will be less reliant on government to pay for their food, and less reliant grocery stores from selling them food going forward. Therefore, due to fact that the people who make up the labor for Lukhanyiso can benefit from the food it produces and trainings it conducts, the short and long term social value that the project provides is multiplied across the different communities the project effects, emphasizing the benefits a person or household can receive by embracing a societal culture of self-reliance. This coherence demonstrates how a community food project can be organized to avoid collapse and failure. By focusing the project on benefitting the community, but also giving labor additional benefits such as income and skills training, the project avoids alienating employees who feel they are not benefitting as much as other, which is a common cause for community projects to fail in South Africa.

Lukhanyiso Vertical Coherence #1

Two of the most important vertical coherences for the Lukhanyiso project focus on the partner organizations that it interacts with. First, as stated before, the partner organizations supply many of the materials and resources required for the project, specifically water, labor, training knowledge and the project infrastructure, at little or no cost to Lukhanyiso itself. As those resources are paid for outside of the project's budget, Lukhanyiso can focus its financial resources towards maintaining the food garden to provide short term food security and poverty alleviation, as well as conducting the trainings that can potentially provide long term versions of

these benefits, all while still generating a modest revenue. Therefore, the coherence is how the partner organizations providing substantial resources and materials to Lukhanyiso, allowing the employees to focus on delivering the functional value of the project, producing social value for the communities while generating revenue, which can be reinvested in the project. What is important about this coherence is how partner organizations, especially resource rich partners such as government organizations, can enable a project to truly be successful and beneficial to its target customers.

Lukhanyiso Vertical Coherence #2

However, partner organizations can also have negative impacts on an organization. In the case of Lukhanyiso, by having the Department of Environmental Affairs and the municipality as partners, the governance structure of the project becomes complex. Specifically, these two partners restrict first what money can be allocated for in the project, which can potentially restrict the effectiveness of Lukhanyiso to address new challenges or crises with their value proposition and its functional value. Additionally, since the project is backed by the government, all the skills that Lukhanyiso wants to transfer to the Kutlwanong community must be preapproved by the Department of Environmental Affairs, and the government must be the one to provide that training to employees initially. While this may not seem like a drastic problem, government organizations in South Africa are notorious for failing in service delivery, and often are very slow to getting people and organizations the resources that they need. Thus, there is a negative coherence between the partner organizations and the governance structure, which in turn limits the effectiveness of them to deliver a value proposition of Lukhanyiso, and its derivative functional value. However, this coherence does not completely prevent delivery, and should only be taken as an example of the negative impacts partner organizations can have.

5.7.5. Germinating Seeds for Success (GSS) Impacts

GSS Economic Impacts

The overall costs of the GSS food garden are quite minimal, with Nceba stating he only spends about 200 Rand (approximately 13 Euros) a year on his garden. Initially, he did incur some

startup costs, specifically with some pipes for his water recycling system, but the cost was only 300 Rand, and has since been covered by his profits.

Figure 43. Germinating Seeds for Success Economic Costs and Revenues

Costs	Revenues
200 Rand per year For Seeds and Repairs to Garden Infrastructure	1000 Rand per Year from Vegetables Sold

Source: Developed by Researcher

The primary economic revenue of the project is an income generation from the project that goes directly to Nceba. Since beginning his garden, Nceba makes approximately 1000 Rand a year, meaning his profits are upwards of 300% of his economic costs. Additionally, his project gives financial flexibility for his family as they save money on food, as well as poverty alleviation for the community members who come to his house and purchase the vegetables. With ratio of costs to revenue, it can be clearly seen that the GSS is economically beneficial, despite its small scale.

GSS Environmental Impacts

The most significant environmental impact within the life cycle of the vegetables that GSS grows is the transportation of the manure to the food garden, as Nceba attains it from his grandfather’s farm for free. As Nceba only uses sustainable farming techniques and recycled resources within his production scheme, and has no distribution costs as the community members come to his house to buy the vegetables, GSS’s business model has few environmental costs otherwise. Therefore, the overall environmental costs of the project are quite minimal.

Figure 44. Germinating Seeds for Success Environmental Costs and Benefits

Environmental Costs	Environmental Benefits
Transportation of Manure	Improved Health from Nutritious Food Environmental Awareness

Source: Developed by Researcher

On the other side, there are several environmental benefits that come from Nceba's project. When community members come to his home to buy the vegetables, he uses his garden as a way of showing them that they can take control of their own food security, going as far as to train a few members in the techniques he has learned so that they can replicate the same methods at their own home. Additionally, by having the food garden, Nceba has become more aware of environmental resources he has available to him, and how important they are to maintaining the garden. Initially, Nceba's backyard had soil that was nutrient deficient, but through his work, he has revived his backyard, as well as learned the value of recycling water in a country that suffers from frequent droughts. Looking at both the environmental costs and benefits of the project, it can be clearly seen that, overall, GSS generates positive ecological value.

GSS Social Impacts

This two-sided approach of both providing food, but also showing others in the community his methods is so that GSS does not create a cycle of dependency on him and his garden, the one potential social cost of his project. Nceba is happy to sell to the same families and people who he knows need access to this food. However, if he sees someone multiple times a week coming to buy vegetables, he will stop selling to them, share the methods he uses for his vegetables, and help set up their own garden. This way, he hopes he can prevent people becoming dependent. Other than this, there are no significant social costs to the project.

Figure 45. Germinating Seeds for Success Social Costs and Benefits

Social Costs	Social Benefits
Potential Dependency on GSS from Phase IV Community	<p>Community Members Can Become More Self-Reliant</p> <p>Personal Development for Nceba</p>

Source: Developed by Researcher

There are several social benefits that come because of Nceba's food garden. Nceba's presences and activities through the food garden is helping community members to become more self-reliant, while helping maintain their food security. At the same time, Nceba benefits greatly on a personal level, as he gets personal development through his work, which eventually lead him to pursue mechanical engineering at CUT. Despite the risk of creating a dependency on the food garden for community members, GSS' social benefits clearly outweigh that potential risk, making the enterprise as a whole socially beneficial.

5.7.6. Germinating Seeds for Success (GSS) Coherences

Figure 46. Germinating Seeds for Success Economic Layer

Partners	Activities	Value Proposition	Customer Relationship	Customer Segments
No Partner Organizations	Garden Activities (Sustainable UA)		Community Supplier of Organic Vegetables	
	Resources		Channels	
	UA garden resources (seed, manure, recycled materials)	Affordable, Nutritious Vegetables	Word of Mouth	Phase IV Community
Costs			Revenues	
200 Rand per year For Seeds and Repairs to Garden Infrastructure			1000 Rand per Year from Vegetables Sold	

Source: Developed by Researcher

GSS Economic Horizontal Coherence

While the small size of the project may create the impression it that it limits the economic capability of the enterprise. However, that is not the case. As the GSS food garden is situated in Nceba's backyard, the garden's size dictates that Nceba requires only a limited amount of water, seed, manure, and recycled materials for the garden infrastructure. These resources are already low cost or free resources for GSS, costing approximately 200 Rand for every harvest. With the resources being low cost, GSS can provide short term food security in the form of reduced price vegetables to the surrounding community of Phase IV, and still manages to generate a substantial revenue for the project. Thus, the activities and resources of GSS are both low costs meaning it is easy to provide cheap vegetables to the food insecure households of the Phase IV community while still generating revenue. This coherence clearly showcases the economic success that even a small scale urban farmer can have if their backyard garden is implemented in a cheap and efficient way, as the revenue that the project generates in a year is equivalent to one month's salary for a South African receiving a minimum wage salary (992 Rand/month). On top of that, the GSS food garden also provides food security for Nceba and his family, allowing them to allocate additional financial resources to other activities in the household.

Figure 47. Germinating Seeds for Success Environmental Layer

Supplies and Out-sourcing Seeds Manure for Nutrients (Comes from Grandfather)	Production Low Cost, Organic UA Materials UA garden resources	Functional Value Low cost, nutritious, organic vegetables	End-of-Life When people choose to consumed the vegetables Potential re-use through composting Distribution No Distribution (Community Comes to GSS)	Use-Phase Consumption nutritious, organic vegetables
Environmental Costs Transportation of Manure		Environmental Benefits Improved Health from Nutritious Food Environmental Awareness		

Source: Developed by Researcher

GSS Environmental Horizontal Coherence

As stated before, the environmental layer of GSS's business model allows for the project to generate positive ecological value, and there is one specific coherence that is the cause of that. In the GSS food garden, the production method used is completely organic, utilizing solely natural pesticides and organic manure for nutrients. Additionally, the organic pesticides, manure, seed, water and recycled materials for garden infrastructure are all sustainably sourced from inside the project, or are cheaply acquired, if not free, from outside of the project. Therefore, there are no significant environmental costs associated with the production side of the environmental layer, all while the production of the functional value provides several environmental benefits. Most importantly, the production in the GSS food garden provides health and nutritional benefits from the food it produces and sells. Additionally, though, the garden has helped increase the nutrient capacity of the soil in Nceba's garden, while also providing environmental awareness and knowledge transfer opportunities for the people that purchase food from GSS. Thus, due to the eco-friendly production, and the ecologically friendly sourcing of materials, there are virtually no environmental costs for the functional value, while the production of functional value provides many environmental benefits. The simplicity of the production and functional value of GSS's business is what this coherence highlights, as it showcases how small scale urban agriculturalist can still create positive ecological value despite the size and scale of their project.

Figure 48. Germinating Seeds for Success Social Layer

Local Communities Phase IV Community	Governance Simple Nceba has full ownership	Social Value Poverty Alleviation Food Security	Societal Culture Culture of Self Reliance	End-User Phase IV Community Members
	Labor Nceba is the only labor		Scale of Outreach Local Level of Outreach Only	
Social Costs Potential Dependency on GSS from Phase IV Community			Social Benefits Community Members Can Become More Self-Reliant Personal Development for Nceba	

Source: Developed by Researcher

GSS Social Horizontal Coherence

There is one horizontal coherence that contributes to the overall social beneficial standing of GSS. Since Nceba is the only labor for GSS, and consumes some of the vegetables that are grown in the food garden, GSS creates social value, in the form of poverty alleviation and food security, for both the Phase IV community, as well as for Nceba and his family. As GSS can create this multi-leveled social value, this further demonstrates to the Phase IV community the potential benefits of being self-reliant regarding their own food security and financial flexibility. Therefore, a coherence exists in how GSS can create social value to both Nceba and the Phase IV communities, allowing that social value to be a demonstration or example of what a person can achieve if they buy into a societal culture of self-reliance. This coherence is evidence for how even the smallest practitioners can have a substantial social impact on their household and the surrounding community.

GSS Vertical Coherence #1

For GSS, there are two vertical coherences that showcase why this project is a great model for potential urban agriculture practitioners. First, since many of the materials required for

production in food garden are acquired for free (organic pesticides, seed, manure) or at relatively low cost from recycling (water, garden infrastructure), GSS can provide their value proposition of while still generating revenue for the project. Since Nceba is the sole owner and operator of the project, all off that revenue goes directly to him. To explicitly define this coherence, it is the low-cost materials enabling the delivery of the value proposition, which creates social value for the community of Phase IV at a low cost, all while leading to the generation of a revenue stream. Even though 1000 Rand (64 euros) per year would be considered a very small amount of revenue to people in first world countries, that amounts of money represents a whole month's salary to a South African working a minimum wage job, which over a quarter of the working-age population does not even have. For the average South Africa, if not a majority, that amount of money would represent a significant boost to their income. This boost occurs all while giving the household increased access to sources of food, enhancing their food security. Thus, this coherence showcases the effectiveness of the GSS model potential benefits that urban agriculture can bring to even the most impoverished and food insecure households in South Africa, if they choose to engage in sustainable backyard food gardening.

GSS Vertical Coherence #2

Secondly, with the low cost, environmentally friendly materials and production allowing for revenue generation, the value proposition of short term poverty alleviation and food security that GSS creates has a dual effect on both the community of Phase IV, as food is sold below market value to community members, and Nceba, who receives all the revenue, as well as food for household consumption. Through this dual effect from the social value, the culture of self-reliance that GSS employs is validated. Specifically, it confirms that even when you are starting a backyard garden from very few livelihood resources, you can still successfully create financial and food security benefits from a backyard urban food garden. And not just receiving those benefits because you can supplement your food access, and utilize income differently, but because these types of food gardens can also be income generation source while being socially beneficial to other people and households. Simply put, there is a coherence in how the cheap, eco-friendly materials and production lead to social value of poverty alleviation or income generation, and food security, on multiple levels, validating the societal culture of self-reliance that GSS seeks to demonstrate. What is so important about this coherence is that it is direct proof

that urban agriculture can have a significant impact on an individual's or a household's livelihood, while also having significant benefits for outside people or groups. With GSS as a model, this same type of enterprise can be created and utilized by any level of aspiring practitioner of urban agriculture, and help supplement their food security and income. Further, it is evidence of how even small scale, low tech urban agriculture practitioners can have a sustainable enterprise or business on each of economic, environmental, and social levels of the TLBMC.

5.7.7. Lesedi Meraka Village Impacts

Lesedi Economic Impacts

The most troubling part of the economic aspect of Lesedi are the overall economic costs. Both the bore hole for water, and potential purchase of a bakkie, are both significant costs to the project, that will have additional maintenance and energy costs. Additionally, the size of the food garden of this size will require extra labor, as Mary is 59 years old and cannot maintain the fields herself. Since she hopes to employ someone from the community, the cost of labor will not be significant, but still needs to be factored in.

Figure 49. Lesedi Meraka Village Economic Costs and Revenues

Costs	Revenues
Large Costs for UA Activities (Borehole, Possibly Bakkie)	UFS Grant (100,000 Rand) Social Grant Income (400 Rand/month)

Source: Developed by Researcher

While the project is still not implemented yet, there is still money coming to the project, as Lesedi is receiving funds from the University of the Free State, being approximately 100,000 Rand (6,500 Euros) in total. However, that money comes with restrictions regarding what parts of the project it can be spent on, and UFS only gives out that money only when they see it fit.

Any additional funds that are spent on the project come out of social grants that Mary receives from the government, which amounts to 400 Rand per month. The proposed revenue generating schemes for the Lesedi work in theory, but it remains to be seen how much revenue can be generated from the initial sales of vegetables in Roodewal. As this revenue stream has yet to be established, and the costs of the project substantial, both now and in the future, Lesedi cannot be seen as being economically sustainable at this time.

Lesedi Environmental Impacts

Initially, the overall environmental costs of Lesedi will be coming from the use of pesticides on the crops. Based on the size of the field, it is understandable why the project has chosen to use chemical pesticides, but it represents almost all the environmental cost of the project. However, if the project ends up acquiring a bakkie to sell the produce in other parts of Mangaung, the fuel it used would represent another large environmental cost for the project, depending on the frequency and distance to these other markets. Additionally, it remains to be seen if the scale of the project can be maintained without the use of machinery.

Figure 50. Lesedi Meraka Village Environmental Costs and Benefits

Environmental Costs	Environmental Benefits
<div>Pesticides</div> <div>Potentially Fuel for Bakkie</div>	<div>Health and Nutritional Benefits for Roodewal</div>

Source: Developed by Researcher

Meanwhile, the environmental benefits that the project will create are primarily improved nutrition and health for the beneficiaries of the food and herbal gardens. Additionally, with events occurring in the village for outside organizations, the exposure to the activities going on in Lesedi will help create awareness for benefits one can attain by having a food or herbal garden in their backyard, potentially leading to more projects like Lesedi. While these benefits are wide

reaching, there are still significant environmental costs to the project, leading to an overall environmental neutral value.

Lesedi Social Impacts

Right now, a social cost for the Lesedi Meraka Village is a slow implementation of the social value that the enterprise seeks to deliver. First, the governance structure of the project is complex, as the University of the Free State pre-approves what their grant money goes towards and sometimes prioritizes certain aspects of the village that may not be as urgent or timely as other activities, such as preparing the fields for spring planting. On top of that, the labor that Lesedi utilizes for implementing the project is inconsistent in skill, strength, and passion for the project, as it is all sourced from volunteers from other organizations in Bloemfontein and Mangaung. While using volunteers obviously has its advantages in a financial sense, this is a blatant inefficiency within the business model, even to Mary, but she cannot afford to hire an employee now as the grant money cannot be allocated to labor costs of the project.

Figure 51. Lesedi Meraka Village Social Costs and Benefits

Social Costs	Social Benefits
Slow Implementation of UA Aspects of Lesedi due to Partners and Labor	Food Security and Medicinal Benefits for Roodewal Community Awareness for Issues Community Cohesion

Source: Developed by Researcher

Meanwhile, the social benefits that will stem from the project are quite numerous. On one level, Lesedi will provide social value by enhancing the quality of life for people who are suffering from food insecurity and medical conditions, all using the food garden, nursery, and herb garden. On a second level, by making the gardens features of the village, and seeking to use that as a community gathering place and strengthen the cohesion of the different groups in it. With that in place, Lesedi can sensitize the Roodewal community, as well as others from around Mangaung, to the issues present in their own backyard. While the social layer of Lesedi’s business model is

quite complex, and has led to the inefficient implementation of the project, these difficulties will be lessened once through the implementation stage. Once that occurs, the social benefits of the project will outweigh these social costs, therefore making the project generate an overall positive social benefit.

5.7.8 Lesedi Meraka Village Coherences

Figure 52. Lesedi Meraka Village Economic Layer

Partners	Activities	Value Proposition	Customer Relationship	Customer Segments
Several Partners UFS Re-future Project Volunteer Orgs.	Garden Activities (Permaculture) Eco-building	Affordable, Nutritious Vegetables Medicinal Herbs Community Gather Space	Community Supplier of Organic Vegetables and Medicinal Herbs Food/Health Activist Channels Word of Mouth via Volunteer Orgs & Community Members Outreach via UFS & Re-future partners	Local Community of Roodewal Outside Organizations interested in Lesedi
Costs Large Costs for UA Activities (Borehole, Possibly Bakkie)		Revenues UFS Grant (100,000 Rand) Social Grant Income (400 Rand/month)		

Source: Developed by Researcher

Lesedi Economic Horizontal Coherence

While the project is not currently economically sustainable, that does mean there are not coherences within the project that encourage economic sustainability. Specifically, the Lesedi Meraka Village has several partners, such as the University of the Free State and Qala Phelang Tala, that have helped the project to get off the ground with significant investment in the infrastructure of the village. Specifically, Qala Phelang Tala has helped provide the intellectual knowledge of natural building techniques that have been used to construct the eco-buildings, while the grant given by the university has helped pay for the construction of the borehole and the metal roofing necessary for the eco-buildings. With these significant resources covered by the partner organizations, Lesedi is enabled to focus their money on purchase lower cost

resources, such as seed, pesticides, and electricity for the water pump, all which go towards growing vegetables in the food garden, herbal garden, and nursery. Additionally, while not official partnerships, Lesedi works with several volunteer organizations from around Bloemfontein that help provide the project with free labor, again allowing for money to be allocated to other parts of the project. Therefore, the partnerships that Lesedi holds allows them to acquire important intellectual, human and physical resources, all which better enable Lesedi to provide food security, medicinal alternatives, and a community gather space (the value proposition) for the Roodewal Small Holdings area of Bloemfontein.

Figure 53. Lesedi Meraka Village Environmental Layer

Supplies and Out-sourcing	Production	Functional Value	End-of-Life	Use-Phase
Pesticides	Low Cost, Organic UA (Permaculture)	Low cost, Nutritious, Organic Vegetables Medicinal Herbs	When people choose to consumed the vegetables	Consumption nutritious, organic vegetables
Electricity	Materials		Distribution	
Bakkie	UA garden resources		Initial Distribution done at Lesedi	Consumption of the medicinal
Fuel			Future Distribution Using Bakkie	
Environmental Costs			Environmental Benefits	
Pesticides			Health and Nutritional Benefits for Roodewal	
Potentially Fuel for Bakkie				

Source: Developed by Researcher

Lesedi Environmental Horizontal Coherence

An important coherence in the environmental layer of Lesedi's business model involves the functional value and the outsourced services and supplies of the project. The main outputs of Lesedi are clearly the short-term food security provided by the vegetable cultivation, as well as the medicinal alternatives provided by the herbal garden. These can only have positive environmental benefits in the form of better nutrition and health for the Roodewal community members who these outputs are targeted at. However, to facilitate the production of that

functional value, Lesedi requires several materials, specifically chemical pesticides, electricity, and potentially fuel for distribution, that all have negative environmental impacts. Thus, the coherences here is that while the production and functional value only create environmental benefits, to facilitate that output, there are a number of supplies that are outsourced for production, which lead to environmental costs within the business model. As the project is still in implementation stages, it remains to be seen if the environmental benefits of the functional value and production outweigh the environmental costs caused by the outsourced materials.

Figure 54. Lesedi Meraka Village Social Layer

Local Communities	Governance	Social Value	Societal Culture	End-User
Roodewal	Complex due to Partners with Financial Control	Poverty Alleviation	Community Resilience and Action	Roodewal
‘Change Agents’ from Re-Future’s	Labor	Food Security	Scale of Outreach	Visitors to Lesedi
UFS partners	Volunteers		Extensive due to partners Primarily in Free State	
Social Costs			Social Benefits	
Slow Implementation of UA Aspects of Lesedi due to Partners and Labor			Food Security and Medicinal Benefits for Roodewal	
			Community Awareness for Issues	
			Community Cohesion	

Source: Developed by Researcher

Lesedi Social Horizontal Coherence

The key coherence that enables Lesedi to produce positive social value involves the scale of outreach component of the business model. The local communities that are involved in the Lesedi project are extensive, as the project works with the University of the Free State, the Re-Future Project, and several volunteers from non-profit organizations from Bloemfontein, all in addition to the Roodewal community that the project is based in. This allows for Lesedi to have an extensive scale of outreach on neighborhood, local, and provincial levels. With this extensive outreach, the societal culture of community cohesion and community resilience can reach all the

communities. Therefore, the scale of outreach of the Lesedi Meraka Village is extensive and allows for the societal culture to reach many different communities in and around Mangaung.

Lesedi Vertical Coherence #1

One of the more concerning coherences seen with Lesedi is how the involvement of partners can disrupt the delivery of the value proposition, and its derivative functional value. With Lesedi having many partners involved in the project, some of which provide funding for some of its activities, the implementation of the food gardens has been given less of a priority than the construction of the eco-buildings due to partners providing resources and wanting to see those aspects implemented immediately. However, because of this, the volunteer labor that helps at Lesedi has not been begun to be prepare the food and herbal gardens for planting in the spring, and it will take a considerable volunteer labor effort to do so as there is no access to machinery to make the process more efficient, only further complicates the situation. Consequently, the value proposition of increased food security and medicinal benefits that Lesedi hopes to provide to the community of Roodewal is at risk of being significantly delayed, showcasing a flaw or inefficiency within their business model. Simply put, the partner organizations involvement in Lesedi's governance structure are leading to the ineffective delivery of the value proposition, and its derivative functional value of vegetables and herbal medicines. This coherence is important to take note of because it demonstrates the potential issues that may arise by having partner organizations, beyond just municipal and government organizations, and allowing those partners to be involved in the governance system of the project.

Lesedi Vertical Coherence #2

Despite the previously stated coherence, there is great potential for Lesedi to be impactful. This can be seen in the coherence that stems from Lesedi's value proposition. The value proposition is multifaceted, with health and nutritional benefits being produced through the food and herbal gardens, while the creation of the meraka for the Roodewal community could potentially lead to better community cohesion and awareness of the problems that the different groups within the community face. And if that does happen, it could also lead to other taking action to help address those problems or issues faced in Roodewal, or other parts of Mangaung. Therefore, the coherence can be defined as how the multi-faceted value proposition enables Lesedi to provide

environmental benefits in the form of better nutrition and health, while seeking to create a societal culture of community cohesion and resilience through the meraka, which can only lead to further social value for its main customer segment if that culture is created and maintained. This coherence is important to Lesedi because it directly gets at how Ms. Mofama intends for Lesedi to have a legacy on the community of Roodewal and Mangaung. Once the project has been fully implemented, it would be interesting to see if this coherence played at as it is intended.

6. Discussion

The aim of this research was to understanding the business model principles for sustainable urban agriculture enterprises in South African by answering the following research question: *What are the key business model principles for urban agriculture enterprises to generate sustainable value in the Free State of South Africa?* In order to answer this research question, several sub questions were stated to help determine an answer to this main research question. These sub questions are answered in the section below.

6.1. Business Model Variations

The first sub question was regarding the different business models that urban agriculture enterprises use in Free State, South Africa. The question specifically was: *What are the different variations in business models for practitioners of urban agriculture enterprises in the Free State?* To do this, the enterprises selected for the case study analysis were explored through in-depth interviews that enabled the creation of TLBMC blueprint for each case study. Through the creation of these TLBMC blueprints, the differences between the TLBMC variables in each case study could be seen and explored.

6.1.1. Economic TLBMC Variations

The different TLBMC variables used across the case studies presented many similarities, but a number of differences. As one would assume, all the case studies had garden activities, such as sustainable agriculture and permaculture, as part of their activities, but some of the case studies went beyond this, with travel, trainings, and eco-building as some additional activities seen. Another area of similarity was seen with the value proposition, as these enterprises sought to help address food security concerns, but how was often different between the case studies, and some of them had multiple aspects to their value proposition. Lastly, the resources for the projects were often similar, as the garden activities were often low cost/high yield methods, but would sometimes include extra resources such as fuel needed for travel or distribution of the harvest. Beyond these three previously stated variables, the case studies had more diverse

economic business model variables. Only two of the case studies had partner organizations, and there were differences in the types of partners that those cases had, Lukhanyiso having government organizations as partners, while Lesedi was partnered with UFS and non-profit organizations. Beyond this, the customer segments, customer relationship, and channel variables were diverse across the case studies, often differing depending on the value proposition of the case study.

6.1.2. Environmental TLBMC Variations

Regarding the differences between the environmental TLBMC variables for the case studies, there was a similar degree of variation seen in the analysis. The production methods and materials used for the project were similar across the case studies as they all practiced low cost/high yield vegetable cultivation techniques. There were slight differences in these sections though, as some of the materials used in the QPT and GSS were sourced from within project, such as garden infrastructure, organic pesticides, and water, while Lukhanyiso and Lesedi outsourced many of the materials used. Beyond these variables, three of the four case studies examined had similar functional value, end of life, use phase, and distribution components to the environmental layer of the TLBMC. The only case study that did not match the other three is QPT as its functional value was the knowledge of sustainable urban agriculture techniques, rather than actual vegetables or food that people could consume. With this difference in functional value, the end of life, use phase, and distribution components of QPT are going to be inherently different than the other three as the consumption of that value will be different.

6.1.3. Social TLBMC Variations

The differences for the social TLBMC variables used across the case studies was an interesting aspect of the case study analysis. Across the case studies, either the variables were very similar or quite different. Being quite similar across the case studies, the social value and end user components were very focused on creating value in the form of food security and poverty alleviation. Additionally, the societal culture that the case studies was very similar, often trying to create a culture of self-reliance, with Lesedi being the exception. However, beyond those three

components, the case studies presented a wide variety of social business model variables. The governance component was different across all the case studies, as some cases had partners, in varying degrees of involvement, while others had none, or only used partners in certain circumstances. Depending on the size of the enterprise, the labor component was very different between the case studies, with some requiring no labor beyond the individual practitioner, while others utilized volunteers or formal government work programs. Additionally, the size of the enterprise would often affect the scale of outreach, which in turn would affect the different communities that the enterprise could reach.

Overall, the case studies analyzed provide several different business model variations for urban agriculture enterprises in the Free State. Through this analysis, the case studies' business models could be examined, allowing for them to be categorized in to typologies, and better inform the main research question.

6.2. Typologies

As mentioned, the TLBMC variations found in the first part of the case study analysis can be used to categorize the case studies into types of urban agriculture enterprises. Specifically, the were used to answer the following sub question: *What are the different types of urban agriculture enterprises that these business model variations produce?* To answer this question, the TLBMC variables were used in conjuncture with two different typologies of urban agriculture, to give a holistic picture of the types of urban agriculture found in this case study analysis. The two typologies were developed by Advocates of Urban Agriculture (2004) and Dubbeling (2004).

6.2.1 Typology #1

For the first typology, developed by Advocates of Urban Agriculture the case studies were broken up into the categories of home gardens, community-based gardens, and commercial gardens and small farms. As mentioned in the results section, these categorizations were based off the size of the project, the location it was based in, and how the garden or farm was managed.

The TLBMC variable used to make these categorizations was the governance component, in addition to the size and location descriptions given in the narratives. Of the case studies examined in the analysis, two qualified as home gardens, one as a community-based garden, and one as a commercial garden or farm. While this sample size is surely small, the categorizations seen in this typology analysis match up with impressions of the more common types of urban agriculture enterprises found in the Free State, and South Africa. Information regarding community projects referenced during fieldwork, and information found in preliminary research, indicate that community projects often struggle to stay operational for more than a few years, if that, and often South Africans do not own or have access to the amount of land required for their urban agriculture project to be qualified as a commercial garden or farm. Therefore, it would not be surprising if these categorizations for the first typology were like the reality seen across the Free State and South Africa, despite the small sample size.

6.2.2. Typology #2

For the second typology, developed by Dubelling, the case studies could be placed into the categories of environmentally focused urban agriculture, socially focused urban agriculture, and economically focused urban agriculture. What this typology sought to understand was the overall goals of the enterprise, and how they seek to create value. To do this, the TLBMC variables of value proposition, activities, partners, functional value, production, and societal culture were used to make the categorizations. Of the case studies in the analysis, they were divided evenly with two cases being environmentally focused urban agriculture and two cases being socially focused urban agriculture. None of the case studies fell into the economically focused urban agriculture category. It should be noted that while two of the case studies fell into the environmentally focused urban agriculture category, due to the multifunctional aspects of those cases. It can be seen that both of these cases, QPT and Lukhayniso, overlap with the socially focused urban agriculture category, as they often focused primarily food security and poverty alleviation first, with environmental components coming in as secondary goals of the project. Therefore, it can be stated that the case studies used in this analysis often focused on social initiatives, while also being somewhat environmentally focused.

6.2.3. Typologies Summary

With the case studies categorized into these two typologies, this research can say that the case studies seen in this analysis most closely resemble urban agriculture enterprises that are small in scale, simple in management, and focused on generating social value using urban agriculture. While these are surely not the only types of urban agriculture enterprises found in the Free State, and greater South Africa, it can be said that the answers to later sub questions of this research will be most beneficial to those types of projects.

6.3. Impacts on Sustainability

Next, this research sought to answer the following sub question: *What are the different impacts on sustainability that the different business model variations produce?* Through the analysis of the TLBMC variables for each case study, costs and benefits were determined for each of the three layers of the canvas of that case. From those economic, environmental, and social costs and benefits, an overall assessment was given to each layer of the TLBMC for that case study. Below are descriptions of those impacts for each of the cases.

6.3.1. Qala Phelang Tala

Overall, QPT had very sustainable impacts across the three layers of the TLBMC. Despite the high amount of travel, the economic layer of its business model was still sustainable as the remaining activities and resources needed were low cost, and revenue was generated through presentations and trainings, which require Mr. Olivier to travel large distances frequently. The environmental layer is very similar, as the fuel needed for the distribution of the knowledge was the only negative environmental cost found in the QPT business model, while numerous benefits were produced from that one cost. Lastly, the social layer of QPT's business model, there are only potential costs of social division, while the social benefits of a culture of self-reliance can already be seen in the projects that QPT consults on.

6.3.2. Lukhanyiso Greening Project

The Lukhanyiso project ended up having positive or neutral sustainable impacts. On the economic level, the overall impact was positive as there were very few costs to the project, as many of the costs were covered by their municipal partners, allowing for revenue generation to occur. The environmental layer of the Lukhanyiso business model was overall neutral, due to environmental cost from their overall water consumption for the project. However, there were several environmental benefits produced from the project, such as better nutrition and environmental awareness, that can have a lasting impact on the Kutlwanong community. The social layer for Lukhanyiso was also positive overall, as there are multiple recipients of the social value generated by the project despite the governance system sometimes slowing the delivery of that value.

6.3.3. Germinating Seeds for Success

Due to the fact the project was the smallest and most simple of the case studies used in this analysis, GSS presented sustainable impacts across all three layers of its business model. Economically, the project's utilization of low cost/high yield vegetable cultivation techniques allowed for revenue generation to occur with minimal costs to Nceba, despite selling his vegetables at reduced price to the Phase IV community. On the environmental layer, these same vegetable cultivation techniques were organic, sustainable, and environmentally friendly, while providing community members with better health and nutrition. All the while, the only environmental cost found within the project was with the fuel consumption when acquiring manure. Lastly, the social layer of GSS' business model clearly produced positive value overall, as food security and poverty generation were provided for the community, while Nceba was able to sustain his and his family's food security and generate an income from the project.

6.3.4. Lesedi Meraka Village

With Lesedi, the impacts on sustainability were harder to determine due to the project still being implemented. However, the project was still able to provide enough information to make

preliminary judgements on what types of impacts the project would produce. For the economic layer, the preliminary judgement was that the project would not be economically beneficial. While Lesedi has many partners, some of which provide financial resources for the project, it remains to be seen if the project will be able to generate enough revenue to cover the costs that are assumed to be there once implementation, such as chemical pesticides and a bakkie for distribution of the harvest. On the environmental level, an overall neutral impact was given as the project seeks to provide food and medicinal herbs to the community, but also will be using chemical pesticides and a significant amount of water. However, the social layer of Lesedi should produce positive social value once the project is implemented, as the project produces social value for the community in the first place, and by having the village be a meraka, the exposure of these issues will hopefully encourage others to strive to do similar work as Lesedi.

6.4 Coherences Trends

The last sub question necessary to answer the main research question specifically had to do with the coherences found in each of the case study business models, and how those led to sustainable impacts. Specifically, the sub question was: *What coherences exist between the variations in business models and the sustainable impacts that those urban agriculture enterprises create?* As the case study analysis already provided the different impacts that the urban agriculture enterprises created, the answer to this sub question were found in looking at the variables that cause those impacts. After analyzing the case studies, and describing the coherences seen in the previous chapter, three different coherences trends stood out within the case studies examined. Those coherences are discussed below.

6.4.1. Coherence Trend #1

One of the most common coherences seen within the case studies examined in this research was the use of low cost resources and activities, specifically the vegetable cultivation techniques. QPT and GSS are the clearest examples of having this coherence trend, as both of those enterprises could utilize recycled materials and simple sustainable agriculture techniques to generate significant yields in their food gardens. While QPT and GSS had different value

propositions and utilize their food gardens for different purposes, the fact that their garden activities and resources are low cost has allowed those enterprises to be very economically sustainable. This same coherence can also be seen in Lukhanyiso and Lesedi, as they also utilize recycled materials and low cost agriculture techniques within their respective projects.

6.4.2. Coherence Trend #2

An important coherence seen in two of the case studies was a coherence where by incurring environmental costs, a project could produce much more impactful environmental benefits. This is first seen in QPT, as negative environmental costs are incurred using fuel for all the travel that Mr. Olivier must do to give his presentations and trainings. The fuel used clearly has a negative impact, but it enables him to give these presentations and trainings, which help produce health and nutritional impacts for the communities he reaches, as well as environmental awareness. This same coherence can be seen in Lukhanyiso, as there is significant water consumption from the municipality, but that water consumption directly affects the projects ability to provide short term food security to Kutlwanong.

6.4.3. Coherence Trend #3

One coherence that was only present in a few of the case studies, for obvious reasons, was the potential benefits that partner organizations. This was most clearly seen in Lukhanyiso, but as well Lesedi. For Lukhanyiso, the partners it has have a significant impact as they provided initial startup materials, resources that the project continuously needs, and funding for the labor costs, all for no cost to Lukhanyiso itself. This has allowed the project to generate revenue, while it allows for social value to be produced. However, it is important to note that partner organizations can also cause costs or inefficiencies within an enterprise, which is also seen in the cases of Lukhanyiso and Lesedi.

6.5. Key Coherences

The coherences listed above present examples of a few of the key business principles for urban agriculture enterprises, and how they can produce sustainable value. Looking at these coherences, and applying them within the categories of urban agriculture enterprises this research found in the typologies, key coherences or business model principles for urban agriculture enterprises can be determined.

The first coherence, regarding the utilization of low cost activities and resources, first shows that small scale sustainable agriculture can produce sustainable value in the economic, environmental, and social spheres. As this coherence was seen clearest in the QPT and GSS case studies, and the remaining case studies utilized partners often to purchase larger, more expensive resources, it can be determined that this principle applies more so to home garden category found in the first typology of this research. At the same time, this coherence is beneficial for the different categories of urban agriculture seen in the second typology, as GSS was classified as socially focused, while QPT was classified as environmentally focused. Therefore, it can be said that utilizing low cost or recycled materials, and low cost/high yield vegetable techniques is a key principle for all home garden urban agriculture enterprises, regardless of their focus or purpose. While this same coherence could be useful for the other types of urban agriculture enterprises discussed in the first typology, and was clearly utilized in the Lukhanyiso and Lesedi case studies, larger scale projects should consider utilizing partner organizations to acquire resources and methods of production to handle that increased scale.

The second coherence discussed, understanding that environmental costs will sometimes needed to be incurred to create environmental benefits, is important for all the categories of urban agriculture enterprises discussed. Often when an urban agriculture business or organization is attempting to reduce their environmental foot print, they seek to minimize system inputs, leakiness, and chain distances within the food production system, attempting to create a semi-closed food system (Pearson 2007). What is important to take away from this is that the system is semi-closed, referring to the difficulty it is to make a system a completely closed loop. The second coherence gets at this same point, and emphasizes that no matter how sustainable a

project can be, there will still be environmental costs. More importantly, this coherence gets at the point that urban agriculture enterprises need to understand how to minimize those environmental costs, and learn how to use those environmental costs within a business model that still creates positive environmental value, in addition to economic and social value. As this coherence is seen in QPT and Lukhanyiso, which were categorized as environmentally focused urban agriculture, this coherence applies primarily to those urban agriculture enterprises that are focused primarily on generating environmental value. However, this key principle can be utilized in other types of urban agriculture enterprises as well.

Lastly, the key coherence regarding the usefulness of partner organizations is most relevant to urban agriculture enterprises that fall into the community-based garden and small farm and garden categories stated in the first typology. As discussed above, when operating an urban agriculture enterprise that exceeds the size of a backyard, the resource requirements for the project may exceed the capabilities of the practitioner or practitioners involved. By utilizing partner organizations, these resources can be acquired by these partner organizations, enabling the enterprise to achieve the sustainable value they seek to create. However, there are drawbacks to consider when involving partner organizations, which were seen in both Lukhanyiso and Lesedi. As GSS and QPT could generate sustainable value without the use of partners, and were categorized as home gardens in the first typology, it can be stated that partner organizations are not necessary for this category of urban agriculture enterprises. However, the benefits can be clearly seen in the community-based garden and small farm and garden categories. As Lukhanyiso and Lesedi fell into different categories in the second typology, this principle does not necessarily apply to one category more than the others in the second typology.

6.6. Limitations

While this research certainly produced results, it goes without saying that there were clear limitations. The biggest limitation to this research was of course the sample size of the case study analysis. First, this was partially due to unforeseen circumstances surrounding the direction of this research, and case study recruitment was delayed, leading to fewer case studies being found. Secondly, as mentioned previously, several case studies were found, but not utilized for this

research. This was due to some of them being subsistence only agriculture. However, several case studies were found to be urban agriculture enterprises, but they were in the initial stages of implementing the projects, and unable to provide useful results. This was the case for the Lesedi Meraka Village, as it was still in the implementation phase, but the case study was still determined to be able to provide useful results, as it was much closer to full implementation than other case studies not used for this study.

Additionally, as mentioned in the methodology, the case studies were found through the help of UFS, and a snowball sampling technique. While using UFS as a primary recruitment tool certainly provided excellent case studies, and the case studies provided a good variety of business models utilized as was hoped for in the initial phase of this research, this did restrict the case studies found in some regard. While not confirmed, some of case studies found through these methods may have been the more formalized examples of urban agriculture enterprises in the Free State due to their affiliation or connection with UFS. More informal urban agriculture enterprises, similar to that of GSS, that are not affiliated or closely tied to UFS may utilize different business models or produce different impacts using urban agriculture than were found in this research.

Another limitation in this research focuses on the number of coherences and coherence trends analyzed in this research. As seen in the result sections, there are a number of coherences that exist within a business model of urban agriculture enterprises. Some of those coherences produced positive sustainable value, while others produced a neutral or negative value. Due to a limitation of the amount of coherences that could be discussed, the focus was placed on the variables and principles within those business models that enabled positive sustainable value to be generated. Coherences that produced negative or neutral results were mentioned throughout this research, but were not discussed extensively. These coherences, however, remain important in understanding how urban agriculture enterprises, and their business models, can produce sustainable value.

Lastly there was a limitation with this research involving the research area. While both Mangaung and Matjhabeng are definitively urban areas in South Africa, as shown in the regional

thematic context, they are by no means the most urbanized areas of the country. Bloemfontein is listed as the 9th most populated urban area in South Africa (cite), and Welkom is even further down that list, showing that there are more urbanized areas such as Cape Town, Durban, and Johannesburg. While the findings from this research can surely be utilized in more urbanized settings, it remains to be seen if the results are still applicable in larger urban areas of South Africa.

6.7. Implications for Further Research

Based on the limitations described above, it is recommended that further research focus on three areas. First, it would be recommended that future research should seek to expand the sample size of case studies. As mentioned previously, these four case studies did provide insights into what are some of the key business model principles for different types of urban agriculture enterprises. However, the four case studies are not fully representative of all the types of urban agriculture projects, or the business models they employ, in the Free State. Future research should be directed at seeing the business models employed by more informal urban agriculture entrepreneurs, and understanding how those more informal case studies produce sustainable value.

Secondly, further research should focus on understanding the negative coherences that exist within the business models of urban agriculture enterprises. While this study looked at the coherences that enabled the case studies to produce sustainable value, the coherences that lead to the creation of negative sustainable value are equally important. Understanding these coherences would shed more light on what urban agriculture entrepreneurs should avoid when establishing their business or enterprise, thus creating less barriers to the creation of sustainable value.

Lastly, future research should seek to understand if these findings are applicable to urban agriculture enterprises in other parts of South Africa. As mentioned previously, the research areas used in this study are definitively urban, but are by no means the largest urban areas of South Africa. Being in a larger urban area could present different opportunities and challenges for urban agriculture entrepreneurs. This would be especially interesting to look at in Cape Town

and Johannesburg, as initial research indicated that both urban areas have formal municipal policies for urban agriculture. Informal interviews were conducted with officials from the Mangaung Municipality to determine whether there were similar policies in place in the research area, but the interviews found no significant policies regarding urban agriculture for the municipality. While municipal and regional government are involved in entrepreneurial urban agriculture, seen clearly in the case of Likhanyiso, the effects of having formalized policies surrounding regulating or enabling these urban agriculture enterprises cannot be seen in the research area.

7. Conclusion

The aim of this study was to determine what are some of the key business model principles for urban agriculture enterprises that are seeking to create sustainable value. Significant literature research into the impacts of urban agriculture and sustainable business models was conducted to use for theoretical back for this research. Through a case study analysis, utilizing the TLBMC framework and a life cycle thinking approach, urban agriculture enterprises were examined to understand the different aspects of their business models, and the variables within them that can help create sustainable value. The research question central to this research was: *What are the key business model principles for urban agriculture enterprises to generate sustainable value in the Free State of South Africa?*

To answer this central question, four sub questions or areas for examination were developed for the case study analysis. First, the different variations in business models were examined between the different case studies, seeing how the case studies in how they deliver value and the various activities and components that make that possible. Second, two typologies were developed, and the case studies were categorized within those typologies per a selection of the TLBMC variables, as to determine which types of urban agriculture enterprises this research is relevant to. Next, using the full set of variables from each case study, the positive and negative impacts on sustainability of each case study were determined. Lastly, the coherences between the variables and the impacts of each case study were examined, allowing for trends for these coherences to be developed, and finally matched with the types of urban agriculture enterprises these trends applied to.

The limitations of the study were discussed as well, as it is clear that the sample size of the case study analysis was quite small, and can only shed so much light on the central research question. Additionally, a limitation regarding the number of coherences analyzed in the case study analysis was discussed, as there are more coherences in businesses than was possible to discuss within this research study. Lastly, a limitation regarding the research area, and the type of urban context that exists there, was discussed, and pointed to expanding the research into larger urban areas of South Africa.

In conclusion, three coherence trends or key principles of urban agriculture business models emerged. The first discussed the importance of having low cost resources and activities, and how that can enable the generation of social value. The second focused on the need to make the environmental costs work to the overall benefit of the enterprise, so that the business can still create positive ecological value. The third showcased the potential benefits a business can receive by utilizing partner organizations when trying to create sustainable value, but also pointed out that there can be drawbacks as well. Despite the limitations discussed above, these findings still provide important knowledge regarding key business model principles for urban agriculture enterprises in the Free State seeking to create sustainable value. More research will be needed to confirm the validity of these findings in a larger selection of urban agriculture enterprises, as well as cases found in other urban areas of South Africa.

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9.2. List of Abbreviations

ANC – African National Congress

BMC – Business Model Canvas

CUT – Central University of Technology of the Free State

DEA – Free State Department of Environmental Affairs

EFF – Economic Freedom Fighters

GSS – Germinating Seeds for Success

LCA – Life Cycle Assessment

LCC – Life Cycle Costing

LCSA – Life Cycle Sustainability Assessment

PAR – Participatory Action Research

QPT – Qala Phelang Tala

SDG – Sustainable Development Goals

SLCA – Social Life Cycle Assessment

TLBMC – Triple Layered Business Model Canvas

UA – Urban Agriculture

UFS – University of the Free State

9.3. Interview Guide

This research is being conducted to get to understand the sustainable and regenerative aspects of urban farming in Bloemfontein South Africa. I am conducting this research for my master's thesis at the University of Utrecht in the Netherlands. The questions I would like to ask you relate to environmental, economic, and social aspects and benefits of your farming activities. Everything you tell me will only be used for this research project, and will not be shared with anyone outside the research team. Additionally, your name will not be used, to make sure that no one can identify you with any answer. You have already consented to the interview with the consent form. Do you have any questions before we begin?

Background Information

No. of interview:

Age:

Gender:

Occupation:

Background (Education/Skills):

Place of Residence:

Origin:

Project Questions (Community Leader only)

- Ask about the community...
 - How many people live there?
 - Adults? Children?
 - What jobs or industries do the people work in?
 - Any unemployment?
 - What is the biggest problem facing the community as a whole?

Project Questions (Municipality Councilor only)

- Is small scale agriculture practiced frequently in Mangaung?
 - If not, what are the reasons why?
- What is the municipalities view of the small scale agriculture?
 - Is it a useful tool that should be used to fight food security?
 - Is it a tool that the municipality wants to encourage?
- What policies or initiatives has the municipality to encourage small scale agriculture?
 - If yes, what are the specific benefits that are hoped to be achieved?
 - Is the environmental impact of such activities considered?

Project Questions (General - Agriculture)

- What is your agriculture project?
- Can you describe the size of your agriculture project?
- Who works on the project? Is it just you or do you have others to help you?
 - Do you have any employees? If so, ...
 - How many employees do you have?
 - How much are they paid?
 - Do they receive any training for the work they do?
- How many hours a day do you work on your agriculture project?
- What benefits do you wish to get out of your agriculture plot?
 - Just Food?
 - Social, Economic, and Environmental?

Environmental Questions

- What type of agriculture do you conduct? (Vegetable cultivation, cattle grazing, etc)
- What do you specifically grow or raise? (crop names etc)
- Does your project utilize any techniques that would be considered environmentally friendly?
- Do you use any machinery for your agriculture?
 - How often do/would you use it?
 - What type of energy does it use or consume? (electric, fossil fuel)
 - Are there any sustainable agriculture techniques that you are considering using in the future?
- Do you use any pesticides?
 - If yes, how much? (Looking to understand the importance of its use)
- Would any of your production yields be considered organic?
 - If yes, ask how it is considered organic (for clarity)
- Do you use any recycled materials on in your production scheme?
 - If yes, what recycled materials do you use?
- Have you had any issues with the environment that your agriculture plot is on? Erosion, infertile soil?

- Do you produce any waste products from your agriculture production?
 - If yes, what do you do with the excess waste?
- Do you consume any of the food that you produce?
 - If so, how much?
 - Have you noticed any changes in health since you started?

Economic Questions

- What is the main purpose of your agriculture project?
 - Do you use any for personal consumption? If yes, how much?
 - Do you sell your food yields in any capacity? If yes, how much? (specify with estimation in rand)
- What are the food products (processed and unprocessed) that you sell?
- How much of each food product do you typically produce?
- If you sell your foods, where/how do you sell your food products?
 - Directly to the community?
 - How much?
 - To supermarkets?
 - How much?
- Do you produce any products or manufactured goods from your food yields?
 - What do you produce?
 - Who do you sell the products to?
 - How much do you sell them for?
 - What is the production process?
- How much money do you invest into your agricultural activities for every year?
 - What does that money go towards?
 - What is the most costly?
- Do you have financial autonomy or do you rely on a person or organization to fund your farming activities?

Social Questions

- What social benefits do you get from your agriculture project?

- Has your agriculture project helped you gain access to resource, services or other opportunities?
- Has your agriculture project allowed you access to any social groups that you would otherwise not be a part of?
 - What does that group or groups do?
 - How does being a part of them benefit your livelihood?
- What effect has conducting agriculture activities effected your employment?
 - Does your activities require you to work full time on them, or can you conduct them in addition to another job or activity?
- Have you had to work with the municipality or other governmental organization in regards to your agriculture activities?
 - If yes, how was that experience or experiences?
 - Does the municipality enable you and your agriculture work to be successful? Do they make it more difficult?
- Does the government provide any assistance to you with regards to your farming?
 - Subsidies? Education (either through university or work training programs)?
- Are there resource services or opportunities that you cannot access or struggle to access (regarding your agriculture project specifically)?
- If yes, do you think could help you improve your livelihood?

Closing Questions: Questions about Perceptions of Urban Farming in South Africa

- Do you view small scale agriculture as a rewarding practice?
- Do you think other people share your view?
- If there are those who do not believe small scale agriculture is worthwhile, what is the reason why they don't engage in it?
- Is there anything that could help people engage in urban farming on a greater scale?