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THE SIGNIFICANCE OF INNOVATION NETWORKS IN THE FORMALISATION OF URBAN AGRICULTURE AS AN URBAN LAND USE: THE CASE OF JOHANNESBURG

Morgen Zivhave

A dissertation submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy in Town and Regional Planning.

University of the Witwatersrand, October 2019

Declaration

I declare that this thesis is my own unaided work. It is being submitted for the degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other university.

Part of this thesis has been presented at the II International Conference: Africa Urban Planning in Lisbon in 2017 under the title ‘Planning and the urban agriculture value chain: Can innovation networks bridge Johannesburg’s gap between agriculture and planning’. And, also, the International Urban Farming Conference in Berlin in 2017, under the title ‘Innovation networks in the urban agriculture value chain: Impacts on formalisation in urban land use planning in the City of Johannesburg’.



(Signature of candidate)

____10_____ day of _____October _____ 2019

Abstract

Mainstream debates show the continued marginalisation of traditional urban agriculture (UA) by conventional land use planning despite its food security, nutrition, environmental and social benefits globally. Instigated by observed tensions (and resultant vicious cycle) between UA and land use planning in Johannesburg, this study poses innovation as a means for UA to navigate the city's neoliberal market-driven logic and land use planning. The study argues for the need for innovation by both sectors but takes a step further by drawing on the innovation networks theory to argue the case for a collaborative ecosystem of actors. Literature shows that improving products, services and organisational practices by UA is not sufficient to secure land access in cities. The study uses the market logic within the neoliberal environment, juxtaposing international case studies to explore UA's place in contemporary Johannesburg.

The study used the extended case study approach to gather experiences from UA entities, City of Johannesburg and collaborating partners. The method regards participants as shaping and simultaneously being shaped by the external forces, and; thus innovation networks between UA and land use planning practices are mirrored within the broader national neoliberal planning policy.

Similar to Almere, Berlin, Detroit, Havana and Portland, the key study findings are that applying the principles of innovating networks to Johannesburg creates a collaborations ecosystem between UA and land use planning actors that attract investment and enhances value addition which in turn leads to formalisation of the sector (thus translating to a virtuous cycle). However, despite these collaboration platforms, neoliberal planning pressures have reversed UA formalisation in the cities of Berlin and Portland as urban farms are converted to real estate. With the exception of Almere, experiences in Havana and Detroit shows the success of innovation networks in permanently zoning UA outside the neoliberal planning pressures. Regrettably, the neoliberal planning paradigm focuses on the economic viability of UA and discounts it's social, health, environmental and food security benefits to the local economy.

Keywords: Innovation networks, urban agriculture, land use planning, neoliberalism, vicious and virtuous cycle

Dedication

"… To Him who is able to do immeasurably more than all, we ask or imagine, according to His power that is at work within us" Ephesians 3 verse 20 (New International Version).

AND

To my wife Tabeth, son Anesu, and daughter Anotida for your unwavering support during the period of this study.

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I would like to thank United Way South Africa for the internship that provided a platform for my extended case method, and participant observation of farming entities. My study was even made easier by the collaboration between United Way South Africa, the City of Johannesburg and Izindaba Zokudla that provided me with access to their individual networks.

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Acronyms and Abbreviations

AFSUN	–	African Food Security Urban Network
ANC	–	African National Congress
AUC	–	African Union Commission
BBB	–	Broad-Based Black Economic Empowerment
BHFC	–	Bambanani Food and Herbal Cooperative
CoJ	–	City of Johannesburg
DA	–	Democratic Alliance
DCC	–	Dar es Salaam City Council
IDP	–	Integrated Development Plan
JPC	–	Johannesburg Property Company
NDP	–	National Development Programme
NGO	–	Non Governmental Organisations
NPO	–	Non Profit Organisation
OECD	–	Organisation for Economic Cooperation and Development
RSA	–	Republic of South Africa
RUAF	–	Resource Centres on Urban Agriculture and Food Security
SCI	–	Sustainable Cities International
SDF	–	Spatial Development Framework
SDP	–	Spatial Development Plan
SoAP	–	School of Architecture and Planning, Wits, Johannesburg
UA	–	Urban Agriculture
UJ	–	University of Johannesburg
UK	–	United Kingdom
UN	–	United Nations
UNDP	–	United Nations Development Programme
US / USA	–	United States of America
Wits	–	University of the Witwatersrand

CHAPTER ONE - INTRODUCTION AND OVERVIEW OF STUDY

1 Introduction

"People do not live on air, even though city air makes people free as the German saying went" (Mumford, 1961:260).

The history of urban agriculture (UA) is as old as the city itself. As early as the mid-20th century, Mumford (1961) highlights the relationship between food production and the city. More recently, Steel (2008) adds that urban life and food systems were intertwined since the pre-historic times highlighting that the ancient city of Ur, Mesopotamia was a compact settlement surrounded by productive farmlands. This study argued that in contemporary cities urban farming remains a critical urban land use though marginalised by neoliberal driven real estate interests.

This chapter begins with the background and rationale for this research project. It then goes on to frame the inter-disciplinary nature of the study, its research aim, research question, and the initial assumptions. The chapter also gives an overview of the research strategy and explains why Johannesburg was purposely selected as the case study. The chapter then gives an overview of the study's original contribution to knowledge. The final section of the chapter presents the structure of the study.

UA has economic, social, health and recreational benefits (Cabbanes, 2012; Battersby and Marshak, 2013; Malan, 2015a) and the diversity of these benefits have tended to raise confusion over its primary role and classification leading to questions on where it can be housed within the city structure. In practice, this ambivalence manifests in uneasy relations between UA and land use planning, which became the motivation for this research.

The study aims to understand the dynamics between the innovation networks in UA and land use planning, and how these interactions influence a corresponding municipal formalisation for urban farming. The study applies the theory of innovation networks across UA and land use planning to interrogate the opportunities for formalising urban farming within the City of Johannesburg, South Africa. The study is interdisciplinary and merges the innovation theory from Business and network theory from Sociology. The choice of the innovation networks theory is based on the understanding that isolated innovations within UA and land use planning alone led to value addition and productivity enhancement (Schumpeter, 1934; Komninos, 2008) without promoting interactions across the sector. Such actions have not proved enough to legitimize UA as a land use priority (see Figure 1-1). In other words, there is a mismatch between the linear innovation theory and the nonlinear relationship between traditional UA and conventional land use planning. Innovation networks take a step further by creating a collaborative platform (Ahuja, 2000) for stakeholder engagement for UA and land use planning. The 'networks' in innovation becomes the 'space' with the capacity to capture the interrelationships between UA and land use planning practice. The process creates mutual understanding necessary for formalisation of UA. The effectiveness of innovation networks across UA and land use planning towards formalisation (also called legitimisation) of UA constitutes the research gap that is addressed by my study

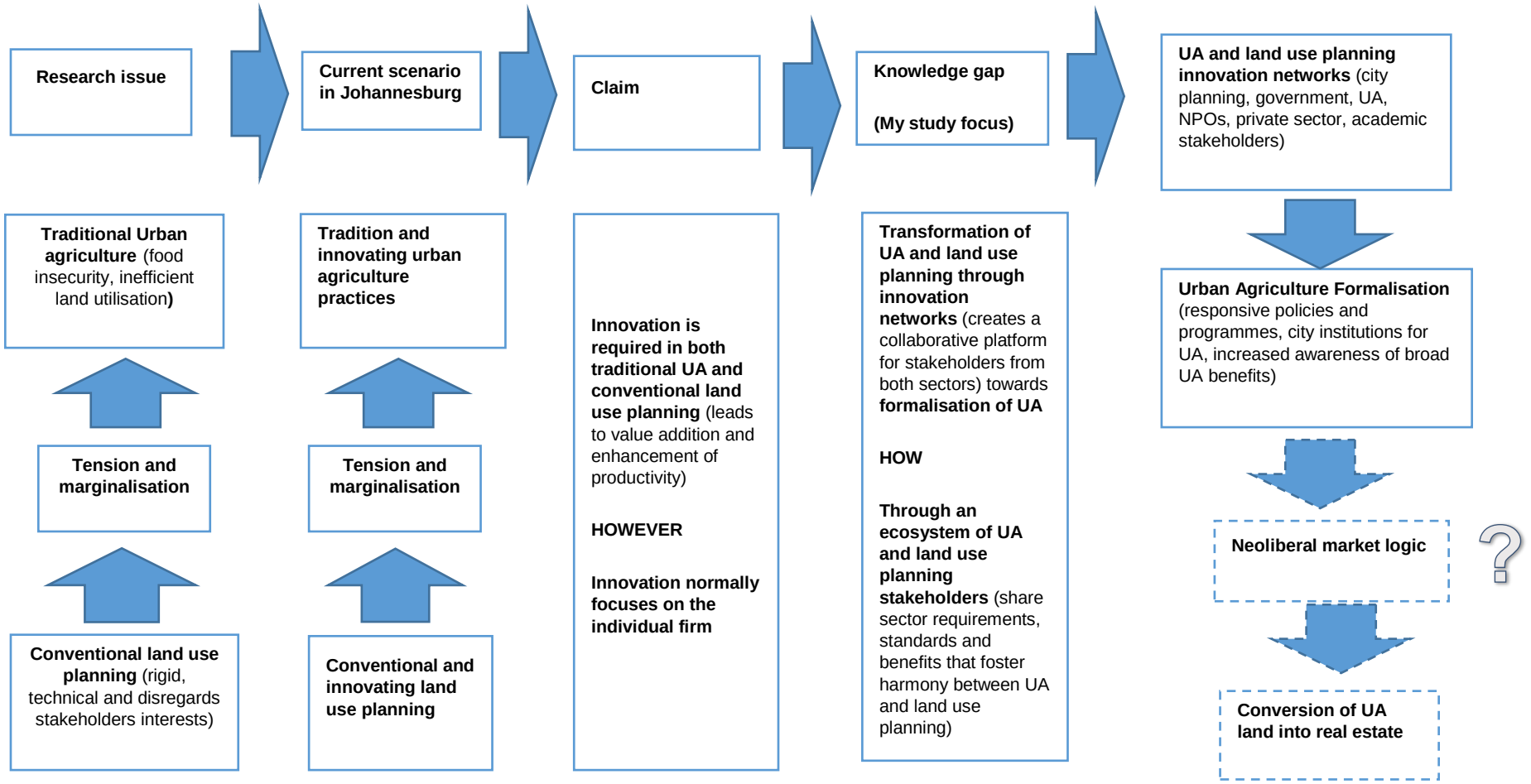

Figure 1-1: The study outline on how innovation networks transform the tension between UA and land use planning towards the formalisation of UA (source, author).

This study draws from diverse experiences towards formalisation of UA in land use planning globally. The case studies from Almere, Berlin, Dar es Salaam, Detroit, Havana and Portland show experiences of neoliberal and socialist planning frameworks, rapidly growing and declining cities, global North and South experiences. All these case studies have varying experiences that can be generalised to land use planning for UA in Johannesburg where about half the city residents are food insecure with high unemployment (CoJ, 2012).

Innovation networks create interrelationships that necessary to overcome the marginalisation of UA by land use planning, but they also create power relations. These power relations emanate from members' positions and resources passed through the network (Ahuja, 2000; Vonortas, 2009). However, the network power relations in UA and land use planning are more complex and can be better explained through MacFarlen's (2011) assemblages.

It is noteworthy that the notion of value addition and enhancement of productivity is upheld in contemporary municipal land use planning processes that are driven primarily by the neoliberal market-driven logic. While the market logic may propel innovation in both sectors, this is based on a narrow definition of economic and quantifiable benefits of UA. These arguments align and locate UA interventions within the formal economy (McClintock, 2014) which narrows the farming practices and affect the formalisation and sustainability of some UA practices.

1.1 Motivation and Rationale of the Study

Addressing the World Urban Forum in 2006, the then Executive Director of UN-Habitat, Anna Tibaijuka, observed that the "urbanisation of poverty [is] the most important urban issue as well as the need to address this as part of the environmental sustainability agenda" (Tibaijuka, 2006:5). Over one decade later urban poverty has become so dire that the success of urban planning in the global South would inevitably depend on how it addresses the issues of inequality, poverty, and informality (Watson, 2009). However, the rapid urbanisation in cities of the global South overstretches municipalities' capacity to plan, and manage competing land uses such as industry, housing, environment, and agriculture. Rising unemployment in cities increases the levels of poverty. As a result, some residents engage in informal employment activities that include UA (Rogerson, 2003). These contexts connect cities and urban farming.

Within the discourse of rapid urbanisation, there are contestations on the benefits of rising urban populations because of the resultant urban poverty. In this debate, a strong argument can be made that UA in the global South emerged as an adaptive strategy in the face of urban poverty. This study argues that UA is not the 'problem' for cities but the lack of supportive policies and programmes towards the development of the sector. This view expands on Steel's (2008) argument who advocates for a symbiotic relationship between cities and cultivated farmlands, which raise resident awareness on the origin of their food. An earlier study by Ninez (1985:1) makes bolder claims arguing that UA is the "last frontier in fighting world hunger".

Synonymous with other forms of urban informality such as transport, UA poses a contemporary planning conundrum for cities of the global South. On the one hand, informal, and traditional urban farming practices underutilise land (Van Averbeke, 2007) on land that could be economically used for real estate, or public open spaces that are used by more residents. On the other hand, business-oriented UA contributes towards food security, jobs, and income to residents Malan (2015a). Given the scale of operation, planners cannot continue to turn a blind eye and instead have to find responsive solutions through innovatively assigning land for farming.

The all-too-often contentious relationship between UA and land use planning is exacerbated by conflicting priorities of municipal authorities'. Local governments are often pre-occupied with neoliberal economic drivers such as urban aesthetics, promoting conventional investment opportunities, property rights, and global city positioning. Such municipal priorities and strategies often go against urban farming, which is primarily local and may not always generate profits compared to other competing land uses (McClintock, 2014). Innovation networks in UA and land use planning could collaboratively evolve responsive solutions that enhance the chances of their mutual core existence.

Given the contemporary urban needs, UA can no longer be overlooked as a peripheral phenomenon or unworthy urban land use or sector. The scope of UA becomes clearer when one considers the statistics around the globe. UA is practised by 800 million people worldwide and accounts for 5% to 15% of food provision in many developing countries (Fritsche, Laaks and Eppler, 2015). The Resource Centres on Urban Agriculture and Food Security (RUAF) postulates that the global area of urban irrigated croplands in 2014 was estimated at 24 million hectares, which accounts to 11% of all global irrigated croplands (Dubbeling, 2017). The potential contribution of UA can also be shown in the Victory Gardens which produced more than 40% of the US crop after World War Two (Mogk, Wiatkowski and Weindorf, 2010). The magnitudes of UA practices have caught the attention of national governments, academics, and development agencies; especially after the 2007 - 2008 urban food protests in 60 countries, that surprisingly included mid-and high-income countries that were expected to be food secure (Morgan, 2014).

Urban planning in most cities of the global South has largely remained a top-down, technical, and modernist practice, which directly zones UA out of the city limits. This master planning approach (which I also call conventional planning in this study) was imported from the global North through 'colonisation and the development agenda' (Watson, 2009:154). The planning approach is problematic because the development agenda in the global South is politically, socio-culturally, and economically different from the North (*ibid.*). The conventional planning approach favours the free-market development paradigm which guides many cities of the global South to provide profits and livelihoods to the politician and the elite but sidelining the poor (*ibid*.). This argument demonstrates why both

conventional land use planning and traditional UA mutually benefits from the principles and practices of locally derived innovation networks.

After the 1992 Earth Summit in Rio de Janeiro, some municipalities took up UA as part of their sustainability agenda in order to promote health, local economic development, as well as improve overall environmental conservation (Mukherji and Morales, 2010). The environmental agenda influenced planning innovation in the global South as highlighted in its inclusion in planning approaches such as the Urban Management Programme in Dar es Salaam, and the Integrated Development Plans in South Africa. These innovative approaches started to accommodate UA in the city. In line with this planning shift, a recent and local study by Karuri-Sebina (2014) in Pretoria challenges planners to innovate through venturing beyond their conventional boundaries of planning knowledge, and practice. In so doing, planners connect with other knowledge forms which allow for a more holistic understanding of cities (*ibid*.). Such planning innovation provides opportunities for the integration of formerly marginalised land uses such as UA into a formal land use policy for cities.

Writing from experiences of Lusaka, Simatele and Binns (2008) show that despite the long and rich history between conventional planning and UA; a more in-depth literature appraisal reveals an uneasy relationship. In South Africa, the conventional planning approach is strongly linked to neoliberalism that seeks to protect capital and investment, and thus tends to relegate environmental, and UA issues out of the city. I could argue that the marginalisation and transitory nature of UA can be attributed to planning's preoccupation with transportation, housing, and economic growth. At the same time, I can also assume from experience that the inability of traditional UA practices to innovate may have contributed to its failure to find support in mainstream city departments. In South African cities, for example, urban farming is housed in the Department of Economic Development in the City of Cape Town (Battersby *et al*., 2013) and from my experience the Department of Social Development, and Department of Economic Development in the City of Johannesburg. Even within these departments, UA is further relegated to low priority sub-units. In this regard, formalisation of UA may also require the sector to be elevated to a relevant city department to reduce prevailing fragmentation.

This study is, therefore, motivated by a concern over how traditional UA could thrive in the city in a manner that addresses its current ambiguous relationship with conventional land use planning. The study explores this concern through the lens of innovation networks, interrogating whether such networks would create an ecosystem for UA and land use planning stakeholders that would influence formal zoning for urban farming.

Battersby, Tawodzera, Hayson, and McLachlan (2013) observe that the prevailing mindset that separate agriculture from urban areas arose from Victorian-era municipal reforms, which prohibited agriculture in cities supposedly for its health and environmental risk. As Steel (2008) and Fritsche *et al*. (2015) would further argue, this separation was reinforced during the 19th and 20th centuries through economic development and innovation in transportation and technology in cooling, canning, and mechanised farming. The innovation incentivised urban spatial reorganisation which relegated food production to rural areas in favour of property, and real estate. In contrast, the current high urbanisation rates, and urban poverty, as well as environmental awareness, nutrition, and city resilience discourses are once again making UA a critical urban land use (Cabannes, 2012). It is from this background and rationale that my study substantiates the role of innovation networks towards promoting UA with the municipal authorities as the key actors among other network partners.

1.1.1 Localising urban agriculture

UA activities can be best understood within a food value chain framework. This entails all the range of activities required to produce a product, from the inputs to final consumption (Kaplinsky and Morris, 2000). The food value chains can be characterised as long or short. However, UA mainly contributes towards a short value chain where food is grown and consumed within a neighbourhood or city limits. Despite the improvements in technology in the preservation of food, the high demand for perishable and fresh foods still motivates for a short food chain. The advocacy for local or low food miles in cities is based on the short value chain argument where food is cultivated and consumed within the community, neighbourhood or town (Morgan, 2010).

The short food value chain or low food miles promote access to fresh local foods especially to the low-income (Morgan, 2010; Seigner, Sowerwin and Acey, 2018), which reduce transport costs, and carbon footprints while improving household food security, and nutrition. The social component of the low food mile discourse give urban farming a competitive edge over other competing land uses such as open spaces. City residents can farm for food security and nutrition, in addition to other benefits of such as education, livelihoods, and social cohesion.

Other low food mile arguments relate to opportunities for recycling organic waste (Cabannes, 2012; Malan 2015a), which supports activities such as city parks, sports clubs, landscaping, horticulture, and even gardening. Recycling organic waste offers enormous savings for municipal authorities and households since a large percentage of domestic garbage is organic. From a nutritional value standpoint, Morgan (2010) articulates that the local food value chains allow food to retain nutrients and also connects consumers with producers more directly. The low food mile arguments, rather than downplay public open spaces, actually amplify their significance since present opportunities for both recreation, and urban farming.

Supermarkets and grocery stores have become central to the food value chain debate, especially in the last half-century. The upsurge in demand for food safety and traceability has seen the proliferation of formal food markets, and supermarkets and a shift in marketing strategies (Chitja and Mabaya, 2015) as seen in Figure 1-2. In South African cities, the four large supermarkets namely Shoprite Checkers, Pick n Pay, Spar and Woolworths contribute 98% of the retail food market (Battersby *et al*., 2013). Situating this trend within global experiences, Fritsche *et al*. (2015) argue that supermarkets neither improve food security nor distribute quality, or safe food at affordable prices. On the contrary, the study contends that supermarkets deliver over-processed, nutrient-deficient food to urban and rural customers (*ibid*.).



Figure 1-2: A supermarket promotes partnerships with local farmers (source, author)

Supermarkets are very contentious in the local food debates. While Steel (2008) argues that supermarket destroys street markets, recent studies by Battersby and Watson (2019) elaborates on the symbiotic relationship between supermarkets and the street traders outside the supermarkets. This contradicts the 'parasitic' perception commonly assumed by professionals and local government. Despite these contrasting views, the rise of supermarkets globally challenges local food systems to be competitive, dynamic, and innovative in order to meet the high standards of the formal market. Though supermarkets can complement urban farmers (Figure 1-2), they are more likely to displace them through procurement from national or international food chains. As such, supermarkets are often criticised for bypassing emerging or small-scale farmers who cannot meet their perceived high food quality standards. This neoliberal practice by supermarkets supports the long food value chains (Guarin, 2013), and thus higher carbon footprints. Also, demands by supermarkets for a consistently a high volume of products of high quality, and safety, standardised packaging, and formal payment systems, go beyond the capacity of traditional urban farmers (Chitja and Mabaya, 2015).

1.1.2 Innovation networks and urban agriculture

Building on studies focusing on the short food value chain, there is a growing interest in research on UA. The literature from South Africa (Rogerson 1993, and 1996; Van Averbeke, 2007; Battersby *et al*., 2013; and Malan 2015a, and 2015b) and global studies (United Nations Development Programme, 1996; 2015; Mougeot, 2005; Simatele and Binns, 2008; and Cabannes, 2012) show that UA practices, in general, have failed to improve its practice over the years. As a result, urban farming has attracted criticism, marginalisation, and systematic displacement as an urban land use (Simatele and Binns, 2008; Webb, 2011). The key concern in this study is premised on the growing insight that most traditional UA (include subsistence-oriented, leisure and non-innovating business-oriented UA practices) are inefficient in providing food to low-income households (Seigner *et al*., 2018). Traditional urban farming practices tend to be crisis centred, household-based and practised outside the urban legislative frameworks (Cabannes, 2012). This is particularly the case for Johannesburg where traditional UA is characterised by low productivity, family consumption and conflict over rights to land (Malan, 2015a).

Different studies by Kjaeras (2013) from Vancouver and Malan (2015a) from Johannesburg calls for UA to innovate in order to address systematic shortfalls such as poor productivity and inefficient land utilisation. Through networking with actors, innovating UA would uphold municipal requirements of efficient land utilisation, increased farm productivity as well as the upholding of health, and safety standards. The resultant innovation networks would thus improve on the farming practices, their livelihoods as well as the quality of farm products to city residents. The studies in Vancouver and Johannesburg show that innovation practices in the urban space are catalysed by cities themselves as spaces for experimentation, and creativity (Kjaeras, 2013; Malan, 2015a). Linking these studies to experiences in African and Asian cities, Turok and McGranaham's (2013) paper on the influence of urbanisation on economic growth argue that cities are pinnacles of human creation that drives opportunities for innovation, and the creation of wealth. Unlike rural agriculture, UA should take advantage of the city network to continuously innovate.

My thesis argues that UA will only remain relevant to the city through an ongoing transformation to align with the ethos of cities as centres of innovation and engines of growth. For this reason, the study adopted innovation into the field of urban development, arguing for innovation in both UA practices and land use planning. In Economics, innovation improves the value and enhances performance or productivity, increasing the efficiency in the use of resources (Schumpeter, 1934). This study, therefore, substantiates on the expectation that innovation could do the same for UA and land use planning in contemporary cities. As highlighted earlier, however, without networks, the innovation of individual firms may not lead to an improved relationship between the two sectors.

Thus critical to this study is the adoption of innovation networks that connect organisations and act as information processing, and screening platforms for actors (Ahuja, 2000). Network members create a platform to learn, share success, and technologies, thus boosting opportunities for further innovation. In support of these collaborations, Pittaway *et al*. (2004) argue that the focus of innovation strategies should not be the company *per se*, but rather the network in which the firm is embedded.

Furthermore, innovation networks are crucial in marketing related products or services, pooling complementary skills and accessing external knowledge (Pittaway *et al*., 2004). For instance, through innovation networks small-scale urban farmers can jointly supply large customers such as schools and restaurants, thus meeting large customer demand they would not otherwise achieve individually (Aubry and Kebir, 2013). Innovation networks have societal attributes as well. Close networks of urban farmers and stakeholders act as support groups for encouraging members (Van Averbeke, 2007), sharing information as well as moral support, and confidence-building. As will be articulated in Chapter 2 and 3, understanding these network dynamics was central to designing the parameters of this study.

The third major element of this study, alongside the urban farming value chain, and the theory of innovation networks, is land use planning. As the primary stakeholder in land use planning, the study envisaged that municipal departments would be among the networking partners for each urban farming

entity. A municipal authority's support for UA, or lack thereof, would thus influence the performance of the urban farming sector. This support can be through ensuring access to land, improving on land tenure, and related policies on planning and promoting urban farming.

The connection between innovation networks in urban farming practices and land use planning can be seen through improved farming methods that effectively utilise land, thus resulting in specific locations for urban farming. A few examples of farming innovation that will be expanded in Chapters 2 and 5 include the hydroponic system, vermiculture and aquaculture. Key to Johannesburg's climatic context, the hydroponics system saves water, and provides nutrients directly to the plant without any detrimental effects to the environment or consumers, while in aquaponics, farmers produce fish under intensive methods within limited urban space. Malan's (2015a) study in Johannesburg argues for innovation in UA, where the immediate environments are exploited for farming inputs and technological designs that assume a closed-loop system. In this instance, recycling approaches, such as composting, are used to recycle waste from the farm or households. In planning innovation, the shift to Integrated Development Plans (IDPs) in South Africa acknowledges local-specific issues such as poverty, inclusivity, and environmental protection.

1.1.3 How global municipal responses to urban agriculture inform South African efforts

Globally, contemporary municipal responses to UA range from supportive approaches such as short-term programmes and projects, long-range policies, and new planning frameworks that avail designated urban land for farming. However, other responses include indifference or outlawing UA which, fuels ongoing marginalisation of UA. In recent history, central, and local government support for UA in North America, and Europe can be traced back to the allotment gardens of the Great Depression of the 1930s, and the Victory Gardens of the 1940s, which provided food to urban residents (Mukherji and Morales 2010; Battersby and Marshak, 2013; Barthel, Parker, and Ernstson 2013). The Victory Gardens also provided psychological support to farmers, including food, and

nutrition for end-users (Mukherji and Morales, 2010; Horst *et al*, 2017), while also creating benefits throughout the food value chain. A study in Cape Town by Battersby and Marshak (2013) show that UA has social and psychological benefits to farmers thus debunking the characterisation that UA contributions to the global North are predominantly social and while to the South they are mainly in food security. The gardens do not reflect a close fit for my study as they were organised and supported by federal or national rather than local governments. However, they provide experiences on how stakeholders collaborate across diverse levels towards promoting and financing UA in cities.

A focus on UA again re-emerged in the 1960s and 70s following the oil crisis, which brought increasing concern over food security and prices, as well as rising environmental problems in cities globally (Mukherji and Morales, 2010). My study draws parallels from the crisis to contemporary issues facing cities such as rapid urbanisation, food security, economic inequality, and fluctuating climatic conditions. Unlike the post-war Victory Gardens, this new wave of UA drivers was community initiative with varied municipal support, highlighting a form of local stakeholder collaboration that is relevant to this study.

The current debates on UA in US focuses on the local food movement that seeks to improve production potential for residents; provide nutrition, health and community benefits, and address food justice through improved access to low-income residents (Seigner *et al*., 2018). These local or municipal food movements are relevant to my study as they display common issues such as difficult access to land or high cost of land and failure to pay decent wages to workers (Meenar, Morales and Bonarek, 2017).

These few global examples direct attention to a pattern of generally uncoordinated municipal responses to UA activities. However, turning towards support for innovating practices, the study draws on the cities of Almere, Berlin, Dar es Salaam, Detroit, Havana and Portland in Chapter 4. These municipal authorities took concrete measures through the introduction of policies, institutional structures, and collaborations with research centres to foster research, and innovation towards evolving long-lasting solutions for UA (Altieri *et al*., 1999; Balmer *et al*., 2005, Jasma and Visser, 2011; Paddeu, 2017). These case studies reflect the principles of innovation networks in influencing the

diversity of farming entities, food security initiatives, and social benefits, and support by the government as well as municipal authorities as discussed in depth in Chapters 4 and 5.

In contrast, in sub-Sahara African cities, UA emerged from a backdrop of rapid population growth, urban poverty, and rising unemployment, especially arising from economic structural adjustment programmes in the 1980s and 1990s (Mbiba, 1995; Simatele and Binns, 2008). For example, UA practices in Harare (Zimbabwe) and Lusaka (Zambia) are widespread, and enjoy varying levels of support from respective municipal authorities, albeit on an uncoordinated and *ad hoc* basis. Ironically, the City of Harare was notorious for slashing maize crops in the 1980s, and 1990s based on fickle excuses that UA blocks traffic (Mbiba, 1995). However, towards the turn of the 21st century, some municipal authorities in Southern Africa (such as Dar es Salaam in Tanzania) adopted proactive steps towards supporting UA (Halloran and Magid, 2013a). The support mechanisms included collaborating with universities and NPOs to undertake research, train farmers, and secure land tenure in support of UA (*ibid*.) as elaborated in Chapter 4.

1.2 Framing the Research Problem and Research Questions

This section presents the rationale, the questions that guided the study, the initial assumptions, and also delineates the scope of the study.

1.2.1 Statement of the problem

Although traditional UA makes significant contributions to cities through food security, nutrition, income, connecting with nature, education, social and community issues as well as city greening (Battersby *et al*. 2013, Malan, 2015a and 2015b; Horst *et al* 2017, Seigner, *et al*., 2018), the sector continues to be marginalised by conventional land use planning. UA is relegated out of the city because of its shortfalls that include poor productivity, inefficient land utilisation,

failure to pay decent wages, negative environmental issues such as pollution, land degradation, and contamination of farm produce (Battersby *et al*. 2013, Malan, 2015a, and 2015b, Horst *et al*., 2017). On the other hand, studies also present conventional land use planning as technical and modernist as well as unresponsive to the socio-economic livelihood needs of poor urban residents thus perpetuating inequality and informality (Watson 2009, and Todes 2012).

As a result, both conventional land use planning and traditional UA practices contribute to the failure and transitory nature of urban farming in South African cities. The current uneasy and antagonistic relationships between conventional planning and traditional UA undermines the ability of urban farming to attract investment towards value addition and enhanced productivity.

Rapid urbanisation, the rise of urban poverty and the need for enhancing city resilience in the global South, calls for alternative planning paradigms. Both sectors, therefore, require coordinated innovation to improve value addition and enhancement of productivity (Schumpter, 1934; OECD, 2005). However, innovation within an individual firm will only improve operations and leave the two sectors acting independently of each other. This contrast with innovation networks, which through a collaborative platform (Pittaway, *et al*., 2007) create interlinkages between the sectors towards the formalisation of UA.

A few studies have focused on the potential of innovation systems in development planning in South Africa (Karuri-Sebina, 2014) and social innovation that promote designs for appropriate technology, capacity building for urban farmers and establishing local markets for UA products (Malan 2015a, 2015b). Some studies in the US have focused on policies that affect food access (Horst *et al*., 2017), UA and land use planning in general (Siegner *et al*., 2018). This study substantiates on the potential of mitigating the marginalisation of traditional UA by conventional land use planning through innovation networks lens which creates an ecosystem of actors collaborating across towards addressing the disharmony between the sector.

1.2.2 Rationale of the study

Unlike in Western Europe where urbanisation was supported by a long period of industrialisation and creation of jobs and livelihoods, many cities of the global South and especially sub-Saharan Africa, are rapidly urbanising under poverty. This scenario challenges the respective municipal authorities to innovate, and evolve initiatives towards enhancing the livelihoods of city residents. UA is one of the widely practised strategies in cities globally to mitigate urban poverty. However, conventional urban land use planning has not been very supportive of traditional UA, as it is erroneously regarded as an inefficient urban land use.

Previous UA studies in South Africa concentrated on the benefits and challenges of UA, coordination of UA practices and food governance systems (Rogerson, 1993; Van Averbeke, 2007; Malan, 2015a and 2015b, Olivier and Heineken, 2017; Kanosvamhira, 2018, Battersby and Watson, 2019). In addition, some authors have identified opportunities for the improvement of existing UA practices in general (Malan, 2015a, and 2015b, Kanosvamhira, 2018). Further, Battersby and Watson's (2019) study in cities in Eastern and Southern Africa observe that food planning for food security and food access has ignored that power of stakeholder in shaping the food system; which is the focus of my study on innovation network power relations.

The body of research which guided my study aligns with Watson's (2009) call for scholarships from the global South that is cognisant of the local socio-economic environments. In this context, planning innovation entails a conscious shift that mitigates the wholesale application of planning theories adopted from the global North through evolving locally responsive approaches. One such alternative strategy is the City of Johannesburg's (CoJ) Integrated Development Plans that responds to critical city problems such as poverty and inequality.

As will be elaborated on in Chapter 2, the literature on innovation networks presents clear evidence on its positive attributes towards improving quality, product or service delivery towards addressing local needs (Edquist, 1997).

In light of the limitations of the conventional land use planning paradigm, Doucet (2008) argues for an interdisciplinary approach to planning in a manner that

responds to local economic and social needs. Such approaches were put forth in earlier work by Friedmann (1998) who challenged planners to be open to other disciplines in order to glean experiences needed to translate their knowledge into action. This study pursues this interdisciplinary approach to knowledge urban planning.

1.2.3 Aims and objectives of the study

The study seeks to understand the dynamics between the innovation networks in UA and land use planning, and how these interactions influence a corresponding municipal land use planning for urban farming.

1.2.4 Research statement and supporting questions

Drawing on the principles of innovation networks that improve productivity and enhance competitiveness through collaborations among actors, my study analyses the impact of such interactions between UA and land use planning. In this study, the interrelationships acknowledge the dynamics of both formal and informal practices in land use planning and UA. The main research question is stated as follows:

What are the limits of innovation networks in urban agriculture and land use planning towards influencing the formalisation of urban farming within the neoliberal market logic? The main research question is further broken down into three sub-questions as follows:

1) What are the drivers underlying the marginalization of UA in municipal land-use planning?
2) Within a context of market logic (productivity and competitiveness), how effective are innovation networks in overcoming the underlying drivers of marginalisation towards promoting formal assigning of land uses for UA?
3) How could insights from the effectiveness of innovation networks in overcoming the marginalization of UA in municipal land-use planning

guide our understanding of the current and future experience in formalization of land uses for UA?

1.2.5 Initial assumptions

The prevailing inadequacies of municipal land use planning innovation for UA in Johannesburg are a consequence and contributing factor to weak innovation networks across the UA value chain. The UA practices in Johannesburg are primarily traditional and transient, which limit the investment that farmers and city stakeholders are willing to commit. Innovation networks in UA and land use planning facilitate long-term investments which yield high value for UA stakeholders and the CoJ in general. The key assumption is substantiated in this study as follows:

- UA has multi-functional benefits that include food security, environmental, educational as well as social and community;
- The growth of the UA sector is hampered by conventional land use planning;
- Within the neoliberal planning and policy, the future of UA depends on strategic engagement between municipal authorities and other stakeholders which emphasises both economic and social benefits of the sector;
- The municipal formalisation of UA through land use planning would promote the growth of the sector.

1.2.6 Scope of the study – innovation networks in urban agriculture and land use planning

The literature review demonstrates that globally contemporary municipal planning responses to urban farming are multi-faceted. However, municipal authorities formally recognise and support UA practices broadly through two urban planning strategies. The first is the Sustainable Cities Strategy that promotes livelihoods,

and environmental conservation through food production, and recycling of waste within the city (Mendes *et al*., 2008). The second strategy is the Smart Growth or Smart Cities that promote urban greening, health, and aesthetics (Smart Growth, 2015). These two strategies give firm arguments for the formal inclusion of UA in land use planning. Building on these strategies, my study narrows its focus to the following sub-themes:

- Municipalities normally support UA through policies, programmes, and projects. However, this study focuses on municipal land use planning innovation towards assigning land for farming in response to innovation networks in UA. In Johannesburg, formalisation in municipal plans entails regularisation and recognition in city plans (Huchzermeyer, 2011). The plans include the Integrated Development Plans (IDPs) and are critical because other city support mechanisms tend to be fragmented for as long as mechanisms for land access are not also addressed However, I should emphasise that formalisation is a contested term as 'formalised' subaltern activities are often treated differently from the 'formal' ones by municipal councils.
- UA practices vary from formal to informal and mainstream literature on innovation networks is biased towards formal businesses and organisations. This study applies innovation networks to both formal and informal UA practices and assesses the differences in land use planning responses.

1.3 The Research Context – the City of Johannesburg Current Land use Planning for Urban Agriculture

The City of Johannesburg (CoJ) is the largest of the five municipalities of the Gauteng Province, with a population of 4.8 million in 2016, and an annual growth rate of 2.3% (CoJ, 2016c) see Figure 1-3. The Gauteng Province is the economic hub of South Africa that attracts migrants from the whole country, Africa, and the world at large.

The urban development of Johannesburg emerged from the discovery of gold in 1886 (Celik, 2017), which subsequently triggered the inflow of migrant workers. Mining shaped the city landscape over the years and after the mining era,

Johannesburg transformed into an economic and business hub anchored in the service industry. However, the resultant economy could no longer cope with the influx of immigrants, which increased unemployment, and resultant poverty, and food insecurity (CoJ, 2016c). Many new migrants cannot secure formal livelihood opportunities, and thus end up in the informal sector with some settling into traditional UA for survival (Rogerson, 2003). On the contrast, Battersby and Marshak's (2013) study in Cape Town found that recent migrants were not urban farmers, showing a broad UA practice by city residents beyond the migrants.

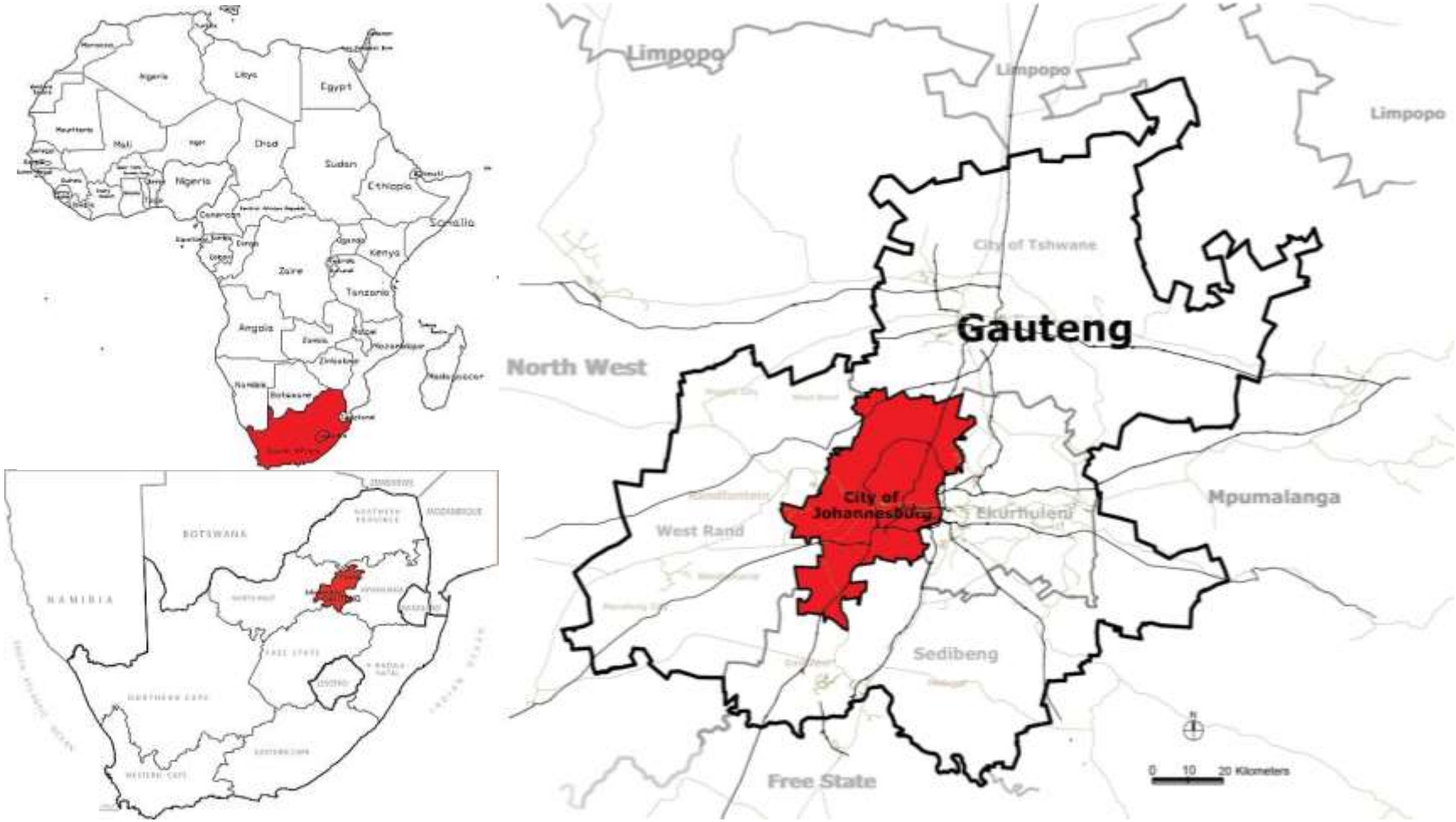

Figure 1-3: The Gauteng City Region showing the location of the CoJ (adapted from the City of Johannesburg, 2018)

Johannesburg was selected as the case study because a greater percentage of its population (estimated at 42%) was food insecure in as far back as 2007 (CoJ, 2012). However, a more recent study by Africa Food Security Network puts the food insecurity rate at 56% (CoJ, 2012). In addition, a recent economic survey estimates that approximately 15.6% of the population of Johannesburg live below the food poverty line (CoJ, 2014). This is the income required by an individual to afford the minimum daily energy intake and is also called the extreme poverty line (Statistics South Africa, 2018). All these studies converge on the case of severe food insecurity, which is defined by CoJ (2015) as the non-availability and lack of access to food, including downstream challenges of food processing and distribution.

Surprisingly, despite the contributions mentioned above, UA is marginalised by land use planning in Johannesburg. While land use planning has transformed in South Africa since 1994 from conventional to contemporary approaches (Harrison, 2006; Watson, 2009, Todes, 2012); it still largely side-lines UA because the innovation of single sector is not sufficient to promote collaboration with the other sector, as elaborated in Chapter 2. In addition, the planning tools that guide urban development in South Africa such as the Spatial Planning and Land Use Management Act (SPLUMA), Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs) provide a framework for applying principles of innovation networks in UA and land use planning and as reviewed in Chapter 2.

1.4 Research Strategy

This is a qualitative study that adopts a bottom-up research strategy (Blaikie, 2007) which employs a case study approach that enables deep analysis and understanding of the subject of research. Within the case study approach, I adopted the principle of reflexivity that guides Burawoy's (2009) extended case approach to ethnographic research. Guided by the extended case method, I undertook a long-term participant observation of UA entities and city departments. As an intern for an NPO that capacity builds farmers in Johannesburg, I studied farmer's innovation networks with collaborating

stakeholders. Reflexive science avoids the positivist principles to research that claims objectivity but acknowledges personal biases (Burawoy, 1998) based on one's profession, experience and beliefs. Based on this approach I immersed myself in the subject and learnt from eleven urban farming entities and two departments from the City of Johannesburg. I closely worked with farming entities, UWSA and city departments by attending their seminars, meetings, workshops and training sessions.

The study of eleven farming entities took the form of 'case studies within another case study' of Johannesburg. I also used Burawoy's (1998) extended case method to reflect on how the micro innovation networks within farming entities and city departments are shaped by the broader macro neoliberal policies in Johannesburg and South Africa.

My study uses a deductive approach to research. I used the theoretical framework of innovation networks to test with empirical evidence whether the theory had a transforming effect on the existing marginalisation of traditional UA by conventional land use planning. The conclusions from empirical evidence confirm or refute the significance of the theory on the relationship between the two sectors.

1.5 Significance of the Study and Contribution to Knowledge – Innovation Networks across Urban Agriculture and Land use Planning

The study of innovation networks is a multi-disciplinary field that brings together the concepts of innovation that emphasises value addition and enhancement of productivity and competitiveness (Schumpeter, 1934; OECD, 2005) from Business, and networks that emphasize interrelationships and social capital in development (Castells, 1976; 1996; 2000) as commonly applied in Sociology. The contribution of my study is both theoretical and methodological.

In theory, whereas innovation and networks are relatively old disciplines; applying innovation networks across UA and urban land use planning constitutes a new scholarship especially in the context of South Africa. My study argues for the

need for innovation towards addressing the marginalisation of traditional UA by conventional land use planning. This debate stems from the realisation of the weakness of both sectors such as UA's poor productivity, inefficient land utilisation and inability to pay decent wages (Van Averbeke, 2007; Webb, 2011; Seigner *et al*., 2018) and urban land use planning's the top-down, technocratic principles that disregard other interest groups (Watson, 2009; Todes *et al*., 2010). Innovation networks across UA and land use planning enables collaborative dialogues between stakeholders that results in value addition and enhance productivity and ultimately formalisation of UA.

The innovation of an individual firm creates a productive entity without necessary extending this relationship to other firms (Ahuja, 2000; Pittaway *et al*., 2004). Such innovation will still fall short of transforming the contentious relationship between traditional UA and conventional land use planning. For instance, in the absence of networks, IDPs and SDFs are innovative planning tools (Watson, 2009) that failed to extend the collaborative practices to UA and hence many UA practices in Johannesburg are not formalised. This emanates from the mismatch between the linear innovation theory and the nonlinear relationship between traditional UA and conventional land use planning. To address, the divergence, this study adopts the theory of innovation networks that creates an ecosystem of collaborating stakeholders from both UA and land use planning. Networks create engagement platforms that can be utilised by stakeholders to promote awareness, share experiences, sector requirements and standards which would in turn influence the enactment of policy, programmes, projects and even the establishment of teams to guide the transformation of the two sectors that attract investment and ultimately formalisation of UA.

Networks are critical since innovation initiatives are often outside the confines of an individual firm (Ahuja, 2000, Pittaway *et al*., 2004; Torok *et al*., 2015), and in this context a department or farming entity. The CoJ planning department that is responsible for land use planning is expected to be a common collaborating partner in this UA-land use planning innovation networks. The existence of CoJ in all the networks would influence the city's response, and hence an opportunity for assigning land uses for UA.

The existing studies on innovation have extensively documented the entrepreneurial skills to drive business innovation, and innovation systems (De Man, 2004; OECD, 2005, Karuri-Sebina, 2014). My study focuses on the recent scholarship on innovation networks and how this theory applies to UA and land use planning in South Africa. Innovation networks have been studied in large chemical industries in the USA, Europe and Japan (De Man, 2004). However very little is understood about the innovation networks of UA and land use planning and how this affects formalisation of previously marginalised UA in the global South and South Africa.

Harrison (2006), and Watson (2007, 2009, 2012, 2016) have written extensively on contemporary planning in the global South, and especially on how such planning addresses current realities, in order to become relevant to the diverse local contexts. My study expands on this planning innovation discourse by assessing how significant innovation networks broaden the horizon of urban planning to respond to 'peripheral' issues such as UA.

Studies such as Rogerson (1993, 1995, 2003), Van Aveberke, (2007) Malan (2015a and 2015b) extensively reported on the contributions and challenges of UA in South Africa. Seigner *et al*, (2018) argue that the trends on current scholarship on UA in the USA centres on; (i) production potential of UA, (ii) nutrition, health and community benefits of UA and (iii) analyses of UA through food justice and equity. My study partly addresses all three trends by identifying the potential to improve UA productivity, acknowledging the multifaceted benefits of UA and analysing the ability of UA to improve food access to low-income residents. The study does this by arguing for innovation networks as a vehicle towards improving the UA and land use planning sectors towards UA formalisation as a legitimate urban land use. Seigner *et al,* (2018) call for an empirical enquiry on the effects of supplying UA products to neighbourhood stores. Again my study partly investigates the ability of UA entities to provide food security in Johannesburg within an inclusive approach which also engages the formal economy.

Gumbo (2000) calls for future-oriented, and public interest-driven urban land use planning that is conscious of current development issues such as urban farming. My study, responds to this call and also to UNDP (1996) which expresses

concern that the contribution of UA is overlooked, underestimated, and underreported. This study further explores the extent to which innovation networks would provide insights into the challenges facing UA, especially concerning the assigning dedicated spaces for its practices within the city. This lens contributes towards Meenar *et al*.'s (2017) study that identified a knowledge gap and called for studies on how local, state and federal laws constrain or enable UA. My study also analyses innovation networks power relations between actors within the UA and land use planning. This lens also responds to Battersby and Watson's (2019) observation that food policy planning has ignored the power of stakeholders in shaping the food system. Broadly, this is an empirical study that elaborates on an existing theory within a new context in order to underpin the envisaged contribution to knowledge.

Methodologically, networks in UA have been previously studied by Steel (2008), who concentrated on how the food systems or market places act as meeting places that raise awareness and share experiences on food, nutrition and innovation in food systems based on experiences from Europe and the Near East. My study takes a step further and accesses the significance of innovation networks across UA and land use planning towards formalising UA with the global South. I used Burawoy's (1998) extended case study for long term participant observation and learning for both the researcher and participants during fieldwork data collection. This approach gives added nuances of the phenomena under study, for instance, the power relations for innovation networks that would not be gathered through quick interviews.

1.6 Structure of the Thesis

The study is structured into eight chapters as follows:

Building on the base set out in Chapter 1, Chapter 2 reviews bodies of literature on innovation networks, UA value chain, and the key shortfalls of conventional land use planning, and traditional UA (mainly as justification for the need for transformation through innovation networks). The literature includes studies on the practical experiences of how innovation networks transformed the electronics

industry in the USA and the online banking sector in South Africa. The chapter then discusses how conventional urban planning has consistently failed to address development priorities for cities in the global South, and the failure by traditional UA practices to competitively, and efficiently utilise urban land. This is followed by studies of the mismatch between traditional UA and conventional land use planning. The literature review then turns to studies on the practical experiences of innovation networks, the framing of the innovation network theory as well as the attributes of innovation networks. The reviews also identify common innovation network themes, such as how innovation networks relate to land use planning, power relations, and micro-macro level discourses. The chapter also presents the application of innovation networks, and its limitation to address UA, and land use planning. The final key element of the chapter is the conceptual framing for the study that outlines the negative relationship between traditional UA, and conventional land use planning that is transformed through innovation networks into mutual co-existence.

Chapter 3 presents the overall research method and design as guided by the components of the theoretical framework. The research design measures innovation network and power relations for assessing how these influences UA and land use planning. These components guided the formulation of the research techniques for data collection, and processing in the field, and also formed the basis of data presentation, and analyses in subsequent chapters. The study applied interview techniques for discussions with participants coupled with ethnographic observations aimed at collecting data on innovation networks, and stakeholder power relations. The chapter then presents the extended case methodology that was adopted to guide the participant-observation of UA entities through diverse activities, such as attending purposely prioritised farmer training sessions, stakeholder consultation meetings, exhibitions, and workshops. The chapter concludes with a presentation on the unit of analysis, overviews on data analysis, and the UCINET 6 for Windows software that was used for Social Network Analysis.

Chapter 4 uses the lenses of neoliberal and market logic arguments besides the food security, nutrition, environmental and social benefits to analyse data to uncover the drivers underlying the marginalization of traditional UA in conventional municipal land-use planning. The analysis is guided by parameters

that measure UA's productivity, which are: the availability of cheap food from the hinterland; contamination of food from industrial and human waste; and its poor market viability and inefficiency compared to residential and commercial property uses. The study begins with the analysis of secondary data on the cities of Almere, Berlin, Dar es Salaam, Detroit, Havana and Portland. Insight from the respective city experiences are then compared with primary data collected on the marginalisation of UA in Johannesburg. I then highlight the constraints as drivers for innovation networks in UA and land use planning in the respective cities.

Having posed the potential of innovation networks, Chapter 5 presents data and their analyses on existing innovation network their power relations and value chains from seven of the study's overall eleven farming case study sites in Johannesburg and their respective stakeholders. The chapter applies innovation networks theory to evaluate the farming and land use networks using a metaphor of ecosystems within the neoliberal environment. Specifically, I look at whether this impacts farmers' ability to attract investment, improve products and services and secure formal land use access.

In addition to farming entities, the chapter assesses the networks among city planning departments and collaborating actors around zoning for UA in cities of Almere, Berlin, Dar es Salaam, Detroit, Havana and Portland. Of particular interest is the potential to create, through the shift to innovation networks, a collaboration ecosystem that leads to the promulgation of municipal policies and programmes on more progressive land use planning for UA. Finally, the study attributes the successes in Detroit and Havana towards facilitating formalization and permanent zoning for UA to key shifts in the neoliberal environment that exists in all other case studies. This, in turn, suggests a weakness of the innovation networks in UA and land use planning within the market-driven neoliberal discourse. Almere is an exception where innovation networks successfully formalised and permanently zoned and connected commercial peri-urban agriculture to the formal economy. Thus the chapter derives findings towards addressing the effectiveness of innovation networks towards overcoming the underlying drivers of marginalisation towards promoting the formal assigning of land-use for UA within a context of market logic. Further, given the extent of the spatial and power relations in these networks among farming entities and

their complex interrelationships, the expands on the notion of networks to that of assemblages.

Given these findings, Chapter 6 assesses the current and future roles of UA innovation networks in Johannesburg's neoliberal-based planning terrain. The chapter also substantiates the opportunities and potentials within Johannesburg to improve UA's short value chain that predominantly supplies households and local communities. Beyond the bounds of Johannesburg, the chapter highlights other benefits of UA in Almere, Berlin, Dar es Salaam, Detroit, Havana and Portland which are underreported due to the priorities of neoliberal planning that focus on economic benefits. The chapter then returns to Johannesburg with an evaluation of the experiences learned that could be applied to local UA practices. The chapter also critiques the effectiveness of the formalisation of UA within this micro-macro environment that is strongly influenced by neoliberal forces and acknowledging this context as one where formalisation is a contested practice. To this end, the analyses in this chapter will address the relevance of innovation networks towards our understanding of current and future experiences in the formalisation of land use for UA in Johannesburg.

Finally, Chapter 7 sums up the key findings and concludes on the marginalisation of traditional UA through conventional land use planning. It also assesses the relevance of innovation networks in creating an ecosystem of actors that fosters value addition and improved collaboration that leads to the formalisation process. The chapter then summarizes the study's contribution to knowledge, theoretical and practical implications, the limitations and recommendations for further research. The chapter concludes by assessing the usefulness of the conceptual framework and the initial assumptions which also considering the way forward from the study's starting point of uneasy relations between land use planning and urban agriculture.

The last section of the thesis presents the appendices. The section summarises the research methodology into a matrix that displays the research sub-questions, ethnographic observation guides, interview guides for farming entities, key stakeholders and key informants, including the reports and policies reviewed. The appendices section also give a data analysis template that shows theoretical concepts, the parameters used to measure these concepts during fieldwork and

the approach to data analysis. These appendices also give an overview of four of the eleven farming entities that could not be presented in the main text (see Chapter 5). However, the unique characteristics of the individual case studies have been integrated into substantive chapters of the thesis.

CHAPTER TWO: APPRAISING INNOVATION NETWORKS THEORY ACROSS URBAN AGRICULTURE AND LAND USE PLANNING TOWARDS FORMALISATION OF URBAN FARMING

"We are all unlike actors, who do unlike things and we are connected in unlike ways", (Founding Director of Izindaba Zokudla, personal communication, 07 April 2017) summarising the networking experiences of Izindaba Zokudla from the perspective of the Actor-Network Theory.

2 Introduction

This chapter presents a literature review and concludes with a theoretical framework as the foundation for the study's application of the innovation networks theory to UA and land use planning practices. It is a multi-disciplinary appraisal bringing together the innovation networks as studied in Business; UA in Urban Geography; and urban land use planning in Town Planning. The study is part of the broader city sustainability and resilience discourses, within both there is the argument for green edibles spaces, with emphasis on integrating marginalised UA land uses. The major theoretical question of the study is whether the networks described by Founding Director of Izindaba Zokudla above (personal communication, 07 April 2017), between farming entities, city departments, and their partners, can be transformed through innovation into collaborative ecosystems with the potential to formalise and enhance the UA sector.

Literature on the theoretical framework of innovation networks are appraised from an international, national, and city perspective towards responding to sub-question 1 on the drivers underlying the marginalisation of UA in municipal land use planning; and sub-question 2 on the effectiveness of innovation networks in overcoming the marginalisation of UA within the market logic. This is followed by

further literature building the argument for how UA, and land use planning, in general, can be transformed through innovation networks.

2.1 Theories Underpinning Innovation Networks

This section reviews a selection of studies on actor innovation networks. As highlighted in Chapter 1, my study adopted the innovation networks theory because it creates a collaborative platform for actors from UA and land use planning. In this study, I use the metaphor of an ecosystem to reflect the complex nature of such a multi-sectoral collaboration between UA and land use planning actors which I argue to be a prerequisite for the formalisation of UA. This is a step beyond innovation theory which more simply promotes value addition through enhanced productivity and competitiveness of a single firm without pursuing interactions with another firm (Schumpeter, 1934; Komninos, 2008, Torok *et al*., 2018).

2.1.1 Framing the theory of innovation networks

The theory of innovation networks is anchored in and borrows from attributes of the two distinct fields of innovation and social network theories. The innovation theory originates from the business field, as pioneered by Schumpeter's (1934); while the network theory was developed from sociology by proponents such as Castells (1976, 1996, 2000), and Latour (2005). While innovation was rooted traditionally in technological development within a single firm (Komninos, 2008), the emergence of innovation networks theory springs from the increased realisation that technological development in firms is attributed to skills and knowledge outside the firm itself (Ahuja, 2000; Pittaway *et al*., 2004; Torok *et al*., 2018). In other words, networks are critical springboards for innovation. The next section elaborates on the theories of innovation and networks separately as the foundations for the innovation network theory.

2.1.2 The theory of innovation

Schumpeter's (1934) *Theory of Economic Development* that outlined the concept of innovation is one of the 'most famous and influential' writings in Economics (Croitoru, 2012:137). The theory laid the foundation for explaining how businesses grow through the process of value addition and enhancement of productivity as well as competitiveness. He defines innovation as "new combinations which lead to new products, new ways of production, discoveries of new resources, new organisational methods of running the business enterprise and entry into new markets" (Schumpeter, 1934:66). The theory attributes economic development to innovation, which implies changes in the economic life of a firm or institution through the initiatives of the entrepreneur or innovator (*ibid*.). I would emphasise that the theory further identifies the distinctive role of the entrepreneur in stirring up innovation, by turning away from the status quo, customs, and routines (*ibid*.). Of importance is that Schumpeter (1934) singles out the unique role of the champion or entrepreneur in the transformation process of innovation of any firm or institution. This would affect the organisational structure of an actor that is promoting innovation.

Commenting on the theory, Croitoru (2012) argues that innovation is the strategic stimulus to economic development, as it underscores the dynamism in the production process. The term 'dynamism' changed the focus from classical economic development theories that emphasised static development (mere increase in production) as a way towards economic development to value-addition and competitiveness (*ibid*.). Bazhal (2016) expands the above claim by arguing that the concept of new and improved combinations underlines the bedrock of innovation. He further elaborates that conventional increase in production without value addition cannot substantially increase the wealth or social welfare of a firm or society (*ibid*.). That said, it should be noted that innovation is, however, dependant on the availability of investment to support related research, as discussed in the next section.

- **The innovator and financier of innovation**

A unique attribute of the theory of innovation is what Schumpeter (1934) distinguished as the roles of the entrepreneur or innovator and critically the financier or investor in the process of innovation. The innovator must both develop the novel ideas and convince the financier that the innovation will result in higher revenue or reduced cost that would enable repayment of the initial investment (*ibid*.). This increased value is another critical aspect of innovation. In other words, the process of innovation must be able to attract the investment needed to improve production methods, and organisational processes. In this regard, the innovator must be a dreamer as well as someone able to market his/her idea as a bankable project to investors.

Over and above the issue of investment, Casper and Van Waarden (2005) articulate that successful innovation should translate novel ideas into products, or services that are technically, and commercially viable for the local economy. From these readings, I conclude that innovation becomes relevant when it can be financed, and the outputs exploited by the intended market. Situating this claim within my study, innovation in land use planning and UA must be able to attract funding for sustainable development projects, as well as respond to the needs of residents.

Delving deeper into innovation, it is characterised by essentially three main types: (i) scientific breakthroughs that define totally new inventions (Schumpeter, 1934); (ii) incremental innovation where inventors make small additional changes to the original invention (Brunori *et al*., 2013); and finally (iii) imitation, where inventors adopt inventions from other firms, regions or countries (Rogers, 2003; Fuglsang and Storm, 2011). I would argue that, given that it takes a long time to realise, test, and adapt results from innovation, most innovations for small enterprises in the global South constitute imitations of global novel ideas and technologies.

In addition, innovation costs are often prohibitive and may require specialised skills which may not be readily available to many small firms (*ibid*.). As will be shown in the following section, these limitations among firms emphasise the relevance of the concept of innovation networks within the business arena. As

highlighted earlier, without such networks, a single firm may innovate but tends to have limited influence on partners (Komninos, 2008) or other stakeholders. And this type of innovation will not address the focus of this study which is the linkages between UA and land use planning.

Before going on to review studies on network theory, it is essential to differentiate between innovation networks and the closely related innovation systems. The innovation systems concept explains the different institutional arrangements that support innovation, and the learning capacity of firms or institutions (RedeSist, 2010). Relating innovation systems to my study, Karuri-Sebina (2014) applied the theory to local development in townships in Pretoria. She found that the theory recognises social, economic and institutional factors that are often neglected by conventional urban planning; though she also found that the same theory had limitations when applied to low-income neighbourhoods with low technology (*ibid*.). These findings provoke planning to look outside its conventional systems in order to remain relevant to marginalised land uses such as UA. From these findings, Karuri-Sebina (2014) challenges the planning profession to learn from other disciplines that are going through transformational changes. Though my theoretical review on innovation networks takes a different focus, it learns from just such related disciplines currently undergoing transformation.

2.1.3 The theory of networks

The network theory was originally derived from sociology and has been applied in different professions. It argues that collaborations are critical because they create a support structure for actors. In other words, networks constitute sets of interconnected nodes of two or more actors that facilitate interaction aimed at providing access to information, resources, and inputs (Castells, 1996; 2000). Central to network studies is the notion that all actors are connected through diverse inter-relationships (Latour, 2005). Critically, networks signify interrelationships among collaborating and interacting actors (Denny, 2014). It is therefore worthwhile analysing how these interrelationships affect innovation.

In an earlier study of American and Japanese firms, Castells (1996) observes that networks are open structures which can expand, and integrate new actors. He attributes technological development to the resurgence of networks, and argues that firms get into strategic alliances or joint ventures with other actors to promote innovation (*ibid*.). By linking technological development to networks, Castells (1996) stresses the value of connections for firms and institutions for promoting innovation.

In this same vein, and bringing the network concept into the African context, Omenya (2006) acknowledges that as early as the 1970s sociologists identified networks as social fields of relationships among individuals. His main argument is that networks are solidarity structures that enable mutual dependencies among partners that reduce vulnerability while maximising collaborative impact through cooperative actions (*ibid*.). This notion of solidarity as a category of networks within social networks underlines Chamber's (1995) earlier contention that they create and tap into the social capital that is necessary to promote economic activity and sustenance. Transferring this concept across UA and land use planning networks, it can be said that social capital creates interrelationships critical to secure information, advice, and expertise.

At this point, it is also worth making two observations from the literature about network relationships. Firstly, it relates to small scale firms where most collaboration does not entail formal agreements (Piitaway *et al*, 2005). Secondly, in his study of self-help housing in Nairobi and Johannesburg Omenya (2006) found that actors can create networks independent of the state or local government. While both of these observations can be said to characterize prominent relationships in UA, my study focuses on the influence of innovation that links actors with municipal authorities in land use planning due to the links between investment and long-term land access for UA.

- **Network type and attributes**

In practice, many networks are not based on formal agreements. Instead, networks provide 'obligations and expectations' (Coleman, 1988:119). Van Aalst (2003) contends that informal networks can be local or extend across regions and

countries, facilitating communications through channels such as joint seminars, email distribution lists, or electronic conferencing.

On the other hand, he also confers that formal co-operation also exists and requires some written and binding agreements such as a memorandum of understanding, outsourcing contracts, and joint ventures (Van Aalst, 2003). Aligned with this formal character of the relationship, Vonortas (2009) suggests that networks can serve as mechanisms that establish customs and collective abilities to 'punish' disobedience, or incentivise cooperation. This 'pressure' from members fosters discipline and commitment to the principles of the network. Denny (2014) also agrees that organisational networks can be formal or informal, however, he characterizes them as most often loose groupings of organisations or individuals with no binding agreements.

Such network relationships are commonly captured in graphs called sociograms, which plot the structure of connection between actors who are represented as nodes (Borgatti and Halgin, 2011; Kadushin, 2012). These actors could be persons, groups, or institutions grouped through edges or ties to represent relationships, activities, collaboration, or lines of influence (Kadushin, 2012).

This study uses sociograms to map networks between UA entities, city departments and collaborating partners. For instance, a simple network sociogram can reflect the connection between a city departments A with a farming entity B. However, a complex network is shown with connections between a city department A to a farming entity B to a government department C, and a university D. In this way, network analysis can be applied to characterise and ascertain the relationships between the actors as well as explain what their interactions entail.

2.1.4 Theory of innovation networks

While Castells (1996) sees the development of technology as emanating from networks, Laperche *et al*. (2008) argue that innovation is based on the dialoguing of ideas, and externalising concepts between individuals, and organisations. The innovation network theory thus focuses on how actors develop new or improved

products, or services, and the connections that are developed to foster the process.

As described above, traditionally, innovation has concentrated on novel ideas and technological development that emerge from an individual company; however, trends are shifting towards outsourcing and collaboration among firms (Komninos, 2008; Torok *et al*., 2018). Consequently, these trends shift innovation into the concept of innovation networks (Torok *et al*, 2018).

As will be elaborated later, the Organisation for Economic Cooperation and Development (2005) identifies three parameters for assessing innovation network that are: (i) Open knowledge and technology sources; (ii) acquisition of knowledge and technology; and (iii) innovation collaboration. The innovation networks theoretical blending aligns with the evolutionary economic theory, which argues that the performance of actors cannot be defined by narrow classical economic developmental perspectives that centre on the agent or entrepreneur only (Lundvall *et al*., 2009). In other words, the true performance of actors needs to include socio-economic processes, and outcomes that shape the process itself, and hence the importance of innovation networks (*ibid*.).

Further evidence of this network importance can be seen in Ahuja's (2000) earlier work. He developed a theoretical framework to assess a firm's network relationships, and how that influences innovation from a study of 97 international chemical industry firms in Western Europe, Japan, and the USA. The study found that direct and indirect ties between an actor and its partners have a positive impact on a firms' innovation output (*ibid*.). To understand the importance of this concept, we must be clear that firms located in a cluster where networks are not predetermined tend to compete against each other (*ibid*.). In contrast, networks are formed specifically for sharing information and expertise and, therefore, create mutual benefits and incentives to work together (*ibid*.). Thus firms in a network derive more benefits than they would without the collaboration, which further promotes more linkages (*ibid*.). It should also be noted that the resources passed through the network vary from technical, equipment, financial, to even information (*ibid*.).

This type of understanding of the relationship between networks and innovation lead to Vonortas's (2009:28) definition of innovation networks as "a complex web

of relationships among firms, universities and other research organisations associated with generating and sharing knowledge relevant to technological innovation". The author further expands the idea stating that similar to social capital in human relationships, a firm's formal and informal networks create value, and allow access to resources, skills, and expertise of other companies (*ibid*.). From the above argument, we can say that networks are the locus of innovations as they provide access to external knowledge, and resources and challenge internal expertise, and learning abilities of actors (*ibid*.).

Lastly, Vonortas (2009) concludes that a dense network enables actors to build their reputation, and social capital such as norms, and trust. However, I would argue that since network collaborations translate into responsibilities, a dense network creates challenges of expertise and resources required to manage such relationships.

Further review of the literature shows that organisations can also innovate through networks such as membership or associations (Pittaway *et al*, 2004). Such collaborations are more formal and include membership organisations, chambers of commerce or pressure groups. While these professional and trade associations promote innovation by acting as knowledge brokers they, in turn, become conduits for informal relationships (Robertson and Lanlois, 1995; Pittaway *et al*., 2004). Such networks can be business-to-business linkages for economic integration or collaboration between firms, and customers to promote the exchange of goods, and services (Pittaway *et al*., 2004). For these reasons, associations, and membership organisations are robust business-to-business networking platforms for small-scale organisations such as urban farming entities.

2.1.5 Innovation networks and power relations

I open the discussion of power within networks borrowing from the theses of Foucault (1998) and Gaventa (2003) as they relate to power within society. Gaventa (2003) further argues that while power is neither negative nor repressive it is required to guide operations (*ibid*.). Of particular relevance to this study is the Foucauldian theory that acknowledges the dominance of some actors to ensure

the proper functioning of society, a concept which I transferred to network power relations.

Many networks are characterized as non-hierarchical in their structure, suggesting that members enjoy a high degree of self-management. However, despite the works of Van Aalst (2003) and De Man (2004) that depict networks as loose structures with relatively 'horizontal' relationships; Giddens's (1984:16) earlier study argues that there are actors in networks "whose action has a transformative effect because of the power inherent in the action". This contradicts the general description of networks as horizontal structures, in reality, actors within networks experience a differentiated sense of power relations.

Ahuja, (2000) substantiates this claim of power relationships in networks. He argues that a larger firm with a greater number of ties among its networks will access more information and technology, and thereby overcome innovation limitations that would face an individual firm. Concerning power relations, temporary network 'leaders' are, then chosen to spearhead the networking processes, and their responsibilities may vary with changes in tasks or priorities among members (*ibid*.). For the sake of this study, it's important to emphasize that in practice, actors wield power. Within networks, these actors assume leadership positions based on roles and/or resources such as the financial and technical skills they bring to the network.

- **Degree centrality – the number of network connections**

The total number of direct connections for an actor is called degree centrality (Everett and Borgatti, 1999). According to Vonortas (2009), a dense network structure is measured by the number of connections between the actor and its partners, and thus builds its reputation and in turn social capital. Applying this dynamic to innovation networks, we see that the position of the firm within their networks affects their performance (as a result of innovation) because of the correlation between their number of connections and their ability to ability to draw expertise and resources from the network (*ibid*.). Thus it can be argued that the concept of degree centrality acknowledges that innovation networks are not

neutral, in practice, power equates to one's ability to make connections among actors in the network. In this study, I anticipate that the collaboration between urban farming entity and city department will be affected by power relations.

- **From innovation networks to assemblages**

Based on the discussions above, there can be no doubt that power relations exist in networks. However, the limitation of the above analysis is that it is one-dimensional. It implies power as emanating from one source to govern the powerless. To take these power relations a step further, I borrow from McFarlane's (2009; 2011) concept of translocal assemblages which critiques the notion that power relationships can be simply based on the number of connections between actors. His idea of assemblages defines "composites of place-based social movements which exchange ideas, knowledge, practices, materials and resources across sites" (2009:561). In this way, assemblages further emphasise the depth of the connection, defined through histories of engagement, and group collectives and hence their distributed agency (*ibid*.) over and above the network connections.

Additionally, assemblages bring about the concept of spatiality and temporality in networks and explain how actors establish territory, mutate and disperse (McFarlane, 2009; 2011). From a study of slum dwellers in Mumbai, McFarlane (2009) contends that low-income groups use assemblages to share information and break barriers associated with classes; for instance, community groups can leverage these collectives and engagement platforms to organise exhibitions that are traditionally middle-class activities.

Expanding on the concept of assemblages, Simone's (2011) study of a market in Jakarta, found that assemblages explain formal and informal functions at the market. For instance, traders manage trading space, security, payment of tariffs through complex relationships, and actors that appear, merge and disappear based on politics, religion, and business relations (*ibid*.). Rather than merely acknowledging ties between actors assemblages further recognises the unevenness, and temporality of engagements, power relationships, and how

these are altered by group collectives for the benefit of members. Drawing from these findings in the literature, I argue that the urban farmers, CoJ, and other actors replicate these complexities and layers of relationships both in their formal and informal arrangements – thus exhibiting the character of assemblages.

2.1.6 Limitations of applying the innovation network theory across urban agriculture and land use planning towards formalisation of urban farming

At this point, it is essential to point out that innovation network theory has strengths but also limitations when applied to UA and city departments. The theoretical framing by Ahuja (2000) that the actor's ties positively impact on the firm's innovation output is based on a study of large chemical industry firms from Western Europe, North America, and Japan. This is a context very different from the African experience.

Similarly, researches by Edquist (1997) and De Man (2004) have biases towards large firms in the global North. Therefore, the transfer of these findings to small-scale farming enterprises and public institutions in the global South also has contextual limitations. It must be acknowledged that the global North presents a different political, cultural, and socio-economic development paradigm to the global South, and more specifically southern Africa. This locational difference is significant because contexts influence circumstances surrounding the development of innovation networks, information sharing, and the expertise required to manage the resultant processes of innovation.

However, there is value in considering those studies in parallel with Helmsing's (1999) earlier work which documents the transfer of technological innovation, and the improvement of businesses in small to medium enterprises in Bulawayo, Zimbabwe. But again I point to a critical difference, in this study the theoretical foundation is based on innovation among formal businesses. My study of UA entities, many of which are informal, there presents a different context and condition thus highlighting a knowledge gap among previous studies that focused on formal small and large enterprises often in alien contexts.

2.2 Urban Agriculture and the Food Value Chain

This section of the chapter examines the literature on UA's capacity to generate and distribute food, creates income and jobs. The focus is its role as a survival strategy for low-income households as well as a much larger role in urban food production.

Mougeot (2005:2) defines UA as an "industry located within (intra-urban), or on the fringe (peri-urban) of a town, city or a metropolis, which grows and raises, processes and distributes a diversity of food and non-food products". The UNDP (1996; 2015) characterisation adds to this largely locational definition of UA to include practices of subsistence-oriented to business and farming within the city core to the peri-urban. The UNDP (2015) definition also reflects the diversity of farming activities that range from cultivating of vegetables to the keeping of small livestock. Key to this study, both UNDP (2015) and Mougeot (2005) acknowledge that UA is an industry and emphases the critical role of value-addition through processing and distribution of farm products. Seigner et al (2018) underline the significance of value addition pointing out that small plot size means traditional UA cannot produce large enough volumes for the needs of many insecure households.

Historically UA dates back to the pre-historical times, where Neolithic towns and villages were built around food growing regions (Steel, 2008). Writing from British, Roman, Greek and Near East cultural history, she argues that planning of cities displayed how the food was brought to cities and waste disposed of or recycled (*ibid*.). From this thinking, the future planning, architecture and urban design should consider the relationship between cities, food and how citizens are fed (*ibid*.). My study piggybacks on the close history between cities and food to propose an improved relationship between the two sectors through the formalisation of UA through innovation networks.

2.2.1 The typology of urban agriculture practices

This study classifies UA into innovating and traditional (or non-innovating) practices. UNDP (1996) and Cabbannes (2012) characterises UA into three broad classifications:

- **Business-oriented urban agriculture**:

Also called market production enterprises, can be either family or individual operated, to micro-enterprises, cooperatives or producer-associations (UNDP, 1996; McClintock, 2010; Cabannes, 2012). Critical to this study, such business-oriented farmers are often innovating thus able to attract capital investments in the production, marketing, and management processes, and often have formal access to land.

- **Leisure or recreational urban agriculture**:

This often practised as a hobby or for educational purposes, and may or may not provide food for households (Cabannes, 2012). Some leisure farmers are employed middle-class who wants to maintain links with nature, and the environmental, get physical exercise and grow fresh vegetables (*ibid*.). Therefore, products from leisure UA can be consumed or distributed to the community, or even sold to cover operational costs with no profit motives.

- **Subsistence-oriented agriculture:**

This is predominantly tradition farming. It is the most common form of family-based urban farming among low and middle-income households (UNDP, 1996; McClintock, 2010; Cabannes, 2012).

2.2.2 Characteristics of urban agriculture

As will be discussed later, the local and international literature reflects a connection between the classification of UA and where it is practised (Cabbanes, 2012; UNDP, 2015), which this study argues must be part of a more nuanced UA-land use dialogue. This connection can be seen in the relationships between the various forms and practises in diverse places around the world, including:

'leftover' spaces in the build environment such as backyard gardens, on floodplains, wastelands, and balconies, and along wayleaves (McClintock, 2014); or institutional properties such as schools, churchyards, and in public parks and open spaces (Mukherji and Morales, 2010; Cabannes, 2012, Horst at el., 2017). These may be centrally located or on the fringes of the city (UNDP, 2015).

As an example, in the local context, Malan's (2015a) study in Johannesburg argues that UA practices are not shaped by rural agriculture because of the urban realities of land shortages. Seigner *et al*. (2018) expand this notion arguing that due to urban realities such as competition over land, small-scale UA occupies small land parcels that often prove insufficient to provide adequate food for the household. This study argues that such realities and inefficient land use practices incentivise a platform that sustains both networking and innovation.

In support of this, Malan's (2015a) work shows that unlike their rural counterparts, urban farmers have a network of government, academic, private, and civil society organisations to learn from in order to adopt best practices. The competition over land and access to networks presents opportunities for innovation in the UA sector compared to rural agriculture. The key question becomes; what types of network support do urban farmers require to maximize their contribution to the city and themselves? And how do they get around it (for instance policy restrictions, negative perceptions, and the limited scale of operations that require quick yields, and intensive land utilisation)? The next section presents a review of studies, focusing on the contributions, and weaknesses of UA.

2.2.3 Contributions of urban agriculture to the city

Despite the marginalisation of traditional (and even innovative) UA by conventional land use planning, a survey of studies on cities of North America, and Sub-Saharan Africa shows similarities between some factors driving UA in the global North and South, and contributions to the city (Battersby and Marshak, 2013). The primary drivers for UA in the global South are food security, and nutrition as well as economic, and livelihood opportunities (Battersby and Marshak, 2013; Malan, 2015a). Studies in the USA similarly show that UA

contributes to improving food security and nutrition (Lovell, 2010; Meenar *et al*., 2017; Seigner *et al*., 2018), but also increasingly on livelihoods. These two claims are further supported by Cabannes (2012) who argues that globally UA primarily contributes to food security and the provision of nutritious and fresh food to low-income city dwellers.

Here it should be interjected that in South Africa, Battersby and Marshak's (2013) study in Cape Town argues that the characterisation of UA benefits in the global North as largely social and the global South as food security are inaccurate. This is supported by an earlier study in informal settlements in Pretoria, which claims that while UA contributes towards the livelihoods of low-income groups by reducing their expenditure on food this is outweighed by the social benefits particularly to women (Van Averbeke, 2007). This constitutes a strong finding given that food security for this group is critical since food accounts for more than 50% of the expenditure of low-income groups (*ibid*.). Though proponents for UA have been criticised for inadequate empirical evidence to substantiate farming's contributions (Webb, 2011), I would argue that though the practices are often informal and thus hard to capture; the lowering of expenditure for the low-income is a huge step towards reducing household food insecurity.

Other studies support that UA also contributes to the less easily quantifiable social well-being. A review of cases from Cuba, Argentina, and Brazil by Cabannes (2012) reflects the social and physical contributions of UA to urban environments. UA increases social cooperation by bringing different city residents together in community gardens with opportunities for social inclusion and confidence-building especially for disadvantaged groups (Van Averbeke, 2007; Cabannes, 2012, Meenar *et al*., 2017). Returning to the South African context, Van Averbeke's (2007) research discussed above is further expanded by Kornienko's (2013; 2017) study in two Ekurhuleni informal settlements which show that pensioners practice UA as a livelihood strategy, that plant exchange is strong friendship bond and that cultivating medical plants connects to traditional cultural practices.

Internationally, Berlin's allotment gardens and community gardens provide ways for environmental enthusiasts to escape the concrete jungle and connect with nature (Matthei, 2017). These gardens offer youth and families opportunities to

learn to farm, meet other city residents and foreign nationals who want to learn the local language (*ibid*.). These few examples also illustrate the diversity of socio-economic groups participating in UA.

In addition to household contributions, there is an active dialogue that UA has huge benefits to the city. Globally, cities have sprawled into extensive hard surface areas that reflect and absorb sunlight, and increase surface runoff, contributing to the urban heat island effect (Simon, 2016). In such circumstances, UA together with urban forests and parks serve as principal greening infrastructure for the city, the key to both the sustainable and resilient city dialogues. Mougeot (2005) argues that through the vegetation cover, and food crops, UA enhances city greening, beautifies, and cools the city, reduces erosion, cools buildings (through rooftop gardens), and improves biodiversity. Locally, Malan (2015a) argues that UA also offers the closed-loop opportunities of recycling organic waste, and the re-use of grey-water for irrigation; which supports my previous work in Dar es Salaam and is supported by the broader findings around urban livestock (Diogo *et al*, 2012). All of this said, it is important not to romanticise UA as there also are some weaknesses in urban farming.

2.2.4 Weaknesses of urban agriculture in the city

Though much of the literature singles out food security and nutrition as the largest contribution of UA, Webb (2011) queries such contributions in the absence of hard evidence to support such claims (see further Webb 1996; Ellis and Sumberg, 1998). He stresses that without such concrete evidence, arguments in favour of UA amount to blind advocacy that does not benefit the sector (*ibid*.). In light of the above claims, my study on the intersection between UA and land use planning through innovation networks cannot be taken lightly.

One response to Webb's (2011) argument would be that UA is part of the local food movement that provides food to the low-income residents (Seigner *et al*., 2018), much of which I know from my own experience is undocumented. However, it must also be said that the study by Battersby *et al*., (2013) in Cape Town and the international examples discussed above show that urban farmers

are not necessarily among the lowest income groups. Which brings up the question is UA supporting food security or simply the desire for fresh local produce by people who are food secure? Arguably, Webb's (2011) claim is further elaborated by Horst *et al*. (2017) who argues from a study in the USA that disadvantaged residents are often time-constrained by extra jobs thus unable to practice gardening. My experiences from Dar es Salaam and Harare are that though urban farmers may not necessarily be the poorest city residents, the customers who buy food at farm gate or vegetable markets do include low-income groups who regularly buy local foods in small quantities.

In part due to just such weaknesses, the literature review demonstrates that UA is under threat from multiple directions. These include land use restrictions, food safety concerns, and negative attitudes towards farming as a source of livelihood. From the African perspective, UNDP (1996:38) argues that:

> "UA in Africa presents a contradiction: It has a relatively long tradition and is widely practised, yet in most African countries it has been undervalued and resisted by a generation of public officials".

While this UNDP claim might be considered outdated, writing from experiences in Zambia, Simatele and Binns (2008), and Simatele, Binns and Simatele (2012), confirm that the African context has continued relevance.

A further weakness of UA is its relationship to urban land. Literature from the Portland, Berlin and Cape Town shows that UA's inability to compete as a viable urban land use in the global market economy is clear, property developers, and the real estate market constitute the primary impediment to urban farming globally (Rhoads and Quentin, 2009; Geyer *et al*. 2011; Matthei, 2017). As discussed further in Chapter 4 and 5, the pressure from the neoliberal economic trend is undeniably great, in fact arguably the 'deal-breaker'.

Another common land concern over UA relates to desperate individuals who illegally farm marginal and hazardous sites, exposing themselves, customers, and residents to health risks from pollutants. For instance, the Msimbazi Valley in Dar es Salaam has farming groups who regularly use water polluted with raw sewerage and industrial effluent (Halloran and Magid, 2013b). These farmers risk potential contaminants such as bacteria and heavy metals posing health problems for themselves and consumers of their farm products (*ibid*.). It is

noteworthy that this threat is not unique to the cities of the global South. In a study in the Plaine de Biere of Paris, France, some lettuce farmers were relocated from the inner city to peripheral zones because of industrial pollution on the land (Aubry and Kebir, 2013).

The future of UA is also threatened by negative perceptions from both residents and municipal councils. The low productivity of traditional agriculture and half-hearted commitment by residents exploring better-paying careers elsewhere has created a mindset that characterises UA as a temporary or stopgap occupation. The consequence, as Horst *et al*. (2017) argue from studies in the USA cities, is that UA is regarded as an interim land use for vacant plots.

Such negative perceptions impact the farming side as well, reinforcing the idea that urban farming is inherently transitory. Aubry and Kebir (2013) observe that small-scale farmers in the Paine de Versailles in Paris have problems in recruiting farm labour. Coupled by in this region of Paris, farmers' spouses, children, and sometimes the farmers themselves prefer more attractive incomes and city lifestyles again rendering UA a temporary occupation (*ibid*.). Furthermore, accommodation costs within this central region of Paris are very high, and agricultural workers cannot afford a decent life with farm wages (*ibid*.).

Studies in the USA cities support this claim, showing that many UA practices cannot pay a decent or living wage (Meenar *et al*. 2017, Seigner, *et al*., 2018). I would say such negative UA experiences, sound warning bells for its future, especially given the absence of strong networks supporting urban farmers in the global South. Consequently, my study argues that the survival of UA inevitably rests on its innovation (addressing quality product and productivity) and its ability to network with land decision-makers thus rendering it more competitive for permanent land use. The relevance of innovation on the whole value chain is discussed in the next section.

2.2.5 The food value chain

The value chain, in general, describes "the full range of activities which are required to bring a product or service from conception, through the different

phases of production, delivery to final consumers and final disposal after use" (Kaplinsky and Morris, 2000:4). As such it is important to consider in the dialogue of AU's contribution to the city.

This study seeks to expand that definition to include the inter-relationships between the respective actors. In line with this, Sanchez-Hernandez (2011:105) identifies the key actors:

> "Value chain involves a complex array of primary producers, industrial processors, trading companies, retail outlets and final consumers; all of them must meet the rules of regulatory bodies operating at different geographical scales".

Important to this study is how the actors transfer and share resources and expertise through networks, which the study argues will, in turn, transform the food value chain and thus impact the power dynamics within those networks. My study broadens the actors identified by Sanchez-Hernandez (2011) to include relevant city departments, NPOs, and the private sector that work with farmers.

Geographically, the literature categorises value chains into local, national, or international (Kaplinsky and Morris, 2000; Sanchez-Hernandez, 2011). My study further characterises these food value chains into long (international and national), intermediate (city-wide) and short (local or community). My intention is to emphasise and separate the short value chain that provides food to the local community from the intermediate value chain to wider city residents for purposes of identifying strategic food security practices. It should be noted that also tied into the 'local food' vocabulary is the crisis in the late 20th century and the mistrust of the global agriculture food systems to deliver the right quality food began the ongoing promotion of local food value chains (Aubry and Kebir, 2013). This ongoing interest in the origin of food among consumers creates demand for UA products within the intermediate and short value chains.

The literature also suggests that there is a social relationship to food chains. In the long food value chains the product travels long distances, form loose relationships with national stakeholders, and customers, customers do not have personal contact with the producer, and thus little feedback on the products, as outlined in the Marian fish fillet in Norway (Sanchez-Hernandez, 2011). On the contrary, the short food value chain creates interactions and bonds between

producers and consumers, which facilitate feedback mechanisms on consumer tastes, and quality demands *(ibid.)*. An argument can, therefore, be made that as well as food security, UA can be situated in the short and intermediate food value chain because of ethical concerns on issues such as energy efficiency, and "eat local" trends, especially with an interest in fresh and nutritious food. Despite the varying scales of production between long and short food value chains, urban farmers and their network of actors can draw valuable experiences from the Marian fish fillet national food value chain (*ibid*.) which are: (i) improvement of production methods through mechanisation; (ii) documentation; (iii) and collaboration across diverse actors, and geographical spaces.

2.3 Drivers underlying Marginalisation of Urban Agriculture by Municipal Conventional Land use Planning

Both Chapin (1965) and Olima (2007) contend that conventional urban land use planning is primarily geared towards regulating urban land development to ensure the spatial 'location and intensity' of the most appropriate, and efficient uses of land. This longitudinal understanding of that definition is important when situating such embodied practices as the master planning approach which Friedmann (1973) argues applies scientific and technical rationality towards addressing the socio-economic goals of the city. It must also be noted that today, such a rational comprehensive planning model, spearheaded by the planner as the expert, is widely criticised for its top-down, technocratic, and bureaucratic approach (Watson, 2009; Todes *et al*., 2010). This conventional planning framework is enforced through zoning regulations and development control among other related development approval mechanisms.

Planners have traditionally use the concept of competing land uses in zoning to segregate incompatible land uses, and mitigate inefficient land uses (Watson, 2009). Conventional land use planning is guided by principles such as the density and intensity of use of land (Todes, 2012) and urban aesthetics that, when combined with the neoliberal market logic, pushes UA out of the city. With origins in the global North, Watson (2009) and Todes *et al* (2010) both argue that the master planning approach is inappropriate to address planning challenges of the

global South: urban poverty and informality. Yet in spite of its well-documented shortfalls, this master planning approach is still the dominant form of spatial planning in many countries, including the global South (Watson, 2009; Todes *et al*., 2010; Todes, 2012). Given this dilemma, my thesis becomes scholarship that responds to the limitations of the master planning approach and proposes that planning innovation should respond to local realities in the global South. This uneasy relationship between conventional urban planning and UA are reviewed in further depth in the next two sub-sections.

2.3.1 Marginalisation of urban agriculture by conventional land use planning – the urban agriculture argument

Globally, urban farmers access to land for farming through a variety of tenure systems which include formal zoning, stable agreements and precarious informal land occupation (Cabannes, 2012). My experience in facilitating the formalisation of UA in Dar es Salaam shows that without innovation network, formal land use zoning for UA puts the sector in confrontation with conventional land use planning guidelines. Some urban farmers world-wide have informal agreements with landowners, often reduced to verbal contracts or no agreements at all. For instance, 'guerrilla farmers' occupy, and utilise land without the owner's consent (Meenar *et al*., 2017) 'manoeuvring' between the municipal guidelines and pressure from property developers to practice farming. My argument is that while such radical UA practices justifiably confront the capitalist agribusiness practices, without innovation such practices further alienate traditional farming from conventional land use planning.

A more stable land arrangement is the 'tried and tested' economic rent method which the UNDP's (1996) study in Africa, Asia, and Latin America found to be the most common model for land access for UA. With the rent method, farmers enjoy recognised access to and pay for land and in return maintain the piece of land (*ibid*). There are long-term typologies of the economic rent method globally. For instance, property rights in Havana, provide for land access for UA for periods of up to 40 years (Fisher, 2012) and In the global North, Europe's allotment garden systems give rights of land access for up to 25 years (Barthel *et al*., 2013).

However, as seen locally in Cape Town, the rental system is not failsafe. Geyer *et al*.'s (2011) study note the low economic rentals for UA and the high opportunity cost by competing land uses results in the conversion of urban farming plots to other land uses. This argument depicts that locally traditional UA is at odds with conventional land use planning. Such contestations on access to land and viability indicate that within the prevailing planning practices and neoliberal economic environment, traditional UA will remain marginalised by conventional urban land use planning. As the following case study shows, this is not limited to the African context.

- **Case study 2.2: Urban agriculture and land use planning vs the neoliberal market logic**

Within the land tenure and UA discourse, there are controversial claims that UA is characterised by low productivity and is, therefore, an 'inefficient' urban land use (Simatele and Binns, 2008, Seigner *et al*, 2018). An example can be drawn from the earlier study in Bexley, London in which Mbiba (2003) unearthed underutilised allotment gardens that posed an enormous management burden to the local authority. For instance, in 2002 alone, the London Council spent an estimated £500 (about R9 000) per plot per annum on the maintenance of under-utilised allotment gardens (*ibid*.). Given such circumstances, the council disposed of the underutilised plots to property developers, thereby reducing the land area set aside for UA (*ibid*.). Such inefficient land utilisation is a critical contributor to the marginalisation of UA, especially in the neoliberal market logic where productivity and competitiveness are the central criteria of land allocation.

- **Productivity and competitiveness of urban agriculture**

Further complicating the UA/land use dynamic is that some UA advocates contest the claim that UA is inefficient. To show the types of trends contributing to this I draw on the older UNDP (1996) data which argues that some UA practices make the best use of urban land through a short cycle, high-value market crops, and multi-cropping, highlighting attributes of UA innovation. As well as a much

more recent study by McClintock (2014) in the USA and Canadian cities which found that UA productivity per hectare ranges from 0.02 ha in Montreal to 15.38ha in Philadelphia. Interestingly, this study shows that UA can produce high yields again justifying the need for innovation.

Though McClintock's (2014) study did not give the real estate comparisons for the same plots sizes, I would assume that the productivity per hectare would be higher. Most of the literature reviewed does not have such 'hard' statistics on the productivity of UA, hence justifying the critique by Webb (2011).

Contrasting this neoliberal market logic, the Director for RUAF, Dubbeling (2017) in her keynote address to the International Urban Farming Conference in Berlin in September 2017 questioned the expectation that UA should be financially viable. Her main argument was that UA has other social and community benefits that cannot be disaggregated to quantitative measurements. UA's ability to flourish outside this market logic will be discussed later in the examples of Havana, Detroit and Almere in Chapter 4. Also outside this market logic, are the arguments that UA provides hard to quantify social capital, environment and community benefits to the city (Battersby and Marshak, 2013).

2.3.2 Marginalisation of urban agriculture by conventional land use planning – the land use planning argument

Urban planning thinking and practice in the global South was and still is, strongly influenced by planning traditions of global North (Harrison, 2006; Watson, 2016). Watson (2009) among others argues that these practices were spread through colonisation and perpetuated through the global development agendas of the North. The planning ideas from the global North claimed universal relevance as part of post-Enlightenment thinking, proliferating the notion of Northern rational hegemony. This thinking was further entrenched post-World War II with the establishment of the Bretton Woods Institutions and the UN as the leading generators of development norms. The Bretton Woods Institutions' neoliberal "principles of private entrepreneurship and profit-maximisation" were viewed as the "avenue to lift millions out of poverty" (Kornienko, 2013:14).

These dominant planning ideas have become so influential that despite the failure of conventional land use planning in the global South, the "political elites and growing middle class supported urban modernisation as it delivered profits in land to these groups" (Watson, 2009:154). This study argues that such normalised practices as elitist master-planning (discussed earlier) can be redressed by adopting planning innovations that are cognisant of a broader range of urban development challenges in the global South. To this end, a new planning paradigm would breakdown the *status quo* driven by global neoliberal market logic and just such top-down approaches.

Local studies in Ekurhuleni show that such conventional master plans neglect social diversity, and public participation dynamics, as well as related actors and their interests (Todes *et al*., 2010). This example shows how in the neoliberal planning framework such a planning approach sidelines sectors within the city that are deemed economically insignificant. UA would fall into this category.

- **The argument between planning and urban agriculture as food security**

The marginalisation of traditional UA is affected by jurisdictional as well as macro-micro (for instance neoliberal agendas/UA farmer) level governance issues. The contentious global-local land use planning for UA discourse is brought to light in Donovan *et al*.'s (2011) argument that Australian planners have limited awareness of the significance of UA and how it falls within their roles and responsibilities. The authors elaborate further that though planners understand the importance of food, they are unconvinced that small urban farms will contribute towards global food systems, and addressing food security (*ibid*.). Such arguments and perceptions perpetuate the marginalisation of UA out of the city, especially at the neighbourhood level that recognises the local and household contributions of UA despite its seemingly marginal significance, at the city level.

Similarly, a study in the USA of 22 cities by Rhoads and Quentin (2009) between 1997 and 1998 shows parallels with the Australian practices. In this study, planners felt that food security is not part of their responsibility since the food

system is indirectly linked with the built environment (*ibid*.). Commenting on such claims, Dubelling (2017) argues that UA practices are by nature small with specific needs that cannot be replaced by improving peri-urban or rural agriculture.

A second argument on the role of planners in UA is that planners are agents of the local government and thus advocate for courses of action approved by elected representatives for implementation (*ibid*.). In this context, where the electorate and politicians do not highly prioritise food planning, planners are emasculated to promote such issues (*ibid*.). This debate upholds the 'public interest' argument and presents a planning conundrum for subaltern activities such as UA, especially in cities such as Johannesburg that strive for world-class city status. Huchzermeyer (2011) commends that the global city status is driven by global development and neoliberal economic goals, which sways local governments and the general public opinion in favour of large projects that, however, benefit the elite.

Planners equally have the difficult task of prioritising local food production among other competing urban land uses. In particular, they assume that UA is a sub-set of other planning fields. For instance, locally in the City of Cape Town UA is classified under the Department of Economic Development and the Health Directorate (Battersby *et al*., 2013). Here I draw on the international study of Portland (Rhoads and Quentin, 2009) to argue that this is problematic. They contend that when viewed as a sub-set of other planning themes, local food production is rarely prioritised (*ibid*.).

However, despite such studies, efforts to integrate UA in the USA and Australian cities are an 'uphill battle', leaving Fisher (2012:69) to conclude that some "planners typically view UA as an interim land use until a development opportunity with higher economic utility such as housing, retail, or manufacturing becomes feasible". The discussion of this section frames the tensions between UA and land use planning that initiated this study.

- **The peri-urban agriculture argument**

Some neoliberal critics of land use planning for UA take stronger views. Moustier and Danso (2012) argue that scarce public resources should not target UA in cities since land is insufficient and expensive. They further propose that transport infrastructure should be improved in order to make peri-urban farming more viable (*ibid*.). This argument is supported by Rhoads and Quentin's (2009) earlier study that found that planners believe food can be more efficiently provided by private firms from the hinterlands beyond the city boundaries. This critique of UA is valid when applied to large urban farming initiatives in peri-urban areas. However, it would not serve the small-scale farming initiatives in the city core that occupy under-utilised parks, vacant plots and rooftop gardens (Dubelling, 2017). Such small-scale farming practices are often carried out by more vulnerable populations with broader benefits beyond land use productivity and competitiveness.

To sum up this section, the USA and Australian planning experiences show that even at its best, conventional land use planning falls short in incorporating marginalised land uses such as traditional UA. It is then unsurprising that efforts to accommodate UA under this planning framework are met with lukewarm responses, benign indifference or active resistance. In this regard, Doucet (2008) calls for land use planning to broaden its horizon outside the conventional planning paradigm. His argument along with the tensions discussed above highlight my embracing of innovation networks as a "platform" with the capacity to bring together planning's all too often rigid address and market-driven preoccupation with spatial issues at the expense of other critical social issues such as food security and recreational purposes which contribute to quality of life in the city.

2.4 Can Innovation Networks be an Effective Tool to Transform Urban Agriculture and Land use Planning?

This section reviews literature on innovation networks as a response to the continued marginalisation of UA by contemporary land use planning. At the same time, it sets the Innovation Network Theory at the centre of the theoretical framework. It's worth reiterating that I pose innovation networks as a response because innovations in land use planning and innovations in urban agricultural practices alone (Komninos, 2008) does create an environment for formalisation in the UA sector in Johannesburg. And, while networks currently exist in UA (as will be shown in both international literature and case studies in my research), they alone are not sufficient for the formalisation of UA. It should also be understood that formalisation as a developmental norm is contested in the context of Johannesburg (Huchzermeyer, 2011).

A growing body of literature demonstrates that innovation networks lead to collaborative flows of ideas and resources that result in innovation as well as adaptive organisational management (Ahuja, 2000; Vonortas, 2009). This section presents the parameters for measuring the existence of innovation network through assessing the collaboration across UA and land use planning. The different actors will collaborate through: (i) open knowledge and technology sources, where actors innovate through knowledge and technology that is freely available from sources such as published articles, client feedback mechanisms, learning exchanges or exhibitions without collaboration with the source of innovation; (ii) acquisition of knowledge and technology, where actors acquire machinery and equipment required to catalyse innovation without interaction with the source of innovation; and (iii) innovation collaboration, where actors actively collaborate with research and training institutions, and government laboratories to acquire innovation (OECD, 2005).

My study argues that these innovation networks will create a collaborative platform for actors that share inter-sector requirements, and standards. The study builds the argument that innovation networks create an ecosystem of stakeholders towards value addition (understood as both physical and social) and enhancement of productivity and competitiveness. In UA and land use planning, this will result in a mutual coexistence of the sectors and formalisation of UA.

Experiences from sectors such as electronics, mining and online banking, show that innovation networks transform the sectors to adapt to consumer demands through quality products and standards and increased yields resulting from the flows of ideas and resources (Edquist, 1997; Moore, 1998). Learning from this, my study poses that innovation network will create a collaborative platform in the context of Johannesburg with stakeholders from urban farmers or farmers' association, city departments responsible for planning and UA, government departments, universities, government research centres, NPOs and the private sector. This innovation network will function within the progressive, yet to date underutilised land use planning policies already in place in South Africa and the City of Johannesburg such as IDP, SDPs and SPUMA. Critical further research beyond the scope of this study is the socio-economic and spatial modelling overtime of the planning tools/practices outlined in South Africa's body of land use policy within the innovation network environment outlined in this study.

Practical experiences from international city case studies of Almere, Dar es Salaam, Detroit, Berlin, Havana and Portland (Mukherji and Morales, 2010; Jansma and Visser, 2011; Cabannes, 2012; Halloran and Magid, 2013; Paddeu, 2017; Matthei, 2017) are then used to substantiate the concept of applying innovation networks across land use planning and UA towards the formalisation of UA, as will be detailed in Chapter 4. Specifically, this section looks at why the facilitation of ideas and resources between these two sectors could lead to that outcome.

2.4.1 Experiences from industrial empirical studies on innovation networks

In practice, innovation networks produce a network economy, which is an enterprise-based system that develops manufacturers and markets goods, and services through collaboration between businesses (De Man, 2004). A networked economy ideally benefits all the members and keeps them together. De Man (2004) identifies five types of innovation networks which are: (i) quasi integration, (ii) vertical supply, (iii) solution, (iv) technology research development, and (v)

standardisation (*ibid*.). Table 2.1 below presents quasi integration and vertical supply networks that are the most relevant UA entities and city departments.

Table 2-1: Types of innovation networks (source: adapted from De Man, 2004.20 and 82)

Network type	**Definition**	**Key characteristics**	**Examples**	**Design flaws**
Quasi-integration	These are horizontal networks between direct competitors to increase market power, save costs and rationalise the industry. These networks are close and can result in the merger of firms.	Horizontal; integration of a limited number of activities; long-lasting	Star Alliance and One world. NB: Farmers use quasi-integration to jointly market and sell products.	Too many partners, slow-down decision-making, network overly dependent on one partner, partners not sufficiently powerful
Vertical supply	Networks between suppliers and producers in consecutive phases of the food value chain, improve the supply chain effectiveness. Often result from a focus on core competencies and outsourcing.	Vertical specialisation; medium to long-term relationship; coordination of logistics and product specification	Toyota and Dell. NB: Farmers collaborate with supplies of inputs or buyers of finished goods.	Too much reliance on weak ties, reliance on exclusive ties

One form of the network economy is *quasi* integration where actors come together to market products, and reduce costs, and improve business. The Star Alliance is an example of a quasi-integration network where airlines came together to lower costs, and improve services to customers, as well as improve business for its members (*ibid*.). Such quasi integration networks have unique experiences for my study as actors promote productivity and, critically, understand sector opportunities.

Another type of innovation network relevant to my study is the vertical supply networks, which are formed between producers and suppliers to ensure an

efficient supply chain (*ibid*.). Here Toyota provides a useful example. It has a vertical supply network and collaborates with suppliers of parts so that the company concentrates on its core business and improves the quality of products (*ibid*.). Urban farmers and city departments can use the vertical supply network to collaborate with suppliers of inputs or trainers and buyers of finished farm goods, in such a way that maximises the potentials of UA while at the same time weaving it into larger city-wide land use goals (Jansma and Visser, 2011).

One of the key insights from the literature is that collaborations and joint research have spearheaded innovation in sectors such as electronics and online banking because the technological breakthroughs required for such innovations often depend on contributions by many actors (Edquist, 1997; Moore, 1998: Pittaway *et al*., 2004). Innovation networks catalysed the development of the computer industry in the USA (Pittaway et al., 2004). The sector developed through networked collaboration between the Military Agencies, the USA Bureau of Census, the Massachusetts Institute of Technology, and the University of Pennsylvania (Edquist, 1997; Pittaway *et al*., 2004), in other words facilitating innovation by bringing sources (stakeholders) of ideas and resources together at the same table.

- **How innovation networks in industry apply to UA and land use planning stakeholders**

De Man's (2004) quasi networks and vertical integration will be applied to UA practices and city departments. In this context, the study will ascertain whether UA and the city department developed innovation networks to pooling resources or collaborate with partners to access and guarantee the market. The electronics and online banking case studies demonstrate that innovation networks are prerequisites to overcome technological hurdles in order to access new knowledge or technology that may lie outside an individual firm, institution or sector. The electronic and banking case studies are purely private sector collaborations; however, my study will include central or local government actors among the networks since they are critical towards the formalisation process.

2.4.2 Innovation Networks in Land Use Planning

There is growing criticism of the master-planning approach as a land use management approach given its weakness highlighted earlier and its close alignment to neoliberal market forces, yet there are very few places where this 'nut has been cracked'. All too often the neoliberal system garners control of the real estate market, which in turn influences the planning agendas. This is one of the key power dynamics to overcome within the UA/land use planning innovation network.

Watson's (2009:154) work talks to the gaps in the master-planning practices highlighted by Tibaijuka calling on planning to "replace it with inclusive, strategic and growth management plans". But with what mechanism? That is a question in this study.

Todes *et al.* (2010) speak directly to this master planning highlighting one of the key issues in the UA dilemma, formal versus informal. They re-emphasise that modernist planning frameworks sidelines other forms of land uses such as informal trading, which speaks directly to the case UA and its high level of informal activities. Commenting on such conventional land use planning, Mabin (2014) also observes the problematic nature of bringing such neoliberal theories or development models from the global North and applying them to diverse contexts in the global South where informal livelihoods are so prevalent.

This study is proposing a shift in planning paradigm that integrates informal farming practices into a hybridised market logic that could be facilitated through innovation networks that stems from a growing understanding that individual sector innovation. This is where effective planning policy and political will must engage to support recent *de jure* trends towards inclusivity and integration.

2.4.3 How innovation networks transform land use planning

Planning evolves procedurally and substantively primarily through devising new ways of plan-making and improving the content of plans towards more effective and efficient land use. For the rapidly urbanising cities of the global South, planning innovation is a crucial catalyst for socio-economic transformation and progress towards sustainable development (Kraemer-Mbula and Wamae, 2010). What role do networks, specifically innovation networks, can play in the greater debate of planning innovation?

In contrast to conventional planning, contemporary planning practices seek to promote partnerships between planners, citizens, decision-makers, universities, public, and private sector institutions in order to produce more holistic visions to guide the future development of cities. Watson (2009) elucidates that planning theory and practice in the global North began shifting in the late 1970s, mainly as a result of planning innovation and decision, making processes such as participatory planning, and democratic governance. Harrison (2006:319) argues that "the relevance of contemporary planning theory is limited by its origins within the intellectual traditions and experiences of the West". From this argument, the success of planning innovation, therefore, rests on how suitable or adaptable they are to the local context, and critically as Burawoy and Von Holdt (2012) points out how it is acted on in that context.

Examining newer planning approaches within the South African urban context Watson (2009) comments on the inclusion of - and potential transferability of - strategic and integrated planning that links planning with relevant contemporary city challenges such as the environment, sustainability, resilience and climate change. Cassinari *et al*. (2011) argue that planning is a trans-disciplinary practice, which is dependent on feedback loops from different parts towards decision making, what I call in this study the planning ecosystem. Innovation networks create a collaborative planning platform for stakeholder partnerships, and collaboration to improve the systems and performance of organisations. Commenting on trans-disciplinarity, that is at the core of innovation networks, Karuri-Sebina (2014:69) argues that the approach will propel planning "through the involvement of actors in knowledge production" and thus problem-solving.

This claim resonates with Seltzer and Mahmoudi's (2012) earlier arguments that innovation is the creation, and application of ideas developed from within and outside the boundaries of any single institution.

2.4.4 Municipal land use planning and UA innovation networks – empirical practices

As mentioned earlier, planning innovations are influenced by contemporary planning theories such as collaborative planning by Healey (2003) that acknowledge the multiplicity of actors in urban development and the dynamic interrelationships involved in the process. In my conceptual framework, I draw this together with Watson's (2009) identification of current planning innovations that are influenced by the international discourse on governance and urban management to set the policy and participation parameters of innovation network across UA and land use planning could look like.

Such contemporary planning approaches include: Strategic Spatial Plans successfully implemented in Barcelona, Spain; the Participatory Budgeting approach as implemented in Port Alegre in Brazil; the as yet not fully implemented Integrated Development Plan (IDPs) in South Africa; and Urban Management Planning (UMP) in Dar es Salaam, Tanzania. As secondary research, this study will analyse the existence of innovation networks in both UA and land use planning in the international case studies from Almere, Berlin, Dar es Salaam, Detroit, Havana and Portland in detail in Chapter 4. The next section presents themes that influence the macro-micro environment for innovation in urban farming and city departments. These are neoliberalism, sustainability, and food security debates juxtaposed against the lived realities of the urban farmer.

2.5 Innovation networks and neoliberalism

In general, the influence of innovation networks in UA on land use planning is affected by the country's political context, in other words, the macro-micro relations. This is because planning is influenced by the nation's prevailing political economy (Harvey, 1987). The next section discusses neoliberal trends which have influenced planning in both the global North and South Africa.

As argued earlier neoliberalism as it plays out in the market logic of urban development has had a huge impact on land use planning across the world. Neoliberalism developed as an economic and political strategy in Britain and the USA in the late 1970s (Jessop, 2002), and was spread globally through the influence of the International Monetary Fund and the World Bank. According to Jessop (2002), neoliberalism is based on free choices by individuals and institutions as rational actors in society. The notion of free choice promotes the rolling back of the state apparatuses in favour of the dominant role of the private sector. As discussed above in the power relations as they relate to network strategies, this dominant private sector and lack of balance with policy implementation is a critical hurdle to the stability of the UA sector in the South African context.

Neoliberalism has been more successful in Europe and North America with stable governments and established systems of governance. Although even there cracks can be seen in cities that have rising levels of inequality and unaffordability. However, the rolling back of weak state apparatus in many African countries in the 1990s was disastrous because the weak institutions and fragmented civil society are incapable of exercising the necessary checks and balances (Harrison, 2006) in cities characterised, particularly in South Africa, with extreme socio-economic inequality.

I would argue that though still a dominant political ideology, the recent 2008 world recession has raised questions about the success of neoliberalism even in the global North. In cities, neoliberalism gave rise to the idea of 'urban entrepreneurialism' (Harvey, 1990) where planners and city managers promote capital and investment inflows into the city. In Johannesburg, the new planning framework attracts investment and thus directs land use planning, when

juxtaposed against progressive planning policies such as the IDPs, to date the economic driven trends of inequality that support the elite continue to dominate.

- **Challenges of neoliberalism**

As the following literature will show, the influence of neoliberalism is a contentious topic. Within local governments, Harvey (1990) argues, planning is no longer restricted to professional planners but also includes entrepreneurs who must promote cities in order to attract capital and investment inflows. I would argue that key to the innovation network premise this study, and of concern to UA is that with neoliberal thinking, municipal authorities assess the worthiness of investments in deciding on land use priorities and allocating land. Planners would likely argue that such planning principles uphold the urban land economics principle that values the ability to pay land rent and thus UA finds itself relegated to the city periphery.

A strong argument can be made that urban entrepreneurialism shifted urban planning onto the neoliberal agenda (Harvey, 1990), which he attaches directly to the notion of the Right to the City. This agenda sees cities beyond the mere spatial organisation of land use, to centres for investment and employment creation. However, it must also be noted that there is a strong connection between neoliberalism, innovation and collaboration between actors in economic development. In fact, Jessop (2002) acknowledges the need for partnerships and networks that integrate initiatives and plans between government, the private sector, civil society, communities and academic institutions. It should be noted that the partnerships he identifies are parallel to those identified above that form networks that influence farming entities to improve products and services. This parallel becomes another framing of the potential for innovation networks in this study.

2.6 Innovation networks and urban development debates of sustainable and resilient cities

It is worth emphasizing that this study is guided by the concepts of sustainability and resilience. While these concepts are often presented as separate entities, Walker and Salt (2006:37) argue that "resilience is the key to sustainability". This claim is supported by Harrison et al. (2014:15) who argue that "A common misunderstanding is that resilience replaces the idea of sustainability or that resilience and sustainability are essentially the same (ibid: 15). The same authors further reason that "one way of understanding the relationship between the two terms is to consider sustainability as an essential goal for development and resilience as a way of thinking and acting that would lead us towards achieving sustainability" (Harrison *et al*., 2014:15). This study thus contributes towards both sustainability (as goal) and resilience (as process) research from Walker and Salt (2006) and Harrison *et al*. (2014) underlines that these concepts feed into each other.

This study on innovation networks towards the formalisation of UA in land use planning is part of broad city sustainability and resilience debates. It's worth stopping here to make clear that what I mean by this is a formalisation of UA within the planning, land use practices, I am not advocating the formalisation of urban farming practices and strategies by the farmers themselves.

As highlighted in Chapter 1, the study acknowledges the two frameworks that potentially support the formalisation of UA in land use planning. Firstly, Mendes *et al*. (2008) observe where municipalities increase their land use planning towards sustainable city transformation. Relevant to this study is the sustainable and resilience city strategy that seeks to increase local food production through resource recycling, educational activities, safe food production, green architecture, open space management, social inclusion, and public health (Mendes *et al*., 2008; Mukherji and Morales, 2010).

Secondly, the smart-growth urban development approach that is related to the promotion of conservation of the environment, through the protection of health, and natural environments such as open spaces, farmlands, and places of natural beauty which again bolsters city resilience (Smart Growth, 2015). These two

strategies give a solid argument in favour of the inclusion of UA in land use planning because their principles are embodied in the contemporary planning approaches such as the South African Integrated Development Plans as will be outlined in Chapters 4.

The World Commission on Environment and Development (WCED) Report (1978), popularly known as the Brundtland Commission, envisages that sustainable development ensures a balance across economic, social and ecological issues. Commenting on the concept of balancing the demands from different sectors, Pieterse, (2011) argues that the triple bottom line decision-making model regards the economy as a primary for the reproduction of the society where the social and ecological reforms support extractive capitalism.

Problematically, in South Africa, the dominance of the economy continues to be evident in planning despite the awareness of environmental issues in both the legislation and planning documents such as the IDPs. Ecological and social issues continue to be subjugated to business or investment decisions as a priority. We can point back to the discussion in the previous section dynamic can power and neoliberalism to explain this local dynamic.

The WCED Report (1987) is based on the consensus decision-making model that purportedly results in win-win scenarios for competing ends. My experience in planning shows that the consensus-building decision-making model upholds the principle of participation by different actors. However, in practice some societal interests are irreconcilable. Consensus can be hard to achieve even in the participatory planning model because some community groups have resources and engage experts to advise them during the planning process, also unrealisable expectations can equally be a hurdle.

For instance, even within the consensus-building planning framework, infrastructure and service provision in many cities is skewed in favour of residents who can pay for investment and maintenance. This is problematic in cities of the global South with large populations of urban poor. The loopholes of the consensus-building model are also reflected in neoliberal South African cities; in fact, Karam and Sihlongonyane (2006) argue that economic discrimination has replaced racial discrimination in service provision to South Africa's city residents.

More recently the Sustainable Development Goals (SDGs) have given urban development and sustainability issues prominence, especially through Goal 11, which seeks to make cities inclusive, safe, resilient, and sustainable (Simon, 2016). Goal 11 targets include the right to cities, food security, and nutrition (*ibid*.). In support of the SDGs, the New Urban Agenda (NUA) moved further the UN commitment to sustainable urbanisation (Watson, 2016).

What is pertinent to this study is that the NUA view municipal planning as a mechanism to implement SDGs (*ibid*.). This is a major shift from the development agenda of the multilateral institutions that previously considered planning as a hindrance to the market (*ibid*.). In this scenario and my study, municipal planning creates the platform for collaboration among actors in planning, which is necessary for innovation. The SDGs and the NUA take sustainable development challenges further than the Brundlandt Commission by promoting inclusivity, environmental rights, social recreation, and food security (Simon, 2016). I would argue that promoting rights and inclusivity brings on board previously marginalised urban development issues, which align with planning innovation and inclusion of UA into the formal land use planning practices for cities.

2.7 Innovation networks and food security debates

The UA contribution towards food security globally, and in South Africa in particular, is a contentious subject because as was discussed earlier there is scant 'hard' evidence to prove such claims (Webb, 2011). Added to this, is the reality for most cities that competition for urban space is intense. Within the context of South Africa, cities are densifying to reduce sprawl while at the same time the population is rapidly urbanising, which leaves little space for UA within the city core. Such pressure pushes farming to available land such as rooftops, and temporary open spaces. These land limitations lead to questions related to scale. These arguments lead to a dichotomy: do cities have both the capacity and the land needed to produce the amount of food to feed its population? And, does UA need to feed the whole city to be significant?

In response, one can offer such long-standing discourses as reflected in Rogerson's (1993) arguments that UA is a worldwide strategy for poor urban

residents to reduce poverty and improve food security (Rogerson, 1993; 1996; Meenar *at el*, 2017). This is however contested by a later study by Battersby and Watson (2019) who show that the urban poor buy from informal food markets that are closer to them and sell in smaller quantities. However, one can show that while the scale of the UA operations has increased, the volume of its contribution, within conventional empirical parameters, to the city economy remains negligible. On the other hand, one must also acknowledge that some UA practices are informal, poorly financed, resourced, and documented, leading to unfounded biases (UNDP, 1996; 2015).

Thus it can be said that some of the contestations over UA contributions are caused by the lack of systematic data to back the arguments, which is true for many urban farming activities that contribute to the informal economy. In response to the claim that urban farming cannot feed the city, Haletky and Taylor (2012) assert that UA falls into the community food security category that cannot solve all the ills or replace the current global food system. On the other hand, in support of the community food security argument, Christian (2012) asserts that the UA movement takes control of food production from large-scale industries to local food systems accessible to local city neighbourhoods. Further, as has been discussed UA's food security contribution to city residents is not only limited to consumption or selling farm products but also savings on food expenditures.

2.8 Conceptual Framing – Innovation Networks in Urban Agriculture Food Value Chain and Land use Planning

The theoretical framework for this study presents the interrelationships between the three critical concepts of the study which are urban agriculture (UA), land use planning and innovation networks (Figure 2-1). My own experiences substantiated by the literature reviewed demonstrate an uneasy and contentious relationship between traditional UA and conventional land use planning (Simatele and Binns, 2008; Halloran and Magid, 2013a; Malan, 2015a).

Everyday urban realities reflect that traditional, and in many cases even innovating UA is marginalised despite its environmental, social and community benefits (Van Averbeke, 2007; Cabannes, 2012; Kornienko, 2013, 2017). As a

result, urban residents depend on the long food chain that includes rural agriculture for food. All too often low-income residents cannot afford products from this long food chain, thus creating food insecurity.

Further, the marginalisation of UA highlights the need for innovation in both UA and land use sectors which according to Schumpeter (1934) and Croitoru (2012) improves the value and enhances product and service quality and organisational management. However, while innovations within individual sectors improve their performance, stability within the UA sector and formalisation within land use has not occurred. This study argues that it lacks the necessary linkages to extend these successes towards a viable ecosystem that supports the two sectors. In other words, innovations within UA or municipal departments render UA and land use planning competitive based on the market logic but fails to recognize other benefits of UA that address poverty and unemployment, thus still leaving it as a detriment within the neoliberal market environment.

To address the above described dynamic, this study adopts the theory of innovation networks that would transform the individual innovations within the two sectors of UA and land use planning at a trans-sector level. Central to the application of innovation networks is the creation of an “ecosystem” of city stakeholders able to negotiate the requirements and opportunities for alignment of the two sectors largely through ‘managing’ the power dynamics driven by neoliberal market logic.

The resultant collaborative planning and farming network would include stakeholders such as urban farmers, city departments, NPOs and the private sector. The study poses that these networks have the potential to bring about the formalisation of UA through responsive municipal policies and the establishment of departments or sections that work with urban farmers and programmes and project. It also argues that the implementation of key policy, such as the IDPs, is implemented as a power-levelling mechanism within the network relations.

Further, the application of innovation networks suggests a formalization of UA through urban land use planning requiring a more strategic approach beyond the neoliberal market-logic framework, again policy is implemented in this. The study responds to local and international contexts where competitiveness and value addition are the primary drivers for the formalisation of UA with experiences from

Almere and Portland. However, Detroit and Havana experiences – while both falling outside strong neoliberal environments - show that the dynamics possible with the application of innovation networks can leverage UA towards environmental and social benefits and as such be given the land use priority which much of the literature present has argued for and as argued in this study. The posed planning shift from the 'vicious' cycle of the status quo to 'virtuous' of formalisation within land use planning and thus the city, for which this study argues, is outlined in Figure 2-1.

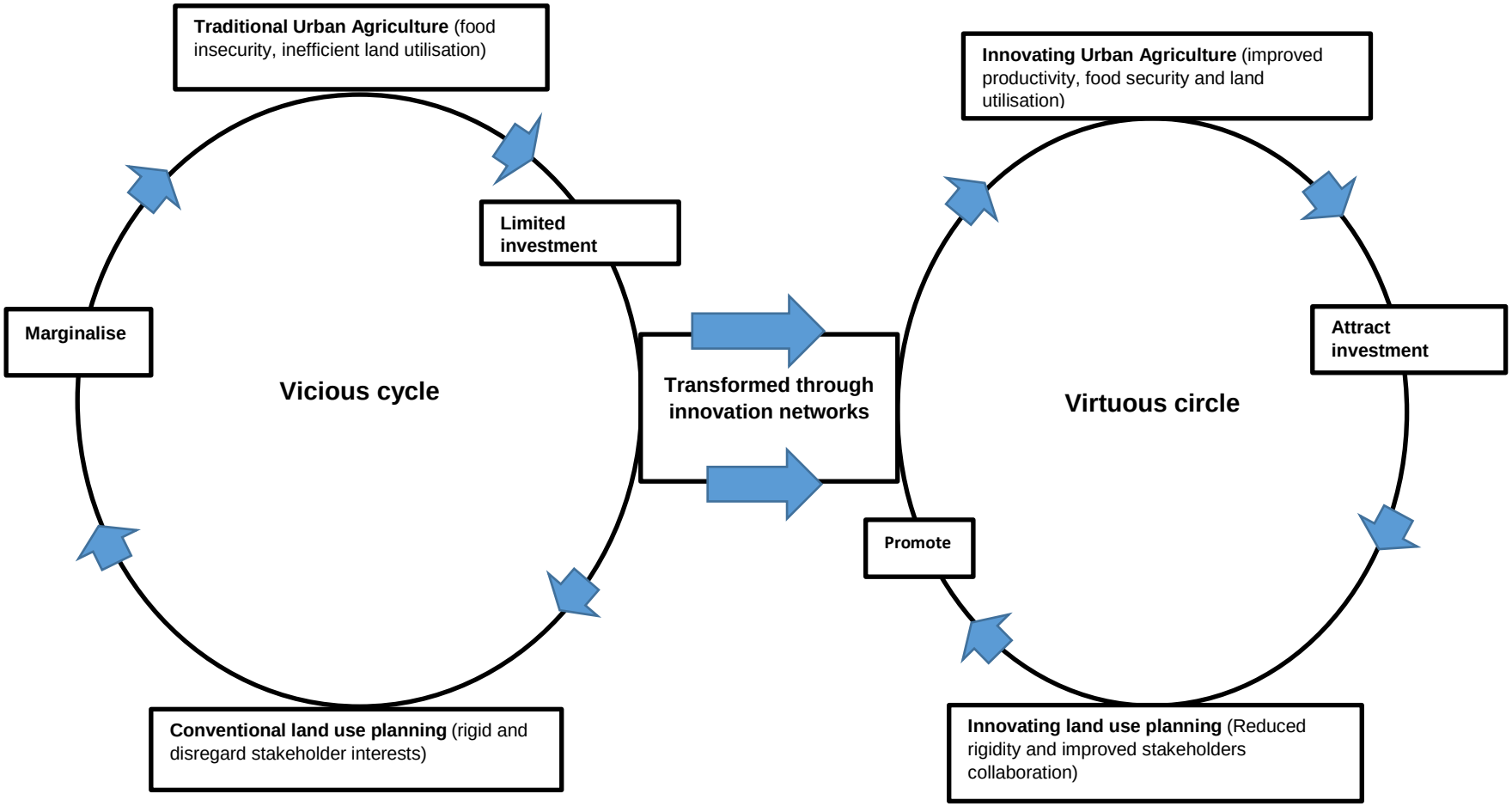

Figure 2-1: The conceptual framework showing key relationships between UA and land use planning, and their transformation through innovation networks (source, author)

2.9 Summary

Champions or entrepreneurs play a distinct role in stimulating innovation towards value addition, enhancement of productivity and competitiveness in firms and institutions. However, innovation within an individual firm is limited towards influencing other stakeholders and would not be relevant for this study that seeks to improve the relationship between UA and land use planning. My study, therefore, adopted innovation networks as a lens to interrogate whether its principles of a collaborative stakeholder platform would redress the current marginalisation of traditional UA by conventional land use planning. As has been shown in this literature review, firms and institutions innovate through networks and also it must be acknowledged that power relationships exist among network members.

These power relations, stakeholders and the environments (socio-economic and spatial) in which they exist are complex and thus the study argues can be better explained through the more nuanced compound concept of assemblages. This notion, drawn from McFarlane's (2009, 2011) study on cities, acknowledge histories of engagement among actors that shape the collaboration between actors and the spatiality of urban development process more fully than simple networks.

Whereas UA's contribution within the city can be improved through innovation, this has not stabilised its standing within land use planning and urban development practices within the market logic of the current neoliberal environment in – the literature has shown this both internationally and in South Africa. Neoliberal principles that concentrate on productivity, competitiveness and land value return equate to uneven power relations within urban development stakeholders. This is compounded by the narrow definition of UA benefits which ignores environmental, social and community benefits. In response, parameters arguing the relevance of innovation networks across UA and land use planning have been drawn from key pieces of literature: implementation of key socio-spatial policy, in South Africa this is the IDPs and SDPs among others; the OEDC (2005) innovation network guidelines; a rethinking of the conventions of

contribution to the city; Healey's (2003) notion of collaboration in practices; and Watson's (2009) of authentic participation of all stakeholders.

The conceptual framework shows the current vicious relationship between conventional land use planning and urban agriculture that leads to poor productivity, poor investment and lack of innovation – and characterises the status quo for UA within land use planning practices. My study argues that these relationships can be transformed through innovation networks to 'virtuous' relationships where innovation in both sectors working together will attract investment and increase productivity leading to a normalising of power relations within the network and thus fostering the formalisation of UA within planning practices.

CHAPTER THREE - RESEARCH DESIGN, METHODOLOGICAL APPROACH AND STUDY CONTEXT

"Urban agriculture, like any enterprise, requires a dense rhizome of networks beneath it" (Founding Director, Izindaba Zokudla, personal communication, 07 April 2017).

3 Introduction

This chapter presents the overall research design, the epistemology of doing research, and the research methods, as well as the research techniques utilised. It is structured into nine sections that explain how data on innovation networks were collected and analysed. A key section includes the research methods that guide the study with emphasis on the extended case method (Burawoy, 2009). The chapter presents these methods and tools for data collection towards responding to sub-question 1 on the drivers underlying the marginalisation of UA in municipal land use planning; and sub-question 2 on the effectiveness of innovation networks in overcoming the marginalisation of UA within the market logic. The chapter then discusses the successes and limitations of the study and concludes with a summary of its ethical considerations.

The Founding Director of Izindaba Zokudla's argument above summarises the role of innovation networks in creating a collaborative platform that incubates knowledge and technologies necessary to transform UA and land use planning practices into sectors which work together to increase the contribution to the city as a whole. My study expands the above argument in two directions: firstly, by exploring the potential of innovation networks across UA and land use planning practice; and secondly, by articulating the role and power relations between actors within the network. To this end, this chapter presents methods and tools employed to collect data, analyse, derive findings and map power relations of the different actors in the UA and land use planning networks. My thesis is an empirical study applying two existing theories drawn together in a novel way to a new context, Johannesburg.

The study assessed the existence and effectiveness of innovation networks across UA and city departments towards improving their products or services, processes, or organisational management through case study research on both innovating and non-innovating farming entities in Johannesburg. The study also analysed whether a planning ecosystem comprising of UA and land use planning stakeholders would enhance the process of formalisation of UA as an urban land use. The parameters were also analysed and applied to measure innovation networks across farming entities and city departments in Johannesburg, as outlined in Chapter 2, are explained and detailed in subsequent sections. These parameters also analysed the transformative nature of innovation networks by observing whether the collaborative platforms were able to generate ideas, investment, expertise and research collaborations for actors in the network. Unlike many studies whose unit of analysis is an individual participant, my research substantiated its findings based on the existence of networks among actors.

My study is anchored in ethnographic research as substantiated in Burawoy's (1998, 2009) extended case method. The approach embraces long-term engagement at multiple scales using direct participant observation for data collection. The research strategy entailed direct observation of the macro and micro level actors and their dynamics surrounding innovation networks in UA and land use planning. Further, I examine allocation and how it transforms stakeholder relationships. Burawoy's (2009) micro-macro level strategy was particularly aimed at understanding the power relations across these two sectors as discussed in the previous chapter.

In line with this aspect of the extended case method, I worked as an intern for United Way South Africa (UWSA) to get access to both farming entities and the city departments in Johannesburg. These findings were complemented this with my independent interviews with urban farmers, city departments and key stakeholders and informants, as will be elaborated later.

3.1 Research Design

The research design is the overall strategy of a study that facilitates the bringing together of all the different elements to be studied and analyses it in a logical way (Mouton and Marais, 1990). Similar to an architectural design, the research design is likened to a blueprint for the research project (ibid.). In line with the extended case methodology, my research design shifted away from a rigid plan to an evolving learning experience between the researcher and multiple scales of the subject of study (Burawoy, 1998, 2009).

Through previous work experience where I facilitated the formalisation of UA for Sustainable Cities International in Dar es Salaam and as a town planner for Harare City Council inspired the study as well as the overall research approach. Holding these positions I had first-hand experience of: (i) the challenges faced by municipal authority working with urban farmers; (ii) NPO capacity building of urban farmers; (iii) and liaising with farmers and farmers' groups that tried to negotiate policy, funding and technological barriers to their survival in the city.

The contentions that I experienced between municipal councils, NPOs and the farmers themselves challenged me to critically question the current and future relationships between land use planning and UA. Consequently, rather than 'apportion blame' between land use planning and UA sectors for their uneasy relationship, I adopted an engagement approach, which moves towards understanding the following key question: 'Under what conditions would UA thrive in a manner that benefits farming entities and the city and thus warrant formalised land use allocations?'

In search of a response brought this enquiry to the context of Johannesburg and applied the innovation network theory. As was discussed in Chapter 2, it is a response to observed innovation in both urban farming and land use policy but the continued marginalisation of the UA sector despite the existing IDPs. Consequently, this study critiques the existing and potential relationships between UA and land use planning and UA through the lens of innovation networks. This multi-disciplinary approach is both novel and critical towards understanding how relationships between these actors could facilitate innovation

for a progressive relationship between planning and UA in South African cities that significantly contributes to the city.

3.2 The Research Paradigm - Epistemology and Ontology Foundations

Epistemology focuses on what should be regarded and acceptable as knowledge and how such knowledge is produced (Bryman, 2012). In other words, the method, value and scope of the study. In an earlier publication, Babbie and Mouton (2010) argue that epistemology explains where knowledge comes from and the criteria it should satisfy to be called knowledge.

Driving my study are Bryman's (2012) criteria for knowledge generation: (i) construction of knowledge should be based on a phenomena observable through human senses; (ii) observation of phenomena should allow the gathering of facts that enable creation and explanation of laws; (iii) theories upon which laws are created should be empirically tested, confirmed or refuted; and (iv) scientific investigation should be based on value-free attitude where the researcher is independent of pre-notions and subjectivity.

From the above criteria, epistemology, therefore, presents assumptions on whether phenomena should be studied objectively or subjectively. I could characterise Bryman's (2012) first three criteria as steps towards generating and interpreting knowledge, including testing theories which my study subscribes to. However, my study refutes criteria (iv) as I follow a reflexive science approach to research as opposed to positivist science (Burawoy, 2009). Reflexive science recognises the researcher's personal biases and value judgements (ibid.). I should clarify that the acknowledgement of bias, as outlined in Burawoy's (1998) extended case method, does not present a narrow approach to the study that disregards other views but pre-empts personal subjectivity in a manner that allows for a more balanced argument. This approach is supported by an earlier study by Weber (1994) that acknowledges that no research standpoint is neutral. This is particularly relevant to my study because of my own extensive professional experience in the field.

Ontology is concerned with “the nature of social entities” as studied by social science (Bryman, 2012:32). The author argues for constructionism, where reality is constructed through interaction with social phenomena, that is, the phenomena does not exist independent of the actors but are shaped by them (ibid). The constructionist discourse upholds that there is no objective reality since social objects are interpreted to exist (ibid). In other words, ontology refers to assumptions about the phenomena of study, whether it consists of social order or is constantly changing.

My research methodology acknowledges and attempts to reconcile epistemological and ontological approaches to research by acknowledging my subjectivity and positionality in research. However, I am conscious not to undermine contrary views in the process of collecting data, analysis and derivation of my findings.

3.3 Themes Anchoring the Study and How they Define Research Design

The study is guided by the initial provocative observations revealing the tensions between conventional land use planning for traditional urban farming, that, as discussed in Chapter 2, are not resolved by independent innovations in each sector. Consequently, I chose to exploit these existing innovations and underutilised networks through the application of innovation networks.

Based on this concept, the study analyses the innovations and nascent networks of eleven farming case study sites guided by the research methodology matrix (Appendix A), the CoJ Department of Development Planning and Department of Social Development, and partners. Central to the analysis of innovation networks among stakeholders are the key themes of: (i) neoliberalism as it impacts real estate values; (ii) power relations between key stakeholders; and (iii) farmers’ access to land. The three themes effectively support the extended case methodology through my own work experience, fieldwork data and secondary case study analysis.

3.4 Effectiveness of Innovation Networks to Transform Traditional Urban Agriculture and Land use Planning - Measuring the Components

Drawing from Chapter 2, this section presents the parameters used to evaluate the potential of innovation networks among UA entities, city departments, and networking partners. The framework for measuring innovation networks is guided by Babbie *et al*.'s (2001:75) statement that the investigation design should "focuses on the kind of evidence required to address research questions".

The three research sub-questions were used to identify and categorise the parameters required from each research component. Taking this a step further, the measuring of innovation networks is informed by the understanding that the "behaviour and performance of firms can only be understood fully by examining their social, technological and exchange relationships with other economic agents" (Vonortas, 2009:3). To this end, my interview questions and observations identified the existence of this collaborative platform in the farming case studies before asking specific questions.

As will be elaborated under case study selection, though an understanding of individual actors is critical, this study focused on the key attributes relevant to innovation network theory, in other words, the dynamics of interaction *between* the actors themselves. For the reasons outlined in Chapter 2, this study, therefore, focuses on the collaborative platform underlying innovation networks, rather than the innovation of stand-alone actors. Furthermore, the study articulates network power relations to inform innovation network dynamics and trace the actors that ultimately benefits from these linkages. The components of innovation and networks studied during fieldwork at each farming entity and city department in Johannesburg are:

- Elements of innovation and networks – this component assessed whether UA and city departments belonged to a collaborative platform of stakeholders that promotes innovation. This informs whether an innovation network platform could lead to formalisation and may comprise of farming entities or their associations, a city department responsible for planning, a city department responsible for UA, and any other stakeholder that may include research and

training institutions, government departments, NPOs, private sector among others.

- Innovation networks – within the collaborative platform the study measured the existence of innovation networks by analysing the parameters characterised by OECD (2005) as: (i) open knowledge and technology sources. Do actors innovate through knowledge and technology that is freely available from sources such as published articles, client feedback mechanisms, learning exchanges or exhibitions without collaboration with the source of innovation; (ii) acquisition of knowledge and technology? Do actors acquire machinery and equipment required to catalyse innovation without interaction with the source of innovation; and (ii) innovation collaboration, where actors actively collaborate with research and training institutions, and government laboratories to acquire innovation?
- Network power relations – as discussed in Chapter 2, innovation networks actors encounter power relations that create network hierarchies (Ahuja, 2000). The power relations among farming entities and city departments were analysed through: (i) degree centrality, which measures the power and influence of an actor based on the number of connections, and (ii) assemblages that assess the power relations based on the histories of engagement, experiences, and group collectives.
- Land access – this study argues that innovation networks promote value addition and enhancement of productivity that finally leads to the formalisation of UA as an urban land use. In this regard, the collaborative platform and innovation networks should result in formal land access. Literature defines UA land access in the form of permanent zoning, land rent or other forms of formal land access agreements (UNDP, 1996, 2015; Fisher, 2012; Cabannes, 2012; Barthel et al., 2013, Meenar et al, 2017).

The above parameters namely, innovation network, power relations and land access arrangement were studied through long-term participant observation and interviews of farming entities, city departments, and related stakeholders. Contextualising this understanding will be guided by the principles of practice and participation identified in Chapter 2 (Healey, 2003; Watson, 2009) as well as a rethinking of the parameters of contribution to the city.

The framework for identifying the existence and types of innovation networks, innovation networks, power relations and land access is summarised in Figure 3-1, as adopted from Nachmias and Nachmias (1997).

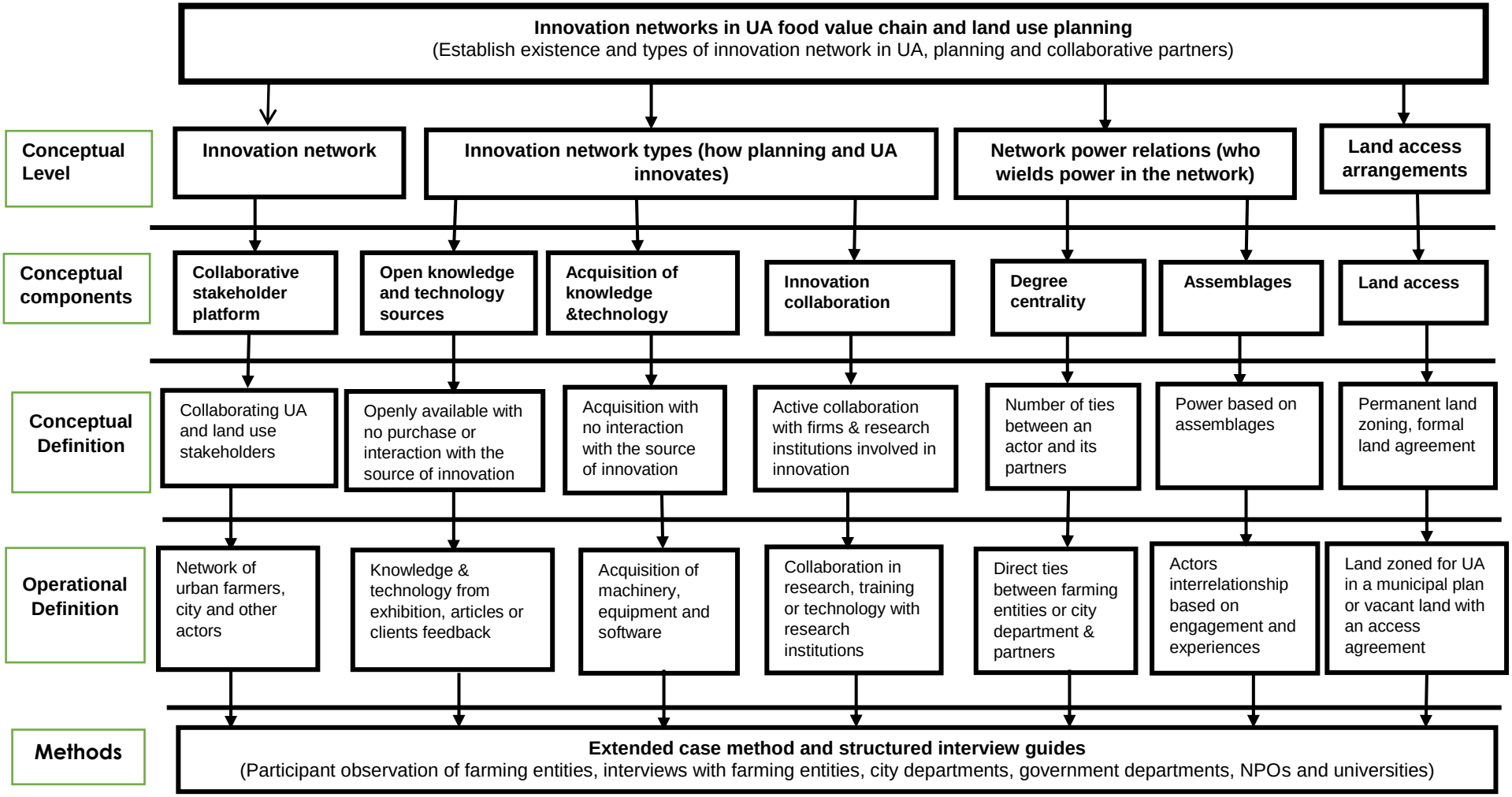

Figure 3-1: Conceptual and operational components for measuring innovation networks across UA and land use planning (source: adapted from Nachmias and Nachmias, 1997:33)

3.5 Case Study Approach and Site Selection

The study of innovation networks in both the farming entities and land use planning is descriptive and analytical. This research adopted a case study method for primary data collection. A case study method constitutes a "form of empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context" (Yin, 2009:13). The method was chosen for this study as it facilitates deep insights necessary to understand innovation networks across urban farming entities and land use planning towards the formalisation of UA in Johannesburg planning practices.

This case study design aligns with Babbie *et al*.'s (2001) and Creswell's (2009) arguments that research should be contextually grounded, and give an in-depth investigation of place-specific activities and events by participants. The case study method allowed me to understand the critical attributes of innovation network of farming entities and city departments in-depth and assess how applying innovation network theory to these attributes could influence the formalisation of UA as an urban land use. To operationalise the theory I relied on Burawoy's (2009) comments that the case study method locates the micro-level issues with their specific details within the context of the larger macro environment of the phenomenon under study. Thus the study located unique data findings from UA experiences and city departments within the broader debates of UA and land use planning at provincial, national and global levels.

3.5.1 Criteria for the choice of the case study sites

The farming case study sites were identified in consultation with the CoJ Department of Social Development, Food Resilience Unit. The Food Resilience Unit has worked with urban farmers since the early 2000s (CoJ, undated). The Unit currently works with about 109 farming cooperatives, with a total of 635 farmers comprising of 310 men and 332 women (ibid.) from all the seven regions of Johannesburg see Table 3.1.

Key determinants include, first, women constitute 53% of the members in Johannesburg. This statistically confirms Van Averbeke's (2007) findings from a study in Atteridgeville, Pretoria that the majority of urban farmers are women, because of their role in providing food for the family. Second, the largest number of farming groups in Johannesburg is located in Region C and D which coincide with the low-income townships of SOWETO, conversely the lowest number of farming groups are from high-income northern neighbourhoods of Johannesburg in Regions B and E. These statistics show the CoJ's UA interventions targets low-income groups to pull them out of food insecurity at household level. This narrow understanding of UA became a key place to re-evaluate the parameters of UA's contribution to the city in the eyes of planning practices.

Table 3-1: Active farming cooperatives that work with the CoJ Food Resilience Unit, Source: (CoJ, undated)

Region	**No. of coops**	**Male**	**Female**	**Total**
A	14	25	43	68
B	11	14	37	51
C	19	101	76	179
D	35	95	85	180
E	11	15	35	50
F	12	30	25	55
G	7	21	31	52
7	**109**	**301**	**332**	**635**

During the farmer selection process, I became aware that the Food Resilience Unit, as a key stakeholder in UA, had tendencies towards gatekeeping in suggesting farming case study sites. For instance, the Unit proposed 'successful' farming entities and avoided controversial sites where the city-farmer relations were not very good. To bypass these gatekeeping tendencies, I employed the snowballing techniques to select additional farming case study sites through the process of interviewing farming entities and key stakeholders.

For instance, I identified the Wits Siyakhana Initiative, Growing Healthy Farms and Rydawi Aquaculture through my participation in the farmers' training seminars, and the Arbour Day Celebrations in the city. Additionally, during my long-term participant observation as an intern for UWSA, I also identified unique farming sites such as Eikenhof Farm, and 3 Kotze Street Rooftop Garden. These farming entities demonstrate the case where the city and its partners invested massive resources in irrigation equipment, processing and farmer training but have limited levels of outcomes. I also considered the diversity and convenience of access in choosing these farming entities.

Drawing on key aspects of innovation theory from the works of Schumpeter (1934), OECD (2005), and Brunori *et al*., (2013), my study evolved a theoretical criterion for classifying innovating and non-innovating farming entities (see Table 3.2). In addition, I triangulated the theoretical definition with the industrial understanding of innovation derived from interviewing key UA stakeholders such as CoJ Food Resilience Unit, the Gauteng Department of Agriculture and Rural Development, Izindaba Zokudla and UWSA (see Table 3.2).

As a result, my study argues that from the theoretical and industrial criteria for innovation in Table 3.2, innovation networks across UA and land use planning should result in:

i) New inputs, farming, machinery or equipment, tools or marketing methods – as defined by Schumpeter (1934) and OECD (2005) in Chapter 2, these methods could brand new invented by the farming entities in the last three years. The input methods include the use of vermiculture for composting or imported fish generics for aquaculture

ii) Improved inputs, farming, machinery or equipment, tools or marketing methods (Schumpeter 1934; OECD, 2005) – these methods introduced by the farming entities incrementally in the last three years that include hydroponics, use of drip irrigation or tunnels, and the *Farm-in-box* for aquaculture.

iii) Inputs, farming, machinery or equipment, tools or marketing methods copied from other farming entities or related industry (Rogers, 2003; Fuglsang and Storm, 2011) – these include methods copied from other farming entities within the industry introduced by the farming

entities in the last three years such as market research before production, signing offtake agreement with buyers, use of Facebook or Websites for stakeholder feedback.

iv) New or improved, or imitation of strategies to meet industrial requirements such as health safety standards by farming entities in the last three years.

Table 3-2: Case study selection criteria

Criteria for selection		**Site name**	**Farming type**	**Innovating or non-innovating**
Theoretical criteria for innovation [New and improved methods, products or services, organisational management. Meet industrial standards (Schumpeter, 1934; OECD, 2005; Brunori *et al*., 2013)]	**Industrial criteria for innovation** (Local UA industry definition of what constitutes improved methods in Johannesburg based on discussions with CoJ Food Resilience Unit, GDARD, UWSA, Izindaba Zokudla and farming entities)			
The **theoretical selection criteria** are: Input methods Farming methods Marketing methods Meeting industrial standards	The **industrial definition of the criteria** are: Use of organic composting methods and vermiculture; Use of drip irrigation, hydroponics, tunnels, farm design Conducting market research, signing offtake supply agreements with buyers, use the website and Facebook to market products and connect with customers Formal land access arrangements and upholding health and safety and product packaging	Growing Healthy Farms	NPO (Educational)	Innovating – vegetable production
		Wits Siyakhana Initiative	NPO (Research or Educational)	Innovating – vegetable production
		3 Kotze Rooftop Garden	Cooperative (business-oriented)	Innovating – vegetable production
		Planner Bee Plant Care	Company (Business-oriented)	Innovating – organic fertiliser production
		Tshwane Food and Energy Centre	Cooperative (Business-oriented)	Innovating – vegetable and poultry production
	The **industrial definition of the criteria** are: Use of improved fish generics Use of improved methods such as *Farm-in-box* technology, recycling waste water from fish tanks	Rydawi Aquaculture	Company (Business-oriented)	Innovating – fish production

	Conducting market research, signing offtake agreements with buyers, use the website to market products and connect with customers, Formal land access arrangements, upholding health and safety standard and product packaging			
The **theoretical selection criteria** are: Inputs methods Farming methods Marketing methods Meeting standards	The **industrial definition of the criteria** are: Use of rudimentary composting methods; Mix use of drip irrigation, hydroponics, tunnels with traditional open space farming, No marketing strategy, no offtake supply agreements, rarely markets through the website or Facebook, Mix formal and informal (verbal agreements) land access arrangements. No health and safety standards. No product packaging	Bambanani Food and Herb Cooperative	Cooperative (Subsistence-oriented)	Non-innovating – vegetable production
		Devine Farming	Individual business (Subsistence-oriented)	Non-innovating – poultry and vegetable production
		Eikenhof Farm	City farm – with many cooperatives business (Subsistence -oriented)	Non-innovating – vegetable, poultry, piggery and goat production
		Serapeng Sa Basadi Cooperative	Cooperative (Subsistence-oriented)	Non-innovating – vegetable and
		Wits Inala Forum	Students Forum (Education and advocacy)	Non-innovating – vegetable production

NB: The criteria for case study site selection were based on the theoretical and industrial practices conceptualisation of innovation.

3.5.2 Case selection and measuring innovation networks

Within South Africa, Johannesburg emerged as a unique case, primarily because it constitutes a knowledge gap. Previous, older studies in the city focused on UA's benefits and limitation (Rogerson, 1993; 1996), or more recently on social innovation that provided appropriate technology through tools (Malan, 2015a; 2015b). Recent studies on UA have focused on Cape Town (Battersby and Marshak, 2013; Olivier and Heinechen, 2017; Kanosvamhira, 2018). I chose Johannesburg because as the commercial capital and most rapidly urbanising centre in South Africa, the city has immense pressure on land, and hence planning for UA is a delicate balancing act that requires a critical lens towards competing interests. In this regard, the CoJ offers an information-rich study area.

This context offered the opportunity to research many farming case study sites within Johannesburg. Further, Yin's (2009) argument, that multiple case studies give more details from different cases, enables some level of comparability and conclusion beyond simply the details of a single case aligns with the complexity of the assemblage model outlined in Chapter 2.

Based on the OECD (2005) guidelines, the study investigated levels of innovation and networks among six innovating and five non-innovating farming entities. Theoretical and industrial considerations identified in Table 3.2 along with the category of farming entities in the city summarised in Table 3.1 informed the case study selection. During the fieldwork, I increased the number of farming case study sites from the original six to eleven in order to reflect the different farming practices in Johannesburg that had not been identified during the proposal stage. Key findings and comparisons were drawn from this large pool of eleven farming entities, while the full data for the other four case studies are in Appendix B and C.

3.6 Typologies of Urban Agriculture in Johannesburg

This section presents an overview of the urban farming case study sites in response to sub-question 1 and 2 on the marginalisation of UA by conventional land use planning. The physical locations and land types of the eleven UA case studies vary from backyard gardens, university or church plots, rooftop gardens, public parks, small scale farms to city farms. The case studies also reflect management styles which range from farming cooperatives, private companies, research institutions and civic societies (Figure 3-2). These farming case studies are further classified into innovating sites in response to sub-question 2 in section 3.6.1 and non-innovating sites in section 3.6.2.

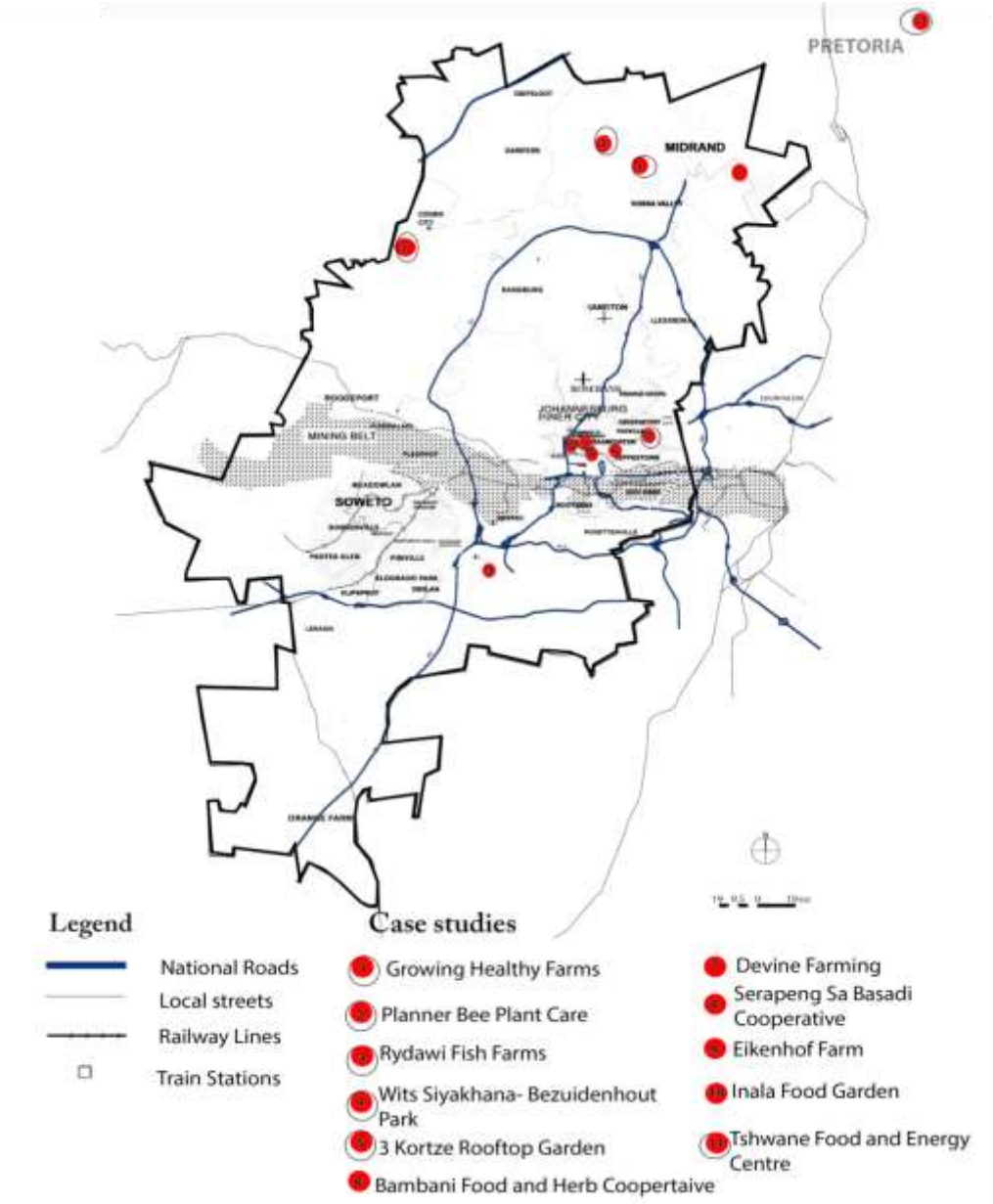

Figure 3-2: The farming case study sites in Johannesburg (adapted from the City of Johannesburg, 2018)

The study collected data from the eleven farming entities (see Appendices Table E-0-6; Table E-0-7; Table E-0-8; Table E-0-9) on:

i) Whether farming entities belong to the innovation network platform
ii) Their types of innovation networks and resultant innovation
iii) The network power relations
iv) The resultant formalisation process, whether land access arrangements are permanent or temporary

Given the large volume of data collected for eleven case studies on the above categories, I prioritised seven out of elven case studies to be included in the write-up. This section presents four of the six innovating farming case study sites, which are: Growing Healthy Farms, Planner Bee Plant Care, Rydawi Aquaculture and Tshwane Food and Energy Centre. The other two innovating farming entities: Wits Siyakhana Initiative and 3 Kotze Street Rooftop Garden are presented in the appendices.

The Chapter also presents three of the five non-innovating farming entities, which are Bambanani Food and Herb Cooperative (BHFC), Eikenhof Farm, and Wits Inala Forum. Again, the remaining two non-innovating farming case study sites, Serapang Sa Basadi and Devine Farming are presented in detail in the appendices.

3.6.1 Innovating farming case study sites

As detailed in the selection criteria in Table 3.2, innovating farming entities are those initiatives that in the last three years developed new or improved products, services or marketing processes, or organisational operations. And if these have been made possible through networks such as: i) enhanced stakeholder collaboration through client feedback initiatives or open exhibitions or peer learning exchanges; ii) improved farming methods through procurement of equipment and technology; or iii) improved farming methods and organisational management through innovation collaboration through research or training. Further, innovating farming entities employed new or improved methods. Such methods include hydroponics, drip irrigation, greenhouses or tunnels, and vermiculture.

- **Growing Healthy Farms** is a Non-profit Organisation (NPO) registered in January 2016 that is located in the Greater Kyalami Conservancy (GECKO) in northern Johannesburg (case study site 1, Figure 3-2). GECKO comprises large and small agricultural holdings and wetlands with multiple farming and recycling initiatives (GECKO, 2017). The farming entity is an NPO managed by a young man (below 35 years) unlike many farming entities run by adults. The NPO uses a residential property with a formal land access agreement.

The farming entity developed an innovative design of swales that harvest and conserve water in collaboration with CoJ, NPOs, consultancy, and food markets. As an NPO, Growing Healthy Farms primarily produces food for feeding orphans and sells surpluses to restaurants and capacity-builds emerging farmers through skills training (Growing Healthy Farms, 2017). The farm uses organic manure or worm compost to produce vegetables that are packaged on site.

- **Planner Bee Plant Care** is a private company that has operated since 1992. Similar to Growing Healthy Farms, the company is located in GECKO and uses a residential property with a formal land access agreement for its business (case study site 2, Figure 3-2). Planner Bee Plant Care employs vermiculture technology to decompose cow dung into an odourless organic fertiliser branded as *Fertilis*. In addition to producing organic fertiliser, the company sells household vermiculture equipment called *Earth Buddies*. The Planner Bee Plant Care premises are designed on a permaculture basis, with an earth dam and swales that absorb run-off to replenishing the water table. The company developed networks with CoJ, NPOs, government departments and research and training institutions.
- **Rydawi Aquaculture** was founded in 2014 in Muldersdrift (case study site 3, Figure 3-2). The company uses an innovative integrated intensive fish farming system called *Farm-in-a-box*. The tilapia species typically farmed in South Africa include the Mozambique Tilapia (*Oreochromis Mossambicus*) and the Tilapia *Rendalli*. However, Rydawi specialises in the Nile Tilapia (*Oreochromis Niloticus*), which is large and grows rapidly increasing the productivity of aquaculture. This species is imported and Rydawi Aquaculture collaborates with the Department of Agriculture to acquire a licence. Additionally, the company has established collaborates network with CoJ, University of Johannesburg, government departments and farmers from the Netherlands to for training, inputs and licensing.
- **Tshwane Food and Energy Centre** (TFEC) is a farming case study from Pretoria. This site was selected after a poultry disease outbreak in Johannesburg prevented data collection (case study site 11, Figure 3-2). The TFEC is a 200-hectare farming cooperative of 25 farmers that was established in 2016 on land permanently zoned UA. The project because dubbed an ‘agropolitan city’ because it integrates the concept of live-work.

The project has an on-site residential unit with rainwater harvesting tanks, solar water heater, a 300m^2-tunnel for vegetables and a 2 000-bird fowl run for each farmer. The cooperative established collaborative networks with City of Tshwane (Pretoria), government department and private companies, according to interviews with the Chairman Tshwane Food and Energy Centre, (08 March 2017). Additional local network benefits exist from the farm's cooperative model. The site has a communal sorting room, cold room, input storage, biogas digester and farmhouse meeting centre. Unlike farming cooperatives in Johannesburg where farmers jointly own and till the same plot, TFEC farmers own and work individual plots. The farmers, however, buy inputs and sell products through the cooperative, which facilitates economies and discounts through bulk procurement. The City of Tshwane provides tools, seed packs, medicines, and feeds for chickens for the first year of operation. The centre uses all farm leftovers, dead chickens and vegetable waste to produce biogas for power generation to offset its electricity consumption.

3.6.2 Non-innovating farming case study sites

Non-innovating farming entities use conventional farming methods such as open field cultivation, as well as rudimentary farming tools such as hoes and elementary marketing methods such as 'door-to-door' selling after harvest. Selling of produce is normally made without prior market research, packaging, sorting or even semi-processing. The classification of these farming entities as non-innovating does not imply that they do not have any innovative practices at all. In fact, they demonstrate an isolated application of knowledge and technology. However, these isolated innovation initiatives fall short of shaping the overall operations of the farming entity. The non-innovating farming case study sites are:

- **The Bambanani Food and Herb Cooperative (BFHC)** is a five-member registered cooperative that farms a 0.65 hectare section of the CoJ in Bertrams since 2006 (case study 6, Figure 3-2). The cooperative has a formal lease agreement with the Johannesburg Property Company. The city constructed an agro-resource centre with communal cold room, sorting

facilities, and boardroom for meetings and also provides water, electricity and seed packs for the cooperative. BFHC developed networks for acquiring input and equipment with CoJ, NPOs, private companies and other farmers.

As an example, United Way South Africa (UWSA) coordinates stakeholder collaborations that review progress, and advise BFHC on operations. At the time of the fieldwork, BFHC faced viability problems and utilised about 50% of the plot despite support from organisations such as CoJ, UWSA, GDARD, as well as a private company. During fieldwork, only four out of the five members were active in the garden. One member had moved back to the village as they were unable to pay housing rental in Johannesburg based on the meagre income generated through the cooperative.

- **Eikenhof Farm** is a 271-hectare city farm established in the south of Johannesburg in 2013. The farm was established in line with the provisions of the IDPs, and the Food Resilience Strategy (case study 9, Figure 3-2). It was established in collaboration with the GDARD, which equipped farmers with skills and equipment towards improving production and value addition. The farm supports 35 farming cooperatives that produce green vegetables, grains and small livestock such as chickens, goats and pigs. Each cooperative has a five-year user agreement with the city. Eikenhof Farm collaborates with CoJ, NPOs, research and training institutions, political parties, private sector and government departments.
- **Wits Inala Forum** (here referred to as Inala) is a climate change and food sovereignty forum formed by students and staff at the University of the Witwatersrand in October 2015. Inala runs two main programmes, which included (i) advocacy work in collaboration with the Cooperative and Policy Alternative Centre (COPAC). Under this partnership, Inala and COPAC campaigned for the recognition of deserving students on Wits campus. Inala updated the list created by the Wits Community and Citizenship Organisation (WCCO) for these students and established a simple database system where students log in for their monthly food parcel, and daily meals. (ii)Inala runs a small vegetable garden on the Wits campus since 2015 to feed deserving students (case study site 10, Figure 3-2). The garden supplements WCCO's food bank by providing fresh vegetables. Inala developed collaborative

networks with NPOs, government departments, university and students organisations.

3.7 Research Methods

Research methodology outlines the methods, processes and tools utilised, as well as the procedures employed in undertaking research (Babbie *et al*. 2001). This study adopted a qualitative research approach and in particular the extended case method in ethnography for data collection. An overview of the ethnographic and extended case method is presented in the next sub-sections.

3.7.1 Ethnography

The ethnographic supported data collection towards answering sub-questions 1 on the marginalisation of traditional UA by conventional land use planning and sub-question 2 on the effectiveness of innovation networks in addressing the identified marginalisation. The parameters for assessing traditional UA practices included the level of productivity and efficient land utilisation. The parameter for land use planning assessed the flexibility of the planning framework and inclusivity of different interest groups. The related and analysis are presented in Chapters 4, 5 and 6.

At each farming case study site and the CoJ Department of Social Development, I applied the participant observation approach, which according to Burawoy (1998), is anchored in immersing oneself in the experience of the phenomena under study. Within this method, I embedded myself within farming entities for long periods, in what Burawoy (1998:17-18) describes as testing assumptions using the "fieldwork as a sequence of experiments that continues until one's theory is in sync with the world one studies". For instance, I revised my interview guides after realising that food is consumed by households and sold to local communities with no records.

I adopted ethnographic research because of the method's strengths identified in Creswell (2006). These include:

- Allows researchers to experience or observe real-life situations in real-life settings. This method allowed me to observe nuances such as localised food production;
- Allows a researcher to understand a system of meanings within a group. This study identified actors, and unearth how innovation networks among urban farming entities and city departments influence the processes of formalisation of UA in land use planning in Johannesburg);
- Appropriate across many disciplines, in both urban and rural community contexts. Through ethnography I observed daily activities of farming entities and the CoJ Department of Social Development meetings and workshops, and how they collaborate with partners, and;
- Allows a personalised in-depth, day-to-day, and face-to-face interaction with the study participants in their context.

I conducted a week-long learning experience at each farming entity and assessed innovation networks that were developed in collaboration with relevant partners. The week-long observations were used to answer specific gaps identified after the initial data had been gathered during the internship through the extended case method in workshops, seminars, training, meetings, and exhibitions. The extended case method is discussed in detail in the next section.

3.7.2 Extended case method

The extended case method is credited to Michael Burawoy who used the approach to study the legacy of colonialism in the Zambian copper belt (Burawoy, 1998). During the research, he worked for Anglo-American for one and half years and later for two years as a Masters student at the University of Zambia (*ibid.*). Burawoy (1998) situates his own realities during the study to address the issue of bias: that he was a white male, recent graduate of a British University and new to the socio-spatial dynamics and legacies of colonisation. He further acknowledges that these realities affected the questions he asked, and the responses he received from participants (*ibid*.). The acknowledgement of personal realities enabled me to remain sensitive to my own biases.

Burawoy (1998) argues for an extended case method as an approach that seeks to address and improve the limitation of positivist science in research (Table 3.3). He sees the extended case method as a response to the weakness of the positivist epistemology that assumes that a researcher should distance him/herself from the object of their study, and thus interrogates the 'subject' through intermediary tools, or examine a slice of a community as representative of the whole (Burawoy, 1989). He argues that personal bias is present in ethnography by virtue of the lived realities of the researcher and this should be acknowledged, and built into the study (*ibid*.). To this end, Burawoy (1989) proposes reflexive science, where the researcher immerses himself or herself in the theory that guides the dialogue with participants.

As can be seen from the table, Burawoy (1982) argues that reflexive science is a prime research tool to unravel power relations. For this reason, I use this practice to inform sub-question 1 on the marginalisation of traditional UA by conventional land use planning, and sub-question 2 on the effectiveness of innovation and networks in addressing the identified marginalisation. Specifically, this is used to examine the power dynamics within network relations and if/how these are impacted by innovation. The parameters for power relations measured the number of stakeholder connections for each participant and the 'strength' of networks based on the history of engagement as presented in Chapters 4 and 5.

Table 3-3: A contrast of positivistic versus reflexive science approaches, (source, Burawoy, 1998:26)

Positivistic Science			**Reflexive Science**		
Positive principles	Survey research method	Context effects	Reflexive principles	Extended case method	Power effects
Reactivity	Stimulus or response	Interview	Intervention	Extension of the observer to participant	Domination
Reliability	Standardisation	Respondent	Process	Extension of observations over time and space	Silencing
Replicability	Stabilisation of conditions	Field	Structuration	Extension from process to force	Objectification
Representativeness	Sample to population	Situation	Reconstruction	Extension of theory	Normalisation

Through this extended case method, I blended my background of growing up on a farm in Zimbabwe, with my work experience for a municipality and an NPO that built the capacity of urban farmers. My background shaped my appreciation and expectations of the uneasy relationship between traditional UA and conventional land use planning. My experience strengthened my conviction that innovation networks presented UA and land use planning with an opportunity to reconcile these two sectors.

Similar to Burawoy's experiences, I worked for United Way South Africa as an intern for one year and nine months (from Aug 2015 – April 2017). My relationships with UWSA and the CoJ in my study created an 'insider-outsider perspective', akin to Burawoy's work with Anglo-American. For instance, I was part of the UWSA and CoJ Project Management Team that planned and reviewed the implementation of the Urban Agriculture Programme to build capacity for 300 emerging farmers. I also sat on the advisory board to Bambanani Food and Herb Cooperative that met monthly to review progress and advise the cooperative. From these experiences, I became a researcher as well as an active proponent for innovation networks across UA and land use planning. I was viewed as 'neutral' which made it easier to get data from farmers and CoJ departments.

In addition, I evaluated the performances of 22 farming cooperatives in Johannesburg and carried out a study of the best urban farming practices in Cape Town, Johannesburg, and Pretoria for UWSA (UWSA, 2016b). Therefore, I had at my disposal multiple approaches of being an observer and a development practitioner on behalf of UWSA, and the CoJ (Figure 3-3).



Figure 3-3: Participant observation and training workshops (source, author)

I also became well acquainted with farming entities such as BFHC, Devine Farming, and some cooperatives at Eikenhof Farm. These farming cooperatives came to regard me as one of their 'members'. I often assisted farmers with minor weeding, or follow up with farmers' partners or customers before or after my fieldwork meetings. This approach changed my relationship with farming practices, city departments, and other network partners over time from an initial 'uneasiness' when participants felt 'being watched' to the enthusiasm of someone telling his/her story to 'one of his/her own'. As a result, the study became an evolving learning experience on how urban farming entities collaborate with the CoJ, GDARD, NPOs and customers.

Furthermore, I established a practical vermiculture project in my student hostel at Wits and fed earthworms with leftover household food. The vermiculture project expanded my knowledge of the composting process and helped me create networks with similar vermiculture projects on campus, such as Oricol Environmental Services and the Wits Biology Museum. I applied the compost to a vegetable garden of a colleague in Newlands, Johannesburg (Figure 3-4).



Figure 3-4: Practical vermiculture project (source, author)

Collectively, these multi-scale levels of engagement brought a unique approach to my study. It served as a critical avenue to understanding the micro-to-macro level relationships among stakeholders and their respective networks.

3.8 In the Field: Data Collection Methods and Techniques

This study collected both primary data as well as secondary data on: (i) the existence of innovation and networks in farming practices; (ii) network practices that could be characterised as innovative; (iii) the network power relations; and (iv) the resultant levels of formalisation of UA. These findings are presented in Chapter 4 and 5. I also collected empirical data through participant-observation on the practices of farming entities and city departments (see Table 3.4).

3.8.1 Secondary data: desktop review

I reviewed secondary data sources that include academic journal articles, newspapers, conference presentations, policies, programmes, and progress reports on UA and land use planning focusing on international case studies of Almere, Berlin, Dar es Salaam, Detroit, Havana and Portland; as well as the CoJ, farming entities, city departments, GDARD, SACN, UWSA, and Izindaba Zokudla in response to sub-questions 1 and 2.

I also reviewed grey literature such as newspaper articles and conference paper sources to understand the ongoing debates and views on UA in South Africa, sub-Saharan Africa, and the world at large. In this same vein, I reviewed online sources such as websites, Facebook pages, and blogs of the main UA stakeholders in Johannesburg, such as CoJ, UWSA and Izindaba Zokudla and farming entities.

To understand the legislative framework governing UA and land use planning, I reviewed national and provincial legislation such as the South African Constitution, the National Development Plan (NDP), the Gauteng Spatial Development Framework, Spatial Planning and Land Use Management Act (SPLUMA) and the draft Regulation of Agriculture Land Holdings Act. I also analysed local planning legislation such as the Integrated Development Plans (IDPs), the Spatial Development Frameworks (SDFs) and was privy to draft documents of the Consolidated Johannesburg Town Planning Scheme of 2010, the Food Resilience Policy, and city annual reports. I then collected primary data to close the gaps between the secondary data sources and the perceptions and realities of stakeholders themselves.

3.8.2 Primary data: fieldwork interviews and participant observation

During my week-long participant observations of each farming entity, I noted the existence of networks and whether they could be characterised as innovative in relation to the different types of innovation networks outlined in Chapter 2. Further, I documented evidence of power relations between network members. Both these areas responded to sub-question 2.

I also documented activities of the farming case study sites and their interaction with customers, the city, and other stakeholders. These observations were based on interacting with farming entities throughout their routines such as planting, harvesting, selling products, review meetings, training sessions and exhibitions. I also carried out transect walks and took photographs to capture the unique characteristics of the farming case study sites.

I used semi-structured interviews (see Appendix 2) to direct my discussions with farming entities, key stakeholders, and their partners. I also interviewed key actors, selected from institutions that have a direct role in UA and land use planning. Prior to data collection, I pilot-tested my interview guidelines at Bambanani Food and Herbal Cooperative to ascertain whether the research technique gathered the required data.

Besides the primary data collection, I also presented my preliminary findings and asked for comments from key informants. The key informants included: a lecturer from the Wits School of Architecture and Planning; a lecturer from University of Johannesburg (UJ), Department of Anthropology and Development Studies; a Chief Executive Officer of the South African Council for Planners (SACPLAN); as well as managers from the South African Cities Network (SACN), United Way South Africa (UWSA), Izindaba Zokudla, and the Wits Siyakhana Initiative. The summary of methods employed in data collections is shown in Table 3.4. In total, I directly observed and interviewed representatives of eleven farming entities, five key stakeholders, three key informants and took eight months of fieldwork. Appendix C gives a summary of the interviewed participants.

Table 3-4: Summary of overall research strategy

Research sub-question	**Methods and data needs**	**Strengths, shortfalls and complementary methods**	**Data analysis**	**Where consolidate and analysed**
1. What are the drivers underlying the marginalization of UA in municipal land-use planning?	**Methods**: Literature review of international case studies and CoJ, documentary analysis of policies and reports, interviews on farming entities, City Planning Department, City Department responsible for UA and partners. **Data needs**: (i) Land use planning rigidity (for and against zoning) (ii) Land use planning disregarding interest groups (stakeholder collaboration) iii) UA productivity iv) UA efficient land utilisation	Policy and plans are available from municipal councils; progress reports from key stakeholders	Maps showing areas zone for UA. Summary of programmes on UA by municipalities and NPOs. Clarity on provisions for UA, zoning for UA. Analysis of policy and plans on their stakeholder collaboration Reports on programme and project implementation from city and government departments	Chapter 4 and 5

2. Within a context of market logic (productivity and competitiveness), how effective are innovation networks in overcoming the underlying drivers of marginalisation towards promoting formal assigning of land uses for UA?	**Methods**: Literature review of international case studies, documentary analysis of CoJ policies and report, interviews of farming entities, CoJ departments and stakeholders. The extended case method. **Data needs**: (i) the existence of innovation network, (ii) the types of innovation networks, (iii) the network power relations, (iii) the resultant formalisation of UA	Interviews and participant observations provided data on innovation networks and power relations. Short term observation not sufficient – complemented by extended case method, transect walk and practical project on composting.	Types of innovation networks and power relations for UA and resultant formalisation of UA– graphically displayed in sociograms	Chapter 4 and 5

3. How could insights from the effectiveness of innovation networks in overcoming the marginalization of UA in municipal land-use planning guide our understanding of the current and future experience in formalization of land uses for UA?	**Methods**: Review of international case study, CoJ publications, online sources and attending conferences – on best practices land use planning innovation for UA. **Data needs**: trends on the effectiveness of innovation networks, trends on formalisation of UA (formal zoning and formal agreements),	Analysis of international case study and CoJ publications on the effectiveness of innovations networks. Analysis of farming entity and key informant responses.	Categorise effectiveness of innovation networks international case studies and from Johannesburg	Chapter 6

3.9 Data Analysis and Interpretation

Data analysis was a process of ordering, transforming and interpreting data in order to draw together findings that reflect on the research questions and theories that provoked the inquiry (Babbie *et al*. 2001). As a result, the study can be characterised as analytical and comparative. A comparative study aided the understanding of different contexts to the extent to which the marginal practices vary from the mainstream (Omenya, 2006). Such analysis across different case studies aids conceptualisation and according to Robinson (2014) provokes debates across the different experiences. To this end, the analysis established patterns, classes and categories of responses from fieldwork data.

For data analysis, I transcribed the electronic recordings and cross-referenced them with personal notes. Important quotations from farming entities, city departments and key informants corroborated arguments in the study. After transcribing voice recordings, I printed all the responses and personal notes, grouped and analysed them according to specific study themes, using the data analysis templates in Appendix F. These initial findings were augmented with reviews of legislation such as the National Constitution, the NDP, SPLUMA, IDPs and SDFs on their provisions promoting planning innovation, innovation networks, and UA.

Further, I contextualised key fieldwork responses and contributions using sociograms to display findings of innovation within networks for UA practices, city departments and other actors. I developed these sociograms using social network analysis software called UCINET 6 for Windows, developed by Borgatti, Everett and Freeman (2002). The resultant sociograms displayed the interrelationships and power relations between farming entities, city departments, and their networking partners. This mapping process was critical for network analyses and especially in deriving power relations among the UA and land use planning and how these impacted the networks.

3.10 Unit of Analysis

The unit of analysis is the basis for analytical inferences from which one can draw findings and conclusions (Yin, 1994). Babbie *et al*. (2001) further state that the unit of analysis is the smallest element of observation of the study on which final conclusions will be drawn. However, an earlier publication by Andranovich and Riposa (1993: 47) shows that there can be more than one unit of analysis, which can be 'objects being studied, such as individuals, cities or governments'. In network analysis, the unit of study is the connection between the objects, nodes or actors. In other words, it is not the farmer and city department *per se* but the farmer and city department plus their networks with other actors. As such the study's analysis aligned with the contentions of Andranovich and Riposa (1993).

Unravelling this further, the actors within the networks are individual farming entities, city departments, government agencies, and universities. That said, it should be noted that power relations often emanate between the individuals engaged in network activities. The conclusions on networks are drawn from the interpretation emerging from the interactions among all these actors.

3.11 In the Field: Successes and Limitations of the Study

On post-study reflection, the actual fieldwork had several successes and challenges. South Africa has 11 languages and though I initially believed language barriers would be a challenge, instead it turned out not to be the case. The initial plan was to engage a local graduate research assistant to translate during fieldwork. However, after working with farming entities in Johannesburg on behalf of UWSA for more than a year, there was no need for a translator as farmers understood and spoke with me openly in English. Therefore, I used only a few introductory greetings in elementary isiZulu and Tsonga to break the ice before the interviews in English.

In his research in the Zambian copper belt, Burawoy (1998) was a white foreigner who interfaced with blacks, who took up jobs from former white bosses in multi-national corporations; they, therefore, treated him with scepticism. Though

seemingly a challenge, this, in fact, helped him get leverage in those companies where many bosses were still white. He negotiated such challenges by using local researchers and creating relationships with participants. In a similar circumstance, in her study of poor black informal settlements in Johannesburg, Kornienko (2013) had to negotiate her white middle-class and foreigner background in a country divided along racial lines for many decades.

In this study, as a black Zimbabwean, I faced similar challenges. The farming entities in Johannesburg are multi-ethnic, multi-racial, multi-tribal with people of highly diverse nationalities. I interfaced with some of the farming entities in communities where xenophobia against black foreigners, especially Zimbabweans and Mozambicans, was still prevalent. I also organised farmer training session where black and white farmers collaborated and dealt with many tensions from the country's apartheid legacy. This entailed initial uneasiness before relations warmed up with time.
The long days in meetings, workshops and training on behalf of UWSA and CoJ opened the doors for heart-to-heart discussions with participants. Many subsistence-oriented farming entities and farming cooperatives are precarious, run by low-income residents with no reliable jobs. Because of this, many of the participants were initially unwilling to disclose details about their businesses but later opened up as they gained trust in me.

The study analysed the strength of innovation within networks by checking the existence of feedback mechanism between farming entities, city departments, and their customers. I checked for innovations in networks communication through tools such as: (i) Facebook or blogs; (ii) emails; (iii) telephone or WhatsApp; or (iv) holding face-to-face review meetings. The strength of communication could signify how actors value the interaction, and, hence, the network. Whereas it was possible to track stakeholder feedback on websites and Facebook, it proved insurmountable to get minutes of meetings or communication through emails or by telephone. Most farming entities do not keep records and some were unwilling to share this information.

Similarly, I originally intended to compare the proportion of monetary investment that farmers and city departments set aside for innovation. However, the data on

expenditure on innovation or income and expenditure on farming operations, in general, were unavailable. The city departments were not eager to share their budgets either. Though outside of the scope of this study, this lack of transparency and accountability, further affirms the difficulty of studying innovation among small business entrepreneurs and public institutions in the global South.

And finally, two instances that needed flexibility in my study approach arose during fieldwork research. First, I had initially planned for ethnographic observation of a commercial poultry producer in Johannesburg. However, towards the end of my fieldwork, I could not interview this commercial poultry producer because of a poultry disease outbreak in Johannesburg in May and June 2017. Because of fieldwork timeline constraints, I negotiated this hurdle by conducting a telephone interview with an alternative commercial poultry venture, the Tshwane Food and Energy Centre just outside Tshwane (Pretoria). I had previously interviewed this cooperative for UWSA's urban farming best practices research. The telephone interview, therefore, filled the gaps in the previous case study data.

Second, access to observations of different farming entities was not all the same. Farming entities, for instance, Devine Farming, Growing Healthy Farms, Planner Bee Plant Care, Serapang Cooperatives, 3 Kotze Rooftop Garden and Wits Inala Forum allowed me to roam freely during my ethnographic observation. However, other entities insisted on accompanying me during the tour, I exploited the guided tour to seek further clarifications. When I roamed alone, I had the freedom to take time and visit all the corners of the garden. However, where I was guided, I had to accommodate the time constraints of the host as well as their gatekeeping to certain areas of the establishment. I reconciled these different scenarios by visiting farming entities more than once and following up on grey areas by telephone and email for additional clarification.

3.12 Ethical Considerations

This study upholds and secured Ethics Clearance from the University of the Witwatersrand (see Appendix B). Ethical considerations in research require "the

scientist to search for the truth but not at the expense of the rights of the other individuals in society" (Babbie *et al*., 2001:520). This study undertook participant observations and interviewed farming entities, city departments and their associated networks. In all of these contexts, I acknowledged and protected participants and stakeholder interests and rights.

For all participant observations, interviews and audio-recordings in all contexts, I sought consent before the interviews as well as prior to ethnographic observations and taking photographs. The process of securing consent was guided by self-introduction, sharing the participant information sheets, and explaining the purpose of my study. During the interviews after explaining the purpose of the study, some participants accepted that their names would be cited in the final document.

I further clarified that the findings from the study would be presented at conferences and seminars, and will be accessible to the public through the university library system, and academic journal articles. Some participants expressed interest in the final thesis and commitment to providing a final soft copy was agreed to. The study offered anonymity to participants who did not want to be identified. For instance, two big corporates chose not to be named after some disappointing work experience with farming entities in Johannesburg, and I held their identification.

3.13 Summary

This chapter presented the ethnographic approach to data collection and specifically why the extended case method was chosen and how it facilitated the long-term participant observation of farming entities and the CoJ Department of Social Development in this study. The research sub-questions and parameters from key concepts such as innovation networks, power relations and land access arrangements, drawn from the literature in Chapter 2, were used to guide the type of data collected and tools employed for data collection, analysis and presentation.

The extended case method approach was critical to understand nuances which brought to light innovation within the networks, as well as the power relations between the network members. These, in turn, informed my understanding of local benefits and pitfalls faced by UA stakeholders

Further, the long timeline of the extended case method won the participants' trust. These relationships proved to empower the research and participants, critically it allowed me to undertake the research without an interpreter, which avoided challenges particularly important nuances lost in translations. Though criticised for its subjectivity, I argue that the reflexive science approach to this research was balanced by conscious listening and acknowledging my contrasting views to reduce personal biases.

Also key, in response to Chapter 2's findings, was my choice of case study sites in Johannesburg. By selecting innovating and non-innovating farms, as well as those that belong to networks critical to collaboration and those that do not, I was able to frame the study's argument that innovation alone and/or networks alone in either farming or land use planning are unable to mitigate the marginalisation of UA. Thus the stage is set to build a case for innovation networks.

CHAPTER FOUR: EFFECTIVENESS OF INTERNATIONAL EXPERIENCES OF INNOVATION NETWORKS TOWARDS FORMALISATION OF URBAN AGRICULTURE ON LAND USE PLANNING: PERSPECTIVES FOR JOHANNESBURG

> "Innovation is novelty or important change one makes in the body politic of a state, against the tradition and the regulations of its constitution… From its very emergence in Ancient Greece, the concept of innovation (*kainotomia*) had a political connotation. As introducing changes into the established order, innovation was subversive or revolutionary" (Godin, 2015:4 and 8).

4 Introduction

The chapter addresses sub-question 1 on drivers underlying the marginalisation of UA in municipal land use planning; and sub-question 2 on the effectiveness of innovation networks in overcoming the marginalisation of UA within the market logic. As suggested by Godin (2015) in the opening quote, innovation at its core implies more than improved practices within a single sector. It is with this in mind that my study argues the potential of innovation networks to unsettle existing sectoral and inter-sectoral power hierarchies that currently establish the order of power and power relations from individuals and institutions in land use decisions. As a process, innovation networks can create a new platform on which just such bureaucracies and individuals negotiate new power relations, and for this reason are often met with cynicism as discussed in this chapter.

Chapter 4 has seven sections that present the international city case studies of Almere, Berlin, Dar es Salaam, Detroit, Havana and Portland as specific stories that provide unique perspectives for the CoJ and its ongoing marginalisation of UA. Specifically, the chapter explains how innovation networks across UA and land use planning provide a platform for the formalisation of UA within planning practices. The chapter then situates this discussion within the present South African and CoJ policies and practices on the marginalisation of UA.

The chapter also presents data and preliminary findings on innovation and networks among stakeholder collaborations towards supporting UA from fieldwork interviews and participant observations. Among these stakeholders are the Gauteng Department of Agriculture and Rural Development (GDARD), CoJ Department of Development Planning, and the Food Resilience Unit, NPOs, research and training centres, and the private sector. In Johannesburg, these actors create innovations in specific sectors of UA and land use planning; that show potential for collaborative platforms that promote innovation among farming entities and city departments.

4.1 The Study's Parameters and Data Presentation: Measuring the Marginalisation of Urban Agriculture by Land use Planning and How Innovation Networks Overcome Such Marginalisation

The international city case studies present experiences on the obstacles that marginalise UA and opportunities for overcoming these obstacles through innovation networks across land use planning and UA. The parameters for measuring the marginalisation of traditional UA include: (i) land use planning rigidity; (ii) land use planning's disregarding of interest groups; (iii) UA's low productivity; and, (iv) UA's inefficient land utilisation.

Relating these findings to land use decision making, in other words bridging the UA and planning silos, the chapter turns to the analysis of power relations. Specifically, this analysis speaks to the relations between market logic and marginalisation. The critical parameters of whether innovation networks will result in shifting power relations are: (i) assessing the number of connections per city department and/or UA stakeholders; and, (ii) assemblages that result from long term engagement.

The data presented on the international city case studies of Almere, Detroit, Havana and Portland are mainly based on secondary data sources. The City of Berlin case study, however, is based on both secondary and primary data collected during an International Urban Farming Conference in September 2017. The data from Dar es Salaam was collected from secondary data sources as well

as a lived experience while facilitating the formalisation of UA for an NPO. Similarly, the data from the City of Johannesburg include both secondary publications and primary data sources collected through participant observations and interviews of city departments and key stakeholders.

The six international city case studies of Almere, Dar es Salaam, Detroit, Havana and Portland present different experiences on innovation networks towards formalisation of UA. The data from these cities (see Appendix B.1) show that five (Almere, Dar es Salaam, Detroit, Havana and Portland) cities developed innovation networks toward formalising UA. These innovation networks created a dialogue among actors on the current and future roles of UA. Two cities (Dar es Salaam and Portland) successfully used networks to formalise UA, however, under neoliberalism even these permanent land use zones are reversed. Only Havana and Detroit have no recorded cases of conversion of UA into real estate because of a neo-Marxist and collapsed land economy respectively.

4.2 International Experiences: Marginalisation of Urban Agriculture through Conventional Municipal Land use Planning

The international case studies present both experiences of the marginalisation of traditional UA by conventional land use planning and also follow principles of innovation networks in formalisation of UA. The cities of Dar es Salaam and Berlin are highlighted as the key examples.

4.2.1 Land use planning rigidity

Asked on land use planning for UA in Berlin, the Manager for Wedding Gartenarbeitsschule highlights that the City of Berlin is characterised by a spatial network of greenbelts comprised of *kleingarten* (allotment gardens), *gartenarbeitsschule* (practical school gardens) and public parks that promote city greening (personal communication, 13 September 2017). During these discussions, it came to light that Berlin as a citywide strategy on mixed uses with

a positive and 'open' approach towards the urban environment (personal communication, 13 September 2017). Surprisingly, further discussions with many UA practitioners at the International Urban Farming Conference in Berlin raised a lot of complaints on the city's planning rigidity especially towards urban farming, a lot of awareness on the environment at macro levels that even include the Green Party.

In term of UA policy, the City of Berlin has the Kleingarten Law, called the Bundeskleingartengesetz, which makes provisions for allotment gardens. In this provision, a third of the *kleingarten* and its supporting infrastructure are comprised of greenhouses and water tanks designated to be used for vegetable and fruit production which goes towards consumption (Matthei, 2017). Additionally, the City of Berlin has a draft Green Plan, the Strategic Plan, which guides UA practices in the city (*ibid*.). The plan makes provisions the overall city resilience and sustainability initiatives including climate change.

However, interviews with *kleingarten* owners during the International Urban Farming Conference shows that the plan was not approved by the council. The Association of *Kleingarten* highlighted that there are ongoing roundtable discussions between the city and the association over the adoption of the plan (*ibid*.). Interviews with the Manager of the Association of *Kleingarten*, showed frustration over the City of Berlin's land use planning rigidity towards UA beyond the existing *kleingatern* and the *gartenarbeitsschule*. The association voices opposition towards the treatment of community gardens as temporary and illegal and would want them included in the formal planning process beyond the narrow provision of the Bundeskleingartengesetz.

However, the Berlin case study also highlights the unique predicament of UA. While the city planning framework is innovative towards the environment and climate change initiative (Matthei, 2017) and has sections that deal with the environment thus promoting urban resilience, in practice, it proves indifferent towards and has no department that deals directly with UA. The Association of *Kleingarten* developed a network of collaborators that include NPOs and universities to promote awareness and lobby for UA recognition; however, City of Berlin officials at the International Urban Farming Conference in September 2017 argued that the city's high building density leaves no space for gardening. This

interchange suggests that even with such networks UA was not able to shift the power of market logic towards their favour for land use decisions.

The Berlin case study presents a variety of UA practices that target diverse city residents utilising different types of land uses. It also shows the development of progressive planning towards urban resilience. However, the absence of a collaborative platform for innovation across UA land use planning in Berlin has created a barrier towards the formalisation of community gardens beyond the existing provisions of *kliengraten* and *gaternarbeitsschule*.

Turning to the African context, the City of Dar es Salaam, in collaboration with UN-Habitat, pioneered the Urban Management Programme (UMP) in 1992. The programme culminated in the development of the Strategic Urban Development Plan of 1999 (Kasala, 2015). Though the plan was not approved by the Ministry of Lands, Housing and Human Settlement Development (MLHHSD), the UMP laid the foundation for participatory planning and stakeholder engagement in planning in Tanzania, which ushered in opportunities for including previously marginalised land uses such as UA (*ibid*.). Within this network, participatory planning and stakeholder engagement approaches empower interest groups such as NPO, grassroots organisations, and universities in presenting their proposals during the planning process, which suggests that with implementation there could be shifts in power relations that lead to land use decision making.

In line with the UMP framework, the Dar es Salaam City Council (DCC) in collaboration with Sustainable Cities International facilitated the development of Municipal Strategies for UA for the three municipalities of Kinondoni, Ilala, and Temeke (Halloran and Magid, 2013a). The municipal councils prepared the UA strategies in collaboration with the UA network actors such as the government departments, University of Dar es Salaam and Ardhi University, the Food and Agriculture Organisation, and UN-Habitat, and farmer representatives (*ibid*.). Though the Municipal Strategies were incorporated into the current master plan Kasala (2015) argues that there has been a tendency towards reverting to the previous master plans in Dar es Salaam. These layers of political and urban processes across physical space characterise the complexity of such networks, and so embody the argument made in Chapter 2 for their understanding as assemblages rather than the simply networks in the formalisation of UA.

From the Dar es Salaam case study we capture two experiences, first, it again shows the consequence of both innovation and networks in land use planning that was not supported by corresponding innovation in UA. Second, since the innovation collaboration that formalised UA was based on the principles of the unapproved UMP, it is unclear how the sector will survive since the city has resorted to the previous master planning approach (Kasala, 2015).

4.2.2 Urban agriculture productivity and land utilisation

The *kleingarten* owners in Berlin belong to the larger *kleingarten* association, which are formally zoned and has an agreement with the city. When asked on the functions of the gardens, the Manager for the Association of *Kleingarten* highlighted that they provide fresh fruit, vegetables and also a platform for social, or community gathering, inter-generational integration, and city greening (personal communication, 11 September 2017). At an individual level, residents run *kleingarten* as ecological projects in order to get close to nature and get fresh garden produce (*ibid*.). Elderly residents mostly practice gardening to keep fit, while the youth undertake gardening to learn to farm (*ibid*.). Critical to my study, here we see an example of how while the neoliberal market logic principle of productivity does not relate to the aims of *kleingarten*, the gardens enjoy a formal status in land use planning with the caveat that the gardens are required by law to effectively utilise the land.

The second formally zoned urban gardening practice in Berlin is the g*artenarbeitsschule.* The Manager of Wedding Gartenarbeitsschule elaborated during interviews that the school gardens are public institutions established in 1920 that are linked to the elementary school curriculum, and offer practical gardening lessons on making vegetable beds, flower beds and lessons on cooking healthy food gardens to both students and the community (personal communication, 13 September 2017). Thus it can be argued that they exist as part of a larger urban resilience strategy by changing the habits of the future urban residents.

Both the *kleingarten* and *gartenarbeitschule* are popular in Berlin for supplying fresh food and nutrition for the household, recreational activities such as

community get-togethers, escaping from the concrete jungle, providing opportunities for exercise, and educational awareness. As such they are critical examples of long-term formalised zoning for UA based on its contribution to the city's overall levels of social capital.

Lastly, from the interviews of the Himmelbeet Community Gardener, the City of Berlin has temporary land access arrangements for community gardens that occupy school grounds, open spaces, or parks and sports fields with though that falls outside the *kleingarten* or *gartenarbeitschule* designation (personal communication, 13 September 2017). Such community gardens are predominantly cooperatives run by the youth and are the consequence of frustration at undesirable long food value chains (*ibid*.). Thus it is important to recognise that, as discussed in Chapter 2, UA responds to both food security and lifestyle choices by those who have other food options.

The Himmelbeet Community Garden (Figure 4-1) offers an opportunity for residents to produce their food and herbs; but, unlike *kleingarten*, they can sell the farm products to the local community. The community garden collaborates with NPOs such as *Grüne Liga* and organises workshops or does consultancy work for city residents about gardening (*ibid*.). The community garden programme innovatively identifies open spaces, links cooperatives with NPOs for capacity building, and with the central government for funding through internships. Here we see a key connection between actors that are bridging the UA/land use planning gap.



Figure 4-1: *Himmelbeet* Community Garden showing vegetables, herbs and a kiosk, Wedding, Berlin (source, author)

Berlin presents three types of UA practices that can be learned from, two are formally zoned and the third has a temporary land use. It should, however, be noted that in this context UA practices are largely for social and community benefits. While all the UA practices have developed networks with other actors, they do not network directly with the city; which affects negatively their collaboration and future of UA in the city.

4.2.3 Lack of collaborative platform for UA and land use planning

From the discussion above it can be seen that the Berlin and Dar es Salaam case studies lack innovation networks across UA and land use planning. In Berlin, the sectors of land use planning and urban agriculture have innovation independent of each other it should also be noted that there is no institutional structure supporting UA. Institutionally, the Senate Department for the Environment, Transport and Climate Protection has three sections namely Environment, Transport and Climate Protection that are all responsible for green spaces but none deals with UA (Matthei, 2017). This institution's overarching capacity could have led to a stabilising of UA as an urban land use; instead in

practice we see the consequence of the existing neoliberal environment, the conversion of UA lands to other uses due to the pressures of real estate values.

Turning to Dar es Salaam and the African context, UA has largely remained traditional and the innovation networks in planning at the city level have tended to sideline urban farmers and their association. Though the municipal planning department attended stakeholder collaborations during the preparation of municipal strategic plans on UA, the facilitation of UA plans that were largely done by an NPO (Halloran and Magid, 2013a).

What stands out from the analysis of these cities so far is that they have not formed the innovation network 'ecosystem' across UA and land use planning as described in Chapter 2. This lack of integration between policy, sectors and practice is in line with findings from a study by Bassett and Shandas (2011) on climate action planning in 20 USA cities that became standalone plans and were not integrated into the planning process because planning processions were absent from the planning process.

4.3 Innovation Networks Across Urban Agriculture and Land use Planning Towards Formalisation of Urban Agriculture

In contrast to the case studies above, this sub-section presents the international case studies of Almere, Detroit, Havana and Portland. As will be shown, for differing reasons, UA in these cities is not as influenced by the neoliberal environment. Thus, I argue that these reflect the principles of innovation networks across UA and municipal land use planning and how this affects the formalisation of urban farming. This argument will be based on the parameters laid out in the introduction and informs my study's exploration of the drivers underlying the marginalisation of UA within municipal land use planning practices, the impact of the market logic on UA and land use decisions, as well as, the effectiveness of innovation network theory in overcoming the marginalisation of UA within that market logic. Thus this section speaks to sub-questions 1 and 2.

4.3.1 Innovation network across UA and land use planning

Similar to Berlin, UA in Portland is practised in diverse ways that range from subsistence gardens for low-income residents and small scale urban farmers informally zoned peri-urban areas (Balmer *et al*., 2005). Some non-profit UA initiatives such as the Growing Gardens and Zenger Farm run educational tours for communities and schools in addition to selling fresh produce (Mukherji and Morales, 2010). Public schools and colleges also undertake some gardening in school farms (Balmer et al, 201).

However unlike the case studies above in Portland we see a greater level of institutional collaboration. The Portland City Council, Bureaus of Water, Parks, Environmental Services, and the Office of Transportation collaborates with Food Policy Council, Portland State University, NPOs and government on UA and its associated food issues (Balmer et al, 2005; Mukherji and Morales, 2010).

In summary, these international case studies developed innovation networks that involved the City or specifically City Department responsible for Planning, urban farmers' associations, NPOs and universities or research or training centres that raised awareness of UA and jointly developed policy or zoning codes towards formalisation of UA.

4.3.2 Innovation network power relations

I should highlight that it was difficult to analyse power relations from the literature on city case studies which concentrated on UA activities rather than roles of actors. However, what was clear in all the four cities of Almere, Detroit, Havana and Portland was the crucial role played by the city especially the planning department and the direct link with farmer's representatives in these networks. Unlike Berlin where the city had no department working directly with urban farmers or Dar es Salaam where the planning department was 'invited' to the process and so lacked a collaborative platform with UA; the four cities of Almere, Detroit, Havana and Portland have established this platform which proved instrumental towards formalising UA within urban land use.

4.3.3 Land use access arrangements

The Agromere is a planning concept that was adopted for the Dutch City of Almere that integrated UA into the city (Jansma and Visser, 2011). The concept inspired planners to zone UA in the Strategic Vision for Almere (*ibid*.). The crop and dairy farmers in the city previously supplied the world market but after the formalisation sell products through the local supermarkets and earn more because of the reduced costs in short supply chain (*ibid*.). As well, the farmers have additional revenue through farm diversification into recreational, education and elderly care for city residents (*ibid*.).

A unique aspect of the City of Almere is the joint planning between the city stakeholders that occurred beyond the direct pressures of neoliberalism. I argue that it is this difference that has reconciled a working relationship between UA and land use planning. The literature shows many cities who unsuccessfully tried to link UA to the formal economy (Malan, 2015a), however, Almere linked its commercial urban farmers that previously exporting to the world market as a means to viably meet the requirements of their local supermarkets and gave value to its contribution to local social capital. Thus it shifted the power of the market logic.

Detroit is another interesting example of a shift in market logic which in turn shifted the key power relations in favour of alternative land use decisions. In other words, the decline of Detroit's economy released vacant land, opening opportunities for innovation in land use planning for greenways, forests and UA (Paddeu, 2017). Detroit offers temporary leases for UA land for up to 10 years with the farmers (Meenar et al, 2017). This timeline is critical to the stability and accessing funds. The City of Detroit adopted the Urban Agriculture Ordinance in 2012, making urban farming legitimate (Seigner, 2018).

Havana is different from the discussion in the previous section because UA inhabits an environment with a fundamentally different economic structure. It should also be noted that Havana's response to UA is also tied to issues of food security. UA in Havana is underpinned by extensive government support that secured land tenure and technical support (Cabannes, 2012). The land allocation process established a land use planning system that identifies underutilised land

for UA (Battersby et al., 2013; Novo and Murphy, undated). The Havana case study ensures that urban farmers have a legal right to the unused land in the city (Novo and Murphy, undated).

Land ownership arrangements in Havana include innovating ways, ranging from raised gardens in areas of poor soils, called *organopónicos*, intensive hydroponics, community gardens, enterprise and factory gardens to household gardens, as well as basic production units, individual farms, and state farms in peri-urban Havana (Altieri *et al*., 1999, Cabannes, 2012). Through *organopónicos*, residents of Havana transformed poor soils into rich agriculture gardens.

And unlike Berlin's *kleingarten* where UA produce is mandated as subsistence, the urban gardens in Havana are also part of the residents' livelihood strategies in the form of products that can be sold. Fisher's (2012) critique is that the neo-Marxist Havana urban farming framework is not transferable to western democracies. However, the model gives valuable experiences on how municipal councils and the state can collaborate for supporting UA initiatives through farmer capacity–building, and the provision of inputs. It also evidences the problematic relationship between the capitalist system with its profit-driven market logic and a 'soft' land use like UA.

Returning to the City of Portland case study, we see that the city in collaboration with Portland State University identified undeveloped land with potential for community gardens and drafted zoning codes for as a mechanism to release access to land for urban food production (Balmer *et al*., 2005). In response to this legislation, the city improved the services that it provided to urban farmers through the Community Gardening Programme as inputs and training (*ibid*.). The network of actors on city farming effectively secured stable land tenure for UA.

The next section turns to the context of this study, presenting the South African experiences on land use planning for UA. It will assess the relationships between actors in the marginalisation of traditional UA by conventional land use planning; and potential on innovation networks in overcoming this marginalisation.

4.4 Municipal Planning for Urban Agriculture in South Africa

This section reviews the legislative provisions of UA and land use planning at the national and provincial level through examples of UA in Cape Town and my case study, Johannesburg. At the national level, the South African Constitution (RSA, 1996) and the National Development Plan (RSA, 2011a) support UA as a strategy towards mitigating food insecurity. Within the realm of UA, the Spatial Planning and Land Use Management Act (SPLUMA), the Integrated Development Plans (IDPs), and Spatial Development Frameworks (SDFs) lay out a road map towards the implementation of the provisions of the Constitution. The above policies, though they speak to all levels of government, specifically set out goals for municipal commitments to support urban farmers with training, agriculture infrastructure, and seed packs. It's important to stop and note that South Africa has three inter-dependent tiers of government; the national, provincial and municipal as outlined in the National Constitution, Chapter 3 (RSA, 1996:21). This section appraises these legal instruments.

4.4.1 National legislative provisions towards planning for urban agriculture in South Africa

South Africa's National Constitution makes pronouncements on national food security, especially through the right to food, and nutrition that all citizens have the right to sufficient food and water (RSA, 1996, Section 27.1b). Battersby *et al*. (2013) argue that this constitutional provision has not been complemented with responsive action to mitigate food insecurity. For instance, a study about a decade after the National Constitution identifies that about 50% of South Africans live below the national poverty line, which is higher than most upper-middle-income countries (Van Averbeke, 2007). As was discussed in Chapter 2, one critical role of UA towards addressing food insecurity is its short value chain where food is produced for the household and the local community.

Relevant to this study, the NDP supports innovation as a driver for technological growth, and South Africa's competitiveness across the industry, business,

society, education, and research institutions (RSA, 2011a). The NDP further envisages innovation in planning as a path towards redressing historical imbalances of South African cities and makes provision for the development of the capacity for spatial governance through educating “and training of planners and spatial professionals”, while recognising, and incentivising spatial innovations (RSA, 2011a:291). Additionally, the Spatial Planning and Land Use Management Act (SPLUMA) makes provisions for sustainable human settlements that cater for the environment and are supported by livelihoods opportunities, which gives opportunities for urban farming.

In support of this initiative, the Department of Science and Technology stimulates research, and innovation in many sectors, including the use of innovating planning instruments to guide the spatial, and socio-economic development of the country (RSA, 2011a). Whereas the NDP convincingly supports UA and planning innovation in South Africa, a unique challenge among urban farmers is the lack of capacity as demonstrated through poor farming methods as well as rudimentary equipment, and management skills, which are just a few examples that could be redressed through innovation networks.

One can, therefore, argue that in theory, sufficient policy provisions supporting UA and planning innovation initiatives in South Africa. Even though such provisions give platforms for municipal planners to develop initiatives in assigning land for UA, in practice, there are many inconsistencies, gaps and simply lack of implementation in bringing these policies to the ground.

Several instances of such fragmentation in policy implementation further undermine the pursuit of UA in South African cities. For instance, the Constitution allocates the responsibility for agriculture development to national, and provincial departments thus empowering them to mobilise national funding for the sector (Malan, 2015a), while failing to integrate the significant role of municipal departments that have similar responsibilities with no access to funding from the national treasury.

4.4.2 Provincial legislative provisions for planning for urban agriculture in South Africa

In Western Cape Province, the respective Department of Agriculture supports households, and community gardens through the food security sub-programmes such as the Farmer Support and Development Programme (Battersby *et al*., 2013). The programme aims to "assist and provide vulnerable communities and households with means to produce their food and increase their accessibility to safe and healthy food" (Department of Agriculture, Western Cape, 2010:46). An example of implementation is the Farmer Support and Development Programme which provides funding and also assists households and communities with training, farm implements, seedlings, compost, and irrigation equipment such as boreholes, and water harvesting equipment. Similarly, within Gauteng, the provincial government, through the Gauteng Department of Agriculture and Rural Development, provides funding, equipment and training for farmers in the city, in collaboration with the CoJ Department of Social Development.

In planning, the provincial spatial frameworks set out the long term spatial vision for the province and how it integrates different sectors in providing access to land. The Gauteng Planning Commission, through the Gauteng Spatial Development Framework, encourages UA in peri-urban zones as part of the province's sustainability strategy. Central to the provincial land use planning and UA programmes in South Africa are that they are funded by the central government and staffed to support these sectors. The provincial governments support and collaborate with municipal land use planning and UA institutions in supporting these sectors as outlined in the next section. These key connections will prove critical to the viability of inter-sector relationships and their influence in the network and land use decisions.

4.4.3 Municipal land use planning innovation networks for urban agriculture in Cape Town

Similar to international case studies, I present the Cape Town case study following the three thematic areas: (i) innovation networks across UA and land use planning, (ii) innovation network power relations, and (iii) land access arrangements.

- **Innovation networks across UA and land use planning**

The City of Cape Town is one of the most progressive cities in supporting UA in South Africa. Municipal supported UA programmes in Cape Town date back to the 1980s and were spearheaded in townships by an NPO called Abalimi Bezekhaya (Geyer et al., 2011). The NPO had programme on small-scale gardening and small livestock production for subsistence and supplementary income (*ibid*.). In response to such initiatives, the City of Cape Town established several UA programmes and supports 201 community gardens (Battersby et al., 2013). In support of the farming initiatives, the city introduced the Green Carts Programme, which licences vendors to sell fruit, and vegetables to increase the presence of healthy food on the streets (*ibid*.).

Key to this study, one can point to the city established collaborations with different stakeholders in line with the principles of the innovation networks theory. The City of Cape Town networks with Abalimi Bezekhaya, Soil for Life, the University of Cape Town and Western Cape Department of Agriculture for farmer capacity building, equipment, and collaborative research (Battersby and Marshak, 2013; Olivier and Heinecken, 2017; Kanosvamhira, 2018).

4.5 City of Johannesburg land use planning innovations for urban agriculture

This section addresses sub-question 2 on the effectiveness of innovation networks in overcoming the marginalisation of traditional UA by conventional land use planning, consistently using the parameters as in the discussion above. It is worth noting from the onset that while this study argues that innovation networks promote collaborations across sectors. The preliminary findings in Johannesburg show that innovation initiative is sectoral, limiting themselves to UA and land use planning – thus innovation networks do not currently exist in Johannesburg across UA and land use planning. This section will present and analyse the sectoral innovation and network initiatives in the city.

Johannesburg and South Africa at large underwent a fundamental turning point beginning in 1994. This marked the beginning of a period of transition from social, spatial, economic, and political apartheid to democracy. It included a new constitution and consequently a total shift in legislation. That said such macro level, and/or *de jure* changes, are not always fully reflected in micro-level, and/or *de facto,* realities of everyday life. In the same vein, the land use planning policies and practices in Johannesburg evolved from the draconian apartheid planning legacies to more adaptive approaches appropriate to democracy.

This evolution is also partly influenced by the City's role as a major metropolis and the economic hub within South Africa and the continent. Explaining this shift, Harrison (2006) argues that the major cities of the South, such as Saõ Paulo, Shanghai, and Johannesburg, are dynamic spaces that bring about intersections between global urban designs adapted from elsewhere, and local histories and cultures. The early post-apartheid ANC government under President Mandela was more supportive of the poor before adopting the current more neoliberal policies under President Mbeki (Kornienko, 2013; 2017). This shaped the different policies and strategies promulgated by the City of Johannesburg (CoJ) to guide urban development as presented in the next section.

4.5.1 Legislation guiding planning innovation for urban agriculture in Johannesburg

Overall, the CoJ *Growth and Development Strategy* (GDS) of 2040 made urban resilience a critical theme for addressing socio-environmental risks such as food security, health, and climate change (Harrison *et al*., 2014). The strategy defines city resilience in terms of self-sufficiency and reducing external dependencies, as well as optimising utilisation of its own resources that include the promotion of urban farming, waste recycling, water conservation, and energy efficiency (*ibid*.).

The GDS strategy is aligned with the national Constitution and the National Development Plan (NDP) which support food security initiatives and therefore makes UA part of Johannesburg's resilience strategies. In other words, the policy is in place for formal UA land use access. The next section addresses this gap, discussing the primary policies that influence land use planning innovation for UA at provincial and local levels, which are:

- **Integrated Development Plans**

The CoJ adopted the Integrated Development Plans (IDPs) in 1994 as part of the larger urban spatial transformation policy to redress previous apartheid-era imbalances. The IDPs are five-year municipal planning innovations that are linked to the political cycle and budget (Todes, 2011). Within city departments, IDPs implement the broader and long-term Growth and Development Strategy. In theory, they promote participatory planning as a means to address apartheid's legacy of urban patterns (Watson, 2009), however, de facto realities reflect that some loopholes continue to exist in the participation process.

Critical to innovation networks, the previous 2012/16 IDP supports innovation by encouraging collaboration in council business throughout city departments (CoJ, 2012). Further, the IDP addresses urban poverty by supporting small-scale growers to provide fresh food to the city (*ibid*.). The current 2016/21 IDP builds on previous plans by promoting economic growth, job creation, attracting investment and poverty reduction (CoJ, 2016c). Critical to this study, the IDP made provisions for the promulgation of the Food Resilience Strategy and the

establishment of the Food Resilience Unit that implements UA projects. The IDPs make a clear shift from the conventional land use planning and have embraced stakeholder involvement and opened to addressing local issues, however, as will be discussed in later chapters this has yet to be fully realised on the ground.

➢ Spatial Development Frameworks

In South Africa, spatial development frameworks are prepared for both the provincial and municipal levels. At the provincial level, the Gauteng Spatial Development Framework encourages intensive urban development that secures UA zones on the urban fringes for food security (RSA, 2011a). Additionally, the provincial framework promotes food security through the establishment of community gardens, rooftop gardens, backyard plots, greenhouses and the creation of Agriculture Hubs (RSA, 2011b). These policies are intended to stimulate food production to reduce Gauteng's dependence on other regions such as Limpopo and Mpumalanga for food – in other words, to get away from longer food value chains.

At the city level, the Spatial Development Framework (SDF) is a section of the IDP that guides the physical design of the city. The current Johannesburg 2040 SDF upholds the concept of compact city development, promoting opportunities for people to live, work, and recreate in their locale (CoJ, 2016c), a sustainable city goal. In theory, this should free land for UA. The SDF further advocates for a resilient city – the design and implementation of urban systems that can withstand hardships without adversely affecting the natural environment (ibid.). My argument is that within the principles of the compact and resilient city, the Johannesburg SDF offers opportunities to grow local food production and create livelihoods as a way to reduce environmental degradation.

4.5.2 Legislation guiding urban agriculture innovation networks in Johannesburg

In upholding the principles of the IDPs, the CoJ Department of Social Development collaborated with the University of Johannesburg, and the University of Witwatersrand to develop the Food Resilience Strategy (Head of Agro-processing, Food Resilience Unit, Personal Communication, 8 November 2017). According to Malan (2015b) the Food Resilience Unit stimulates food production by: (i) promoting access to information on food; (ii) enabling access to land for backyard, or rooftop gardens, open spaces, and city farms; (iii) providing training, and assistance with pest control, implements, and seeds to farmers; (iv) ensuring healthy food by linking farmers with supermarkets and food markets; and (v) establishing street vegetable markets to improve access to food.

My view is that the implementation of the strategy depends on the city collaboration with NPOs, universities, and the private sector since the CoJ Food Resilience Unit has limited resources and personnel. Such collaborations deepening existing innovations within sectors while at the same time provide the policy and practices for the development of innovation networks.

4.5.3 City of Johannesburg innovation in general

As will be discussed below, it can be said that the promotion of innovation has been supported in Johannesburg but that it is generally within sectoral bounds. As such, innovation networks across UA and land use planning in Johannesburg do not exist. The existing sectoral innovation initiatives in UA and land use planning are presented in the next sections. Before, these sectoral innovation initiatives, I would present broader innovation initiatives for the city.

The CoJ has a Department of Innovation that supports innovation to all city departments. The Department of Innovation developed an Innovation Strategy which lays out a roadmap for and spearheads innovation initiatives within the city. To implement this strategy the City collaborates with the Centre for Public Innovation, a government agency that supports and evaluates public sector innovation and rewards best practices. The CoJ promotes innovation in areas

such as: (i) creating an enabling environment for innovation; (ii) idea management by encouraging entrepreneurs to meet fellow innovators, and share experiences; (iii) a capacity building programme that trains entrepreneurs in innovation, and business development; (iv) emphasising innovation as a key performance indicator for senior city managers; and (v) aligning innovation initiatives with plans. During interviews, a city planner elaborated that, in line with the innovation strategy, the CoJ has established pockets of innovation such as the Corridors of Freedom and Bus Rapid Transit System (personal communication, 09 May 2017). The bus rapid transit system has been successfully replicated in other cities in South Africa such as Durban and Pretoria (*ibid.*).

One may ask how these larger city innovation strategies apply to UA and land use planning. Through this Innovation Strategy, the city runs programmes such as the Green Start-up Programme that manages small business competition in collaboration with the University of Johannesburg. Discussions with the Head of Agro-processing, Food Resilience Unit shows that the Unit collaborated with the Green Start-up Programme and submits a list of farming entities that enter this competition (personal communication, 8 November 2017). Unsurprisingly, the Green Start-up Programme has a strong bias towards entrepreneurship and small business development, underscoring CoJ's macro neoliberal development strategies

At the city level, innovation has been incorporated spatially into the CoJ 2040 Growth Development Strategy and IDPs. Innovation is one of the values of the CoJ Department of Group Strategy, Policy Coordination and Relations which is responsible for preparing the IDPs. Thus it's worth noting that innovation initiatives are not isolated programmes but streamlined into the city vision as a whole.

4.5.4 City of Johannesburg innovation networks in land use planning

In land use planning, the City of Johannesburg prepares IDPs and SDFs in collaboration of public and private stakeholders. The city planner in an interview reflected that the CoJ Department of Development Planning takes the lead in land use planning and holds public participation and stakeholder engagements with other city and government departments, agencies, the private sector, civil society and resident representatives (personal communication, 09 May 2017). It is, however, important to remember the limitation of stakeholder engagement from the realities of such exercises as described by Healey (2003) and Watson (2009).

One planner elaborated that in theory, the CoJ Department of Group Strategy, Policy Coordination and Relations coordinates the preparation of IDPs and collaboration departmental plans. However, in practice the implementation process is left to individual city departments, thereby creating silos. Thus it can be argued that the city's departmental silo relationships weaken the dynamics of coordinating the preparation of IDPs and land use planning.

For instance, during the preparation of the Johannesburg 2040 SDF, the CoJ Department of City Transformation and Spatial Planning collaborated with UN-Habitat, and the French Development Agency, through the Urban Morphology Institute in France (CoJ, 2016c). The CoJ also collaborates with the Wits School of Architecture and Planning, through the South Africa Research Chair in Spatial Analysis and City Planning and the Centre for Urbanism and Built Environment Studies in both plan preparation and research. Such collaborations empower the city to glean expertise and best practices from the vast experiences of partners.

4.5.5 Land use access arrangements

As a result, of the innovation in land use planning, the IDPs provide different land access arrangements for UA. However, I must emphasise that these land access options can only be potentially improved if the innovation networks platform in the City of Johannesburg creates a direct dialogue across the Department of

Development Planning and urban farmers or their association. The current collaboration between UA and land use planning are between the Department of Development Planning and the Department of Social Development (on behalf of farmers). Again this structure could have been beneficial if not for the poor departmental collaboration at CoJ.

The land access arrangements in Johannesburg are:

i) Permanent land use zoning

Detailed local town planning schemes, such as the Consolidated Johannesburg Town Planning Scheme of 2010, Section 14 and Sub-section 9, make provisions for formal zoning of UA in its land use zones (CoJ, 2010). These formal zones uphold the IDPs principles of inclusivity and city resilience, which offer opportunities for integrating strategies for addressing the needs of low-income groups and livelihood strategies that include UA. The contemporary IDP tenets of participatory planning and inclusivity offer opportunities for different interest groups in planning, unlike the old master planning approach.

The CoJ through the 2040 Growth and Development Strategy reinforces its strategy on compact development by creating an Urban Development Boundary (CoJ, 2016c). As seen in Figure 4-2, this boundary is a green belt around the city within which property development is prohibited. In other words, the city cannot expand beyond this boundary. To this end, the Department of Development Planning supports green infrastructure, such as natural open spaces, agriculture, and ecotourism. City farms, such as Eikenhof Farm (which is one the farming case study that will be highlighted later) in the south and Northern Farm in the north, are located within this boundary. It also includes agro-ecological and biodiversity initiatives, such as Klipriviersberg's Economic and Ecosystem Development Zone in the south and the Greater Kyalami Conservancy in the north.

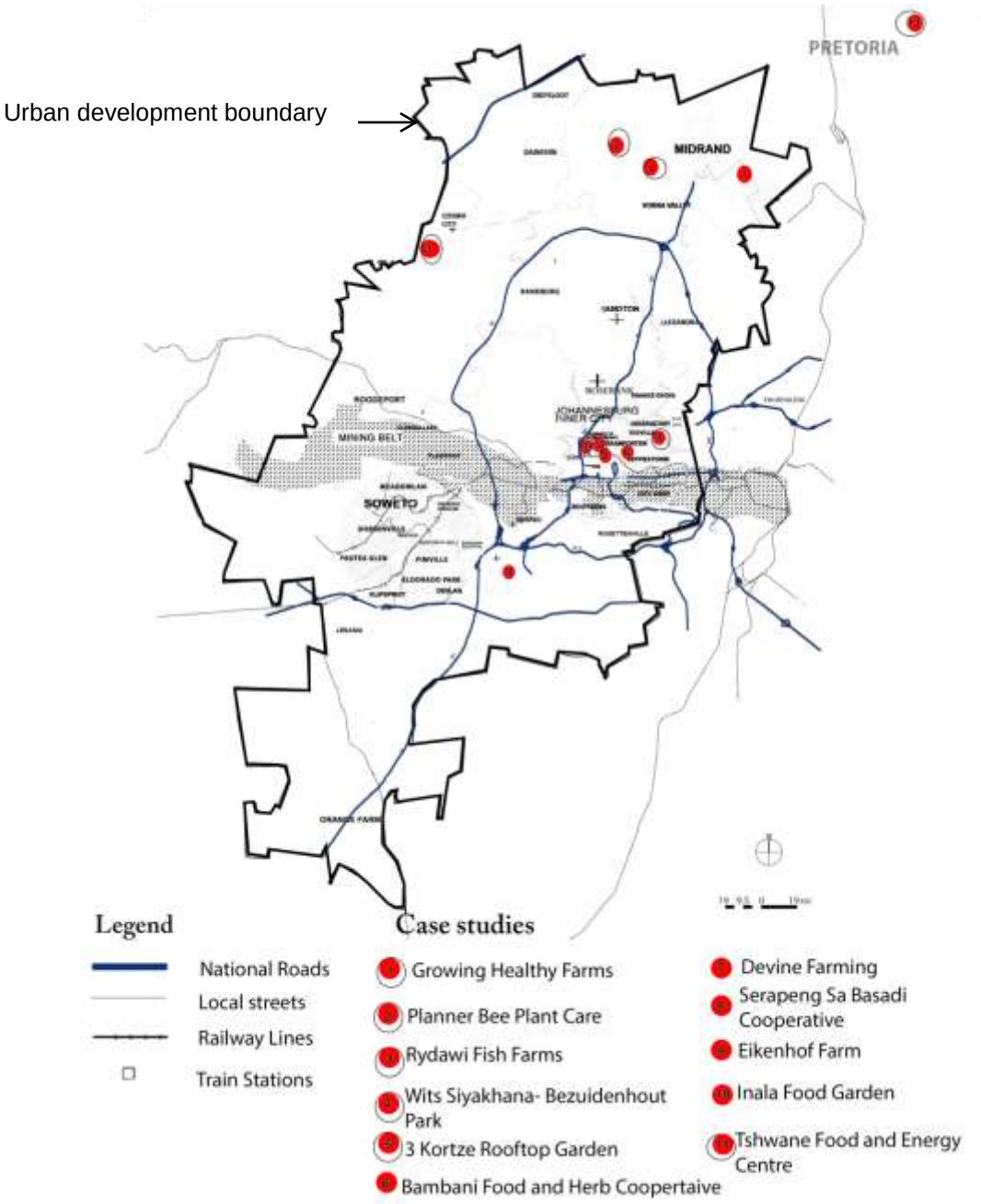

Figure 4-2: The Urban Development Boundary around Johannesburg (source, adapted from City of Johannesburg, 2018)

I should highlight that the Urban Development Boundary is a useful and contentious zoning for UA. According to a CoJ town planner, a group of environmentalists and agriculture smallholders within the boundary would like the boundary to be preserved for agroecological business initiatives (personal communication, 09 May 2017). This group wants to protect the environment and

their farms from encroachment by property developers. To this end, the group leveraged support from the CoJ Department of Planning and Development, in line with their policies against urban sprawl, which increased the cost of infrastructure development in these sparsely populated peri-urban areas. The city continues to support the Urban Development Boundary against rezoning and influenced the provincial government to include the boundary in the Gauteng SDF.

However, the second group that includes provincial housing departments and property developers would want to develop properties along the current boundary (city planner, personal communication, 09 May 2017). The city has received formal applications on these development proposals. This scenario presents a test for CoJ since the second group wields more power and influence - from their financial muscles in engaging the city - on land use planning decisions than the first group. This contention is also exacerbated by disputes over the exact location of the boundary by the CoJ and the provincial governments. Todes (2012) elaborates that the disputes over the boundary have led to developers obtaining permission from the Provincial Development Tribunal, which go against the CoJ policies.

However, it must be noted that although the IDPs have incorporated urban farming in Johannesburg, established city farms and empowered the Food Resilience Unit to support urban farmers, much of the city's support for UA cannot withstand the test of criticism. For instance, a critical weakness in the planning process is that the IDPs and SDFs give an overall vision of the city, without the power to control land use demarcation during plan implementation. This gap leaves a loophole for land use conversion. The inconsistencies between the IDPs and detailed planning schemes give power to the broad neoliberal macro-policies to influence future land use sub-divisions.

This contention over the formal UA zoning begs the questions: what is the role of innovation networks as related to formal UA zones? Are the city farms and conservancies zoned in response to innovation and networks in UA?

i) Temporary UA land access

The City of Johannesburg offers temporary land access arrangements for small farming plots and rooftops in the inner city in areas such as Hillbrow. Farming entities in these areas utilise city land with short to medium-term agreements with the Johannesburg Property Company (JPC) or schools.

To seek clarification on inter-departmental innovation, I interviewed the Head of Agro-processing, Food Resilience Unit. He explained that at the beginning of each financial year, the Department of Development Planning invites the Department of Social Development among others to specify their land use requirements and which secures temporary plots within the city (personal communication, 8 November 2017). Through these inter-departmental consultations, the Department of Development Planning allows the Food Resilience Unit to utilise the land for UA that is earmarked for long-term development projects, with the caveat that they cannot develop permanent structures (*ibid*).

This land access arrangements mirror experiences of some USA municipalities that provide temporary leases for UA (Meenar et al, 2017). These temporal agreements are an innovative land access arrangement for farming; however, they also present constraints since such agreements cannot be used for securing investment for UA enterprises. Besides funding, Meenar et al (2017) argue that such temporary land uses only perceptions that UA is an interim and informal practice.

Another form of temporary land use arrangement for UA includes access to land owned by public schools. The Izindaba Zokudla developed a manual on school gardening and advises farmers during lease negotiations with school and the Johannesburg Property Company. The efforts by the city and NPOs confirm Malan's (2015b) findings that the CoJ Food Resilience Unit facilitates farmer access to land by advising and submitting land requests to the landowners –. That said, it should be noted that access to land is largely ad-hoc and un-coordinated (*ibid*.).

The strategies enumerated above highlight that innovative temporary land access arrangements can be both formal and informal. It is noteworthy that a Head of Agro-processing, Food Resilience Unit underscored that the temporary land

access agreements can unlock investments only if farming entities have a formal agreement of five and ten-years – which corresponds to the lifetime of most irrigation equipment (personal communication, 8 November 2017).

As will be discussed in the following chapters, findings show that networks are critical even in securing formal agreement for temporary land access arrangements. For instance, the Bambanani Food and Herb Cooperative, ably secured a five-year lease agreement with JPC through its collaboration with the City and an NPO (*ibid*).

4.5.6 City of Johannesburg: a move towards innovation networks in urban agriculture?

Guided by the IDPs and Food Resilience Strategy, the CoJ established two city farms, Northern Farm and Eikenhof Farm, in 2013. The city collaborated with DGARD, government departments, NPOs and the private sector for funding and universities on research. The city farms were established with three main functions: (i) to produce food for the low-income households; (ii) to sell surpluses to the local communities, supermarkets, and the Johannesburg Fresh Produce Market or to supply the City Feeding Programme; and (iii) to create job opportunities.

A closer analysis of the functions of city farms confirms the CoJ's neoliberal bias, the prioritising of the supply to the formal economy is traceable. As will be presented in Chapter 5, this practice has set much of UA up for failure as non-innovating farming entities cannot develop sufficient partnerships necessary to innovate and so instead supply the informal economy.

The CoJ further provided support to farming entities through with the establishment of the Agriculture Hub and Spoke Centres (CoJ, 2012). The centres provide farmers with: (i) liaison and managing orders from the Johannesburg Fresh Produce Market and (ii) managing the packaging houses and refrigerated trucks to transport fresh produce. The Hub and Spoke Centres are managed by secondary cooperatives that are formed by the elected representatives of farmers from primary farming cooperatives that sell farm products through the hub. Fieldwork observations show that the primary

cooperatives are struggling with group cohesion and mobilising labour to work in the garden. With these problems of group dynamics, Malan (2015b) queries the capacity to govern the Hub and Spoke Centre when many primary farming cooperatives struggled to deal with the dynamics within their respective cooperatives.

4.5.7 Johannesburg non-profit organisation and private sector support for urban agriculture

The UA sector in Johannesburg collaborates with NPOs and the private sector. Izindaba Zokudla is an NPO that supports a network of more than 200 farmers in Johannesburg. The NPO advocates for participatory approaches and facilitates stakeholder engagement with UA actors (Malan, 2015b). Assistance to farmers includes: (i) creating access to markets; (ii) addressing land tenure; (iii) developing farming technology; and (iv) creating opportunities for academic research (*ibid.*).

I interviewed the Director of Rippon and Nstele Consultancy that has worked with farming cooperatives in Johannesburg for more than a decade. The director explained that the company collaborates with the CoJ and United Way South African and assists urban farmers with basic accounting, and business skills (personal communication, 21 November 2016). The consultancy provides farmer training and mentoring on financial management, record keeping, and benchmarking (*ibid*.). My observation is that training and mentoring in financial management are crucial for transforming management skills and improving bookkeeping, and record keeping.

An interview with the Director of the Rippon and Ntsele Consultancy reveals that actors supporting farming entities should assess farmers' skills gaps before rendering assistance. Without such assessments, they argue, the intervention in UA may be mistimed or miscalculated. For instance, a private company donated a computer to a farming entity for basic record keeping and word processing; however, the computer was underutilised because members lacked basic computer skills (personal communication, 21 November 2016). This is a critical

finding because the City, GDARD, NPOs and the private sector have promoted innovation through acquisition of irrigation equipment and machinery.

However, observations are that many tunnels, greenhouses, computers and Agri-Hubs are underutilised as farmers struggle with limited expertise to manage the equipment, and technology. Commenting on these experiences, a Director of the Rippon and Nstele Consultancy argued that “urban farming entities should be empowered to select the type of assistance they receive UA stakeholders. Currently, cooperatives cannot refuse free handouts even when they are not aligning with their project goals” (personal communication, 21 November 2016). This argument is contrary to views of the treasurer of Bambanani Food and Herbal that she shared in an earlier interview. She explained that the cooperative get funding from different stakeholder signifying their potential to improve their productivity and develop into a small business (personal communication, 11 November 2016). The responses above indicate a mismatch between the perceptions of supporting stakeholders who feel that some farming entities are getting too much assistance that distracts their efforts; and the farming entities themselves who feel that it is a sign that they have ‘successful’ partnerships in UA. Additionally the two views of securing irrigation infrastructure and failure to utilise them highlight the skills gaps among farming entities, a critical fracture that weaken the viability of the networks.

4.5.8 City of Johannesburg network power relations

An interview with a city planner on the influence of the CoJ on the UA network shows that the CoJ Department of Development Planning holds stakeholder engagements with the city, and government departments, and agencies, the private sector, civil society and resident representatives in the preparation of land use plans. These stakeholders include the CoJ Department of Group Strategy, Policy Coordination and Relations, City Mayor’s Office, UN-Habitat and the French Development Agency (CoJ, 2016c), as well as Wits School of Architecture and Planning Figure 4-3, shows the innovation network partners in land use planning.

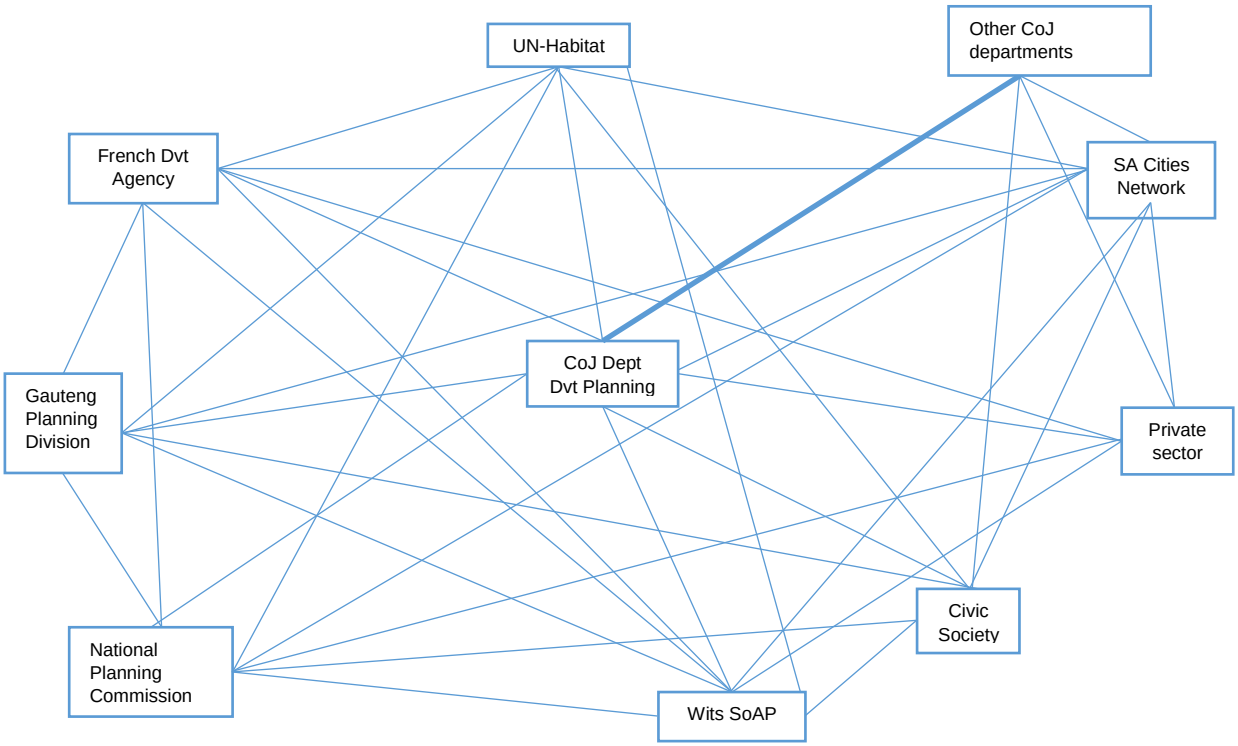

Figure 4-3: The CoJ Department of Development Planning sociogram (source, author)

I will emphasise that the CoJ Department of Development Planning is a dominant actor. It has nine connections, similar to actors such as Wits SoAP and the SACN. However, when such relationships are better explained by assemblages that assess power relations beyond mere number connections. The Department of Development Planning weirds power as a responsible institution at the city level. The thick arrows on the sociogram show critical relationships between the Department of Development and Department of Social Development that is relevant to UA formalisation. Additionally, this diagram shows that farmers or their representatives are not among key collaborating partners on land use planning. However, the Department of Development Planning does not collaborate directly with farming entities creating a gap in the UA and land use planning innovation networks. This explains the going uneasy relationship between planning and UA despite innovation networks in individual sectors.

In UA, Figure 4-4 shows that the CoJ Food Resilience Unit has the highest number of connections. The other key actors in the UA network are the Department of Development Planning, GDARD, farming entities, Izindaba

Zokudla, UWSA, University of Johannesburg and University of the Witwatersrand. Izindaba Zokudla and UWSA are responsible for the facilitation, convening meetings and workshops including training. In this network, GDARD provides extensions services, and irrigation infrastructure, while the Agriculture Research Council provides research, and technical training on farming methods. The AgriSETA attaches unskilled labourers to farming entities. The two universities provide research and evaluation of UA programmes.

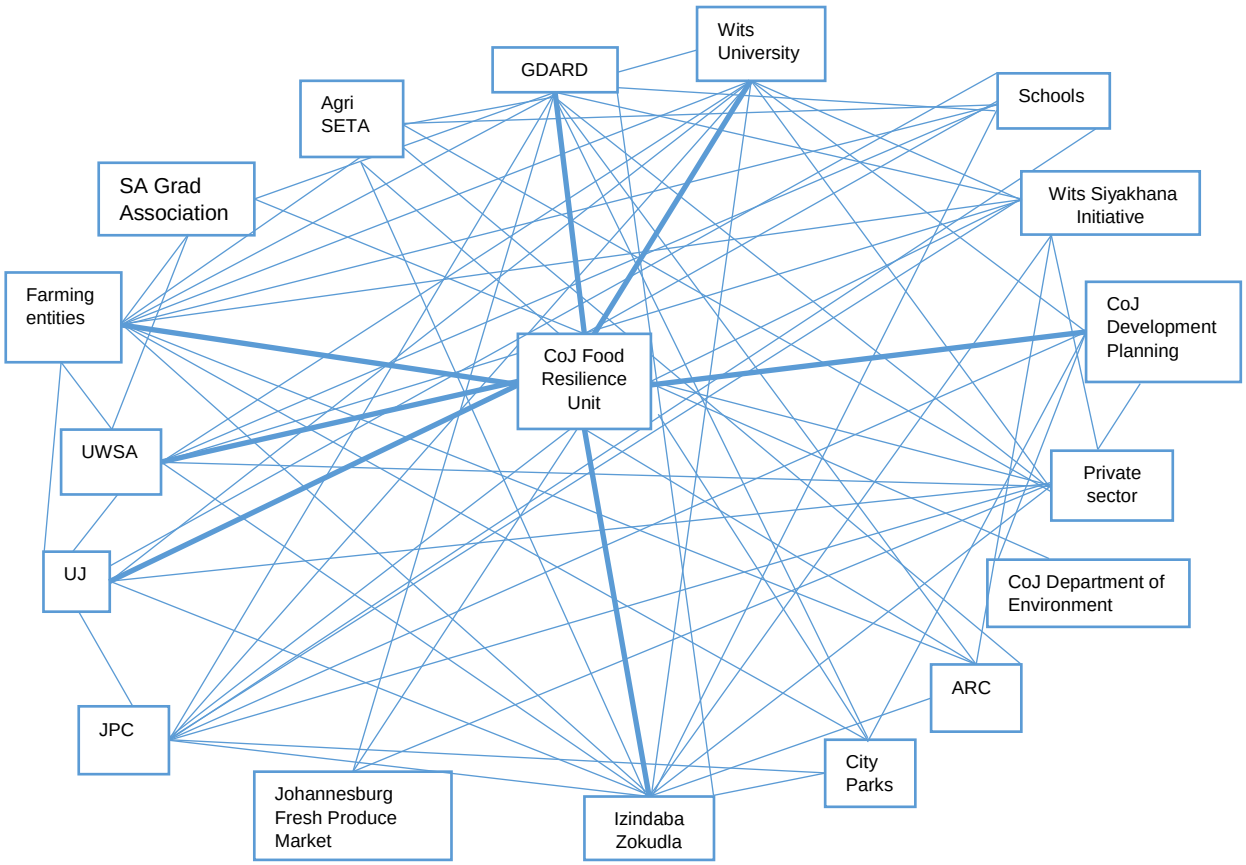

Figure 4-4: The CoJ Food Resilience Unit Sociogram showing its networking partners (source, authors)

I should highlight that the Food Resilience Unit networks directly with farming entities while the Department of Development Planning works with farmers indirectly through the Food Resilience Unit. These interrelationships make inter-

departmental collaboration critical for the Department of Development Planning to respond to farming innovation by assigning land for farmers.

The findings show that city departments are common actors and have more influence among UA and land use planning networks. However, though the Department of Development Planning does not collaborate directly with farming entities as highlighted earlier, inter-departmental collaboration becomes critical towards establishing an innovation network platform at the city level. I would also underscore that though city departments have more influence within these networks. However, NPOs such as Izindaba Zokudla, and UWSA have superior coordinating functions in farmer's networks because they are less bureaucratic and more effective in organising meetings and seminars and act as mentors for farming entities.

4.5.9 From degree centrality to assemblages

As explained in Chapter 2, degree centrality explains the number of connections (highlighted in the sociograms) and thus the actors that influence within the network. The Food Resilience Unit is the most influential in the UA with the highest number of connections; followed by Izindaba Zokudla and GDARD has the lowest degree centrality of eight. The findings uphold the assumption that the city is a dominant actor in both land use planning and farming networks. While NPOs such as Izindaba Zokudla are critical in the UA network for coordinating stakeholders in UA in training, meetings, and workshops, which in turn influence policy.

However, this is a simplified version to explain that the study findings show that the complexity of power relations among UA and land use planning actors can best be explained by assemblages, rather than simple networks. The city provides a tripod of support to the farming entities – explained by the large number of stakeholder connections. However, other actors in the networks such as NPOs and farmers have the power within the network as well. And it must be remembered that, as with McFarlane's (2011) understanding of assemblage discussed in Chapter 2, these power dynamics have a spatial manifestation.

These findings on power relations imply that stakeholder networking and farmer capacity-building processes are beneficial but should be managed to balance towards the farmers. For instance, the Rippon and Ntsele Consultancy clarify that one farming entity managed their garden better prior to developing assemblages with many actors whose intervention diverted the cooperative's attention away from its core farming business (personal communication, 21 November 2016), thus in effect making the farmer's position in the network weaker.

4.5.10 Effectiveness of the principles of innovation networks towards formal zoning of urban agriculture

The Cities of Almere, Detroit and Portland espouse principles of innovation networks across UA and land use planning that included farmers' association, city planning, government departments, the private sector and NPOs (Palmer et al, 2005, Jasman and Visser, 2011; Paddeu, 2017). I, therefore, argue that these platforms developed a shared vision for UA. In some cities, the platform drafted policy and even participated or submitted comments towards formalisation of UA.

While Johannesburg is a unique case study, what experiences can be learned from these cities? In theory, in Johannesburg, the IDPs make solid foundations for innovation and the formalisation of UA in the city. Similar to formal zoning in Almere, Havana and Portland, the IDPs formally recognise and include zoning for UA promoting different uses that improved productivity and land utilisation. And an example can be seen in the Urban Development Boundary such as the Greater Kyalami Conservancy.

The contestation between the Department of Development Planning that pushes UA towards peri-urban and the Department of Social Development that promotes UA in the inner city shows how the concept of formalisation is a disputed one in Johannesburg. Experiences from the informal sector as discussed at length by Huchzermeyer (2011) show a lack of consensus on the form and content of the City's understanding and practice of formalising the informal in the housing sector, leaving one to speculate that the same would be true in UA.

In Johannesburg, the formalised UA land uses in the Urban Development Boundary are contested by different interest groups on whether they should be

temporary or remain transitory, thus casting doubt on their 'formal' status. Even city departments differ, for instance, Department of Social Development would want more formalised UA practices in the city core, while the Department of Development Planning prefers temporary UA arrangements as interim uses for future city development. Such ambiguities leave one wondering about the *de facto* reality of formalisation for UA in Johannesburg's land use planning practices.

4.5.11 Formalisation of urban agriculture and the conversion into other land uses

One of the contradictions in the debate of formalisation of UA is when formalised land is reversed to real estate. Such experiences undermine that gains of the formalisation process as well as bringing frustration and raises the question: is formalisation worthwhile for urban farmers? As reflected in the international case studies, the experience of conversion of UA into real estate cuts across cities of the global North and South. Berlin, Dar es Salaam and Portland have seen the *kleingarten,* urban garden and community gardens converted to property development from formalised zones (Balmer et al, 2005; Halloran and Magid, 2013; Matthei, 2017). The Berlin, Dar es Salaam, Portland and Johannesburg cases show that in neoliberal economies with private land ownership, individuals cannot be prevented from pursuing their investment opportunities.

Given the foregoing, one may ask: does a need exist for more failsafe zoning? Johannesburg also suffers from the conversion of UA land to real estate development. However, the Republic of South Africa recently promulgated the draft Regulation of Agricultural Land Holdings Act of 2017. The act aims to redress the colonial and apartheid land imbalances, and above all to protect existing agricultural land uses in both urban and rural municipalities (RSA, 2017). Though contentious, the act would prove critical for land use planning for UA in urban areas. Despite contestations that the act may be a political strategy by the ruling ANC government to manipulate popular opinion and to transfer land from one group of the elite to the next, the act may potentially protect existing public agricultural land from conversion into other uses.

However, the implications of the act may be limited in the Johannesburg context where public agricultural land is a small fraction of the land currently being used for urban farming. The reason for this is twofold, first, private UA land, such as the Greater Kyalami Conservancy, occupies huge farming initiatives over which both the new policy and the city have little control. Second, within the city centre, there are diverse tracks of land currently used for UA on temporary or semi-permanent basis that is zoned for parks, schools, hospitals and churches that also are not affected by this new policy.

Furthermore, Johannesburg has land use innovations such as rooftop gardening and short-term gardening parcels in the inner city. Such farming practices that are neither on public land nor require formal zoning limit the effectiveness of such legislation for preserving land for UA in Johannesburg. Additionally, it is critical to note that land use planning frameworks such as the Spatial Development Frameworks treat UA land as temporary zones for future development. Thus the new act's provisions for permanence in agriculture go against the existing policies that treat the same land use as temporary. In other words, the new act is by no means a cure-all, but does it perhaps portend a large-scale shift in political will towards farming?

4.5.12 Leadership and political will for urban farming

Though a general statement, leadership support for policies and development projects often make a huge difference in their execution. The cities of Detroit and Havana show strong leadership and shared a vision on the role of UA in these cities. The central government and the City of Havana promoted UA due to food shortages after the collapse of the Soviet Union and mobilised actors towards UA (Lovell, 2010; Cabannes, 2012). Novo and Murphy (undated: 330) argue that "President Fidel Castro proclaimed that no piece of land should be left uncultivated … and even on the front lawn of the Ministry of Agriculture, crops were planted". The Havana case study shows how a strong government will, coordinated research and innovation can promote the development of UA the city.

Similarly, after the collapse of the motor industry the City of Detroit, NPOs and farmer association reached a consensus that UA offers an opportunity to utilise the vacant plots (Paddue, 2017; Seinger *et al*, 2018) Such commitment and shared values transformed the city with UA as an opportunity for revitalisation.

In contrast, as discussed earlier, Berlin, Portland, Dar es Salaam and Johannesburg's neoliberal market-driven logic seems to work against UA. Likewise, for the City of Johannesburg, despite high incidences of food insecurity, may lack the leadership and political will to promote UA since statistics show that the city has strong allegiances to the neoliberal market (CoJ, 2012).

4.5.13 City of Johannesburg land use planning for urban agriculture – disjuncture between policy and practice

While both Harrison's (2006) and Watson's (2009) work on contemporary planning affirm that planning in Johannesburg has evolved to be contextually relevant and appropriate, Watson (2009) adds that the IDPs and SDF are proving ineffective instruments for controlling urban development as long as the land use management systems remain unreformed. This point is supported by Todes *et al*.'s (2010) study in neighbouring Ekurhuleni that the old planning tools are still used to guide urban development in parallel with the new IDPs.

Contradicting these academic studies, fieldwork interviews with the Executive Manager for the SACN proved more critical (personal communication, 04 January 2017). The manager argues that planning in Johannesburg has not sufficiently evolved and functions similar to the apartheid planning instruments, in other words, that the city works for a small number of residents. However, a common thread can be seen in these arguments, that the changes by IDPs could be cosmetic as long as the old planning instruments continue to override them during plan implementation.

Commenting on land use planning innovation for UA in Johannesburg, the Chief Executive Officer of the South African Council of Planners, reasons that:

> "The basic planning [for the city] was done many years ago, and there is no innovation in new planning. The planning department is not necessarily

> innovating with regard to urban farming. Many city developments are driven by infrastructure and costs [the now–costs, and not future costs]. Innovation in UA is different from innovation in land use systems; where one identifies productive land and creates a formal sub-economy for urban farmers. This is because UA cannot supply the formal economy, such as the Johannesburg Fresh Produce Market" (personal communication, 01 August 2017).

This argument reflects the divide between the new policy under the IDPs (on inclusivity, urban resilience and food security) and their implementation on the ground. They, therefore, raise critical concerns about the policy's ability to transform land use planning in Johannesburg, this disjuncture between policy and practice speaks not only to the rights of UA in the city but to post-apartheid urban spatial equality and so urban transformation as a whole.

4.6 Broad Urban Agriculture Practices – Experience from International case studies

One common thread from the cities of Almere, Detroit, Dar es Salaam, Havana and Portland show some diversity in the application of the principles of innovation networks and land access arrangements and farming practices (Table 4.1). The policies in these cities acknowledge the diverse interest in farming and benefits from farming.

Thus the clear lesson to Johannesburg is to accommodate diverse UA practices and their different benefits. Currently, Johannesburg has backyard gardens, community gardens, city farms and rooftop gardens. However, discussions with the city planner and SACPLAN manager, as well as the focus of the programmes by the Food Resilience Unit and GDARD show a consensus that 'real' UA should be small scale and highly productive. This idea by bureaucrats emanates from the neoliberal thinking of productivity. This mindset ignores the other social, cultural and community benefits of UA that can be seen across European, American and African UA practices (Battersby and Marshak, 2013; Matthei, 2017; Olivier and Heinecken, 2017 and Seigner et al., 2018).

Table 4-1: International experiences on marginalisation and effectiveness of innovation networks towards formalisation of UA

City	Innovation networks	Innovation in assigning land uses	Diversity in UA practices	Policies supporting UA	Marginalisation or effectiveness of innovation networks
Almere (planning innovation – neoliberal framework)	Open exhibitions or knowledge sharing workshops, research collaboration with universities	Formal zoning and incorporation of commercial peri-urban agriculture as opposed to displacement by the expanding city	Urban farmers in Almere supply the supermarkets, practice ecotourism, educate city residents	Almere Strategic Vision	Secure peri-urban agriculture through extensive stakeholder engagement
Detroit (planning innovation – neoliberal but collapsed land markets)	Collaborative platform of city departments, NPOs, university and farmers – consensus on UA as solution to shrinking city	Acknowledges the multiple forms of UA and allows different practices and access arrangements	Diverse farming practices such as temporary and permanent, backyard, community as well as commercial practices	Detroit Urban Agriculture Ordinance	Reach consensus on the role of UA in the city. Acknowledge different types of UA and access arrangements.
Berlin (planning innovation – neoliberal framework)	Open exhibitions e.g. International Garden Exhibition (IGA Berlin). Research collaboration between *Kleingarten* Association, universities and city	Formal *Kleingarten* and *gartenarbeitsschule*, temporary community garden - uses school grounds, parks and sports fields	*Kleingarten* are family owned, *gartenarbeitsschule* are owned by government, urban garden or community gardens owned by cooperatives especially youth	Bundeskleingartenesetz, unofficial Green Plan (Strategic Guideline Plan of 2005)	Diversify UA practices, national or international exhibitions, farmer's associations. Neoliberalism leads to conversion of UA land (10% of *kleingarten* every 10 years to real estate)

Portland (planning innovation – neoliberal framework)	Research collaboration city, university and NPOs	NPOs farm formal public land, Low-income residents farm temporary public land for subsistence, Entrepreneurs farm formal peri-urban areas	Non-innovating UA by low-income residence, innovating UA for small business, educational for NPOs and schools	Draft zoning codes	Diversity of UA practices, collaboration with stakeholders and advisory council for UA. Neoliberalism leads to conversion of UA land (Conversion of Reed College Garden into real estate)
Havana (planning innovation - neo-Marxist framework)	Research collaboration between government ministry, provincial department, city and research institutions	Formal large state farms for UA in peri-urban, small collectives for workers, backyards gardens	Popular gardens, basic production units, individual farms, state farms in peri-urban Havana, *organopónicos* (raised beds), hydroponics, community gardens	Department of Urban Planning and the Department of Urban Agriculture developed zoning plans for allocating land for farming and guidelines for securing tenure for UA	Strong state support, extension service, state land ownership and secure land tenure for UA, secure market and labour for UA,
Dar es Salaam (planning innovation - socialist government and neoliberal framework)	Research collaboration between government ministries, city, municipalities, universities and NPOs	Backyard gardens, rooftops and temporary open spaces in city core, formal peri-urban for small enterprises	Individual or household farmers, cooperatives, and NPOs and schools, small enterprises in peri-urban	Kinondoni, Ilala and Temeke Municipal Strategic Plans for UA, Dar es Salaam 2012 – 2032 Master Plan incorporate UA	Diversity of UA practices, collaboration with stakeholders. Neoliberalism leads to conversion of UA land (conversion of gardens established with in 1990s into real estate)

4.6.1 City of Johannesburg departmentalisation

This study is premised on the assumption that innovation networks across UA and land use planning would be supported by interdepartmental collaboration. UA innovation is promoted by the Food Resilience Unit, while planning innovation is pioneered by the Department of Development Planning. The scenario of cross-sectoral innovation demands collaboration between departments working on innovation, land use planning and UA.

However, collaboration is problematic as city departments have different plans and methods for evaluating success (though their plans are sections of the IDP). As a result, CoJ departments work in silos. During interviews, a city planner, however, elaborated that this silos structure emanates from central government and cascades down to the provincial and municipal levels (personal communication, 09 May 2017).

Findings also show that one of the problems with inter-departmental collaboration is often that 'old habits die hard'. For instance, the CoJ convenes inter-departmental meetings for specific programmes and projects such as the preparation of IDPs, but thereafter each department reverts to its old ways and methods. A city planner argued that "the city can do better in inter-departmental collaboration; however, it is difficult without many good models showing how we can do it better" (personal communication, 09 May 2017). Such departmental silo relationships confirm a broad city challenge in stakeholder participation in planning at the CoJ.

Commenting on the city departments working in silos, the SACPLAN Chief Executive Officer argues that the planning framework such as the IDPs are good planning instruments, however, what is happening on the ground is different:

> "During implementation, some city departments do not appreciate the fact that their contribution is part of this grand plan. The city departments are sector-oriented and work with their own departmental key performance indicators and legislation" (Personal communication, 01 August 2017).

The described scenario creates complexity in contemporary planning in Johannesburg. While the IDPs coordinate departments and plans during

planning, they do not have a similar coordinating effect during implementation. As a result, city departmental programmes are disjointed because of its failure to pay allegiance to the overall guiding plans of the IDPs. Furthermore, the failure to align programmes and projects with city plans further encourages city departmentalisation. The fragmented departmental plans and programmes seem to stem from disjointed departmental legislation. Remarking on city legislation, the SACPLAN Chief Executive Officer (personal communication, 01 August 2017) further argues that:

> "The South African Government had an ideal opportunity to coordinate planning and environmental legislation during the development of the Spatial Planning and Land Use Management Act (SPLUMA). However, this did not happen. This [coordination of legislation] is possible and South Africa can learn from New Zealand whose legislation combines the two [sectors]".

The above arguments call for the integration of city legislation in order to lay the foundation for departmental collaboration. Further, separate legislative provision and the departmentalisation of plans and programmes affect how city departments interpret and promote innovation.

In addition, diverse departmental practices show that the approach to innovation is viewed differently across CoJ departments. Therefore, depending on the department or section, CoJ may be regarded as very innovating or not innovating at all. The City innovation strategy is decentralised to departments. However, there should be a mechanism to coordinate these innovations across UA and land use planning. The failure of coordinating departmental innovation initiatives further deepen silos, block departmental learning culture and the cross-fertilisation of ideas. Such departmental fragmentation presents a weak institutional structure for UA that is unable to promote innovation in the sector.

4.7 Summary

This chapter presents experiences on marginalisation and innovation networks towards it formalisation from international case studies and CoJ. The Cities of Dar es Salaam and Portland show stakeholders collaborations that resulted in formalisation of UA. However, in these cities, UA is converted into real estate because it is deemed unproductivity from a neoliberal planning perspective. Again experiences from Berlin, Dar es Salaam and Johannesburg show that UA land uses that are under pressure from property development as a result, of inefficient land utilisation.

Land use planning has contributed towards the marginalisation of UA. In Berlin, through climate change and environment are mainstreamed into planning, land use planning extends no direct collaboration to UA. Dar es Salaam formalised UA, however, since the Urban Management Programme whose principles were used to produce the strategic plans was reversed into master plans, the future of the zoning remains to be evaluated.

Innovation networks are a critical lens within which to assess the opportunities for stakeholder collaboration and across the two sectors and the formalisation of UA. The theory creates a platform for stakeholder collaboration and learning across sectors. In Almere, Detroit and Havana; the principle of creating this platform resulted in formally zoning UA. Almere zoned commercial peri-urban agriculture and Detroit developed a city vision that formalisation UA creates a sustainable response to vacant plots and a shrinking economy. In Havana, upholding principles of innovation networks created consensus among stakeholders that UA would address the food security needs of city residents.

Johannesburg has supportive policies such as the NDP, SPLUMA, IDPs and SDFs that promote city sustainability and resilience, towards formalisation of UA. Besides developing a Food Resilience Strategy and a Unit on UA, no platform exists for UA and land use planning actors to reach consensus on the role of UA as in the case of Almere, Detroit, and Havana. Though contested, land use planning in Johannesburg has become more participatory since 1994 however; it has not been innovative towards the informal sector such as UA. The IDP provisions such as city departmental collaboration provide an opportunity to

create innovation networks towards formalisation of UA. However, the neoliberal planning framework that requires high productivity of UA remains a threat to its formalisation and the future of zoned urban land uses.

CHAPTER FIVE – JOHANNESBURG'S FARMING CASE STUDY FINDINGS: THE EFFECTIVENESS OF INNOVATION NETWORKS TOWARDS FORMALISATION OF URBAN AGRICULTURE

5 Introduction

While the previous chapter examined sub-question 1 on the drivers underlying the marginalisation of UA in municipal land use planning through international case studies of land use, this chapter draws on the case studies from Johannesburg to examine the opportunities for the formalisation of UA in the periphery versus inner-city farms. Based on innovation theory as defined in Chapter 2, I query the effectiveness of innovation networks as a mechanism in overcoming the decisions towards the marginalisation of UA within Johannesburg's largely neoliberal market logic. The chapter presents seven of the eleven farming case study sites comprising four innovating and three non-innovating entities (as defined by the criteria in Chapter 3). A further detailed description of these farming entities is presented in Appendices B and C.

The chapter presents non-innovating farming entities to show how they are marginalised by land use planning as a result, of their failure to develop innovation within their networks. Three non-innovating farming entities are presented in this chapter include Bambanani Food and Herb Cooperative (BFHC), Eikenhof Farm, and Wits Inala Forum. The remaining two non-innovating farming case study sites are Serapang Sa Basadi and Devine Farming which are detailed in Appendices A.3 and A.4 respectively.

The chapter also presents innovating UA entities to illustrate how innovation combined with networks can overcome marginalisation towards formalisation through land use planning. The four innovating farming case study sites are Growing Healthy Farms, Planner Bee Plant Care, Rydawi Aquaculture, and Tshwane Food and Energy Centre. These case studies are presented in this chapter in detail. The other two innovating farming entities, namely Wits Siyakhana and 3 Kotze Street Rooftop Garden, are detailed in Appendix A.1 and

A.2 respectively. However, their unique characteristics are analysed and captured in this study.

The chapter is broken down into four sections, which present the marginalisation of UA by land use planning, innovation within networks to overcome marginalisation and the power relationships, the food value chain for each of the innovating and non-innovating farming entities. The last section pulls together the key sub-findings on innovating versus non-innovating farming entities as they emerged from the case studies.

5.1 Parameters and Data Presentation for Measuring the Marginalisation of Urban Agriculture by Land use Planning and How Innovation within Networks Overcomes Such Marginalisation

The farming case study sites in Johannesburg present experiences of marginalisation by land use planning and how innovation through networks overcomes these obstacles. Innovation networks also present value chains and power relations by the different farming entities. The first section of the chapter measure UA marginalisation by conventional land use planning using parameters such as: (i) land use planning rigidity, (ii) land use planning disregarding interest groups, (iii) UA low productivity, and (iv) UA inefficient land utilisation.

The second segment of the chapter measures the effectiveness of applying innovation networks theory to existing innovating and non-innovating farms to overcome marginalisation through innovation to the stakeholder networks themselves. The assessment parameters include: (i) existence of an innovation within networks that contribute to a more supportive 'ecosystem', (ii) character of innovation within networks measured through, (a) open knowledge and technology sources such as exhibition or learning exchanges, (b) acquisition of knowledge and technology such as machinery and technology, (c) innovation collaboration the form of research and training (iii) innovation power relations, (iv) land access arrangements.

The data presented on the farming case studies as highlighted in Chapter 3 were collected through long-term participant observation and semi-structured

interviews. The value chains are presented on graphs showing the different activities at each stage of the value chain. The power relations are presented on sociograms that show each farming entity's network partners.

The eleven farming case study sites have different food value chains (see Appendix B.2). Six innovating farming entities have developed strategic networks that resulted in formal land access arrangements for their practices. The five non-innovating developed networks but they focused towards social capital. Only two out of the five farming entities have formal land access arrangements, after CoJ took a proactive strategy to promote investment among traditional farmers. All the eleven farming entities do not network directly with the CoJ department responsible for planning but through other departments. This scenario complicates the coordination of UA in the city and hence the need for interdepartmental collaboration.

5.2 Marginalisation of Urban Agriculture by Conventional Municipal Land use Planning

This section presents traditional UA entities that are non-innovating and use rudimentary farming tools and methods. This chapter applied the parameters above to assess the level marginalisation due to the lack of farming innovation. Further, questions are asked on whether these farming entities lead to a disregard other UA contributions to the city (social capital, green spaces, urban reliance practices) outlined in Chapter 2 through a rigid understanding of land use planning? As was discussed in that earlier chapter, the category of non-innovating farming practice is broad and includes recreational and business-oriented farming initiatives that do not use new or improved farming methods or marketing arrangements (Figure 5-1). However, some non-innovating farming entities have isolated cases of application of knowledge and technology, though such initiatives fall short of shaping the overall operations of the whole farm in practice. This section assesses farmer productivity by analysing the activities along the value chain, their collaborative process and network power relations.

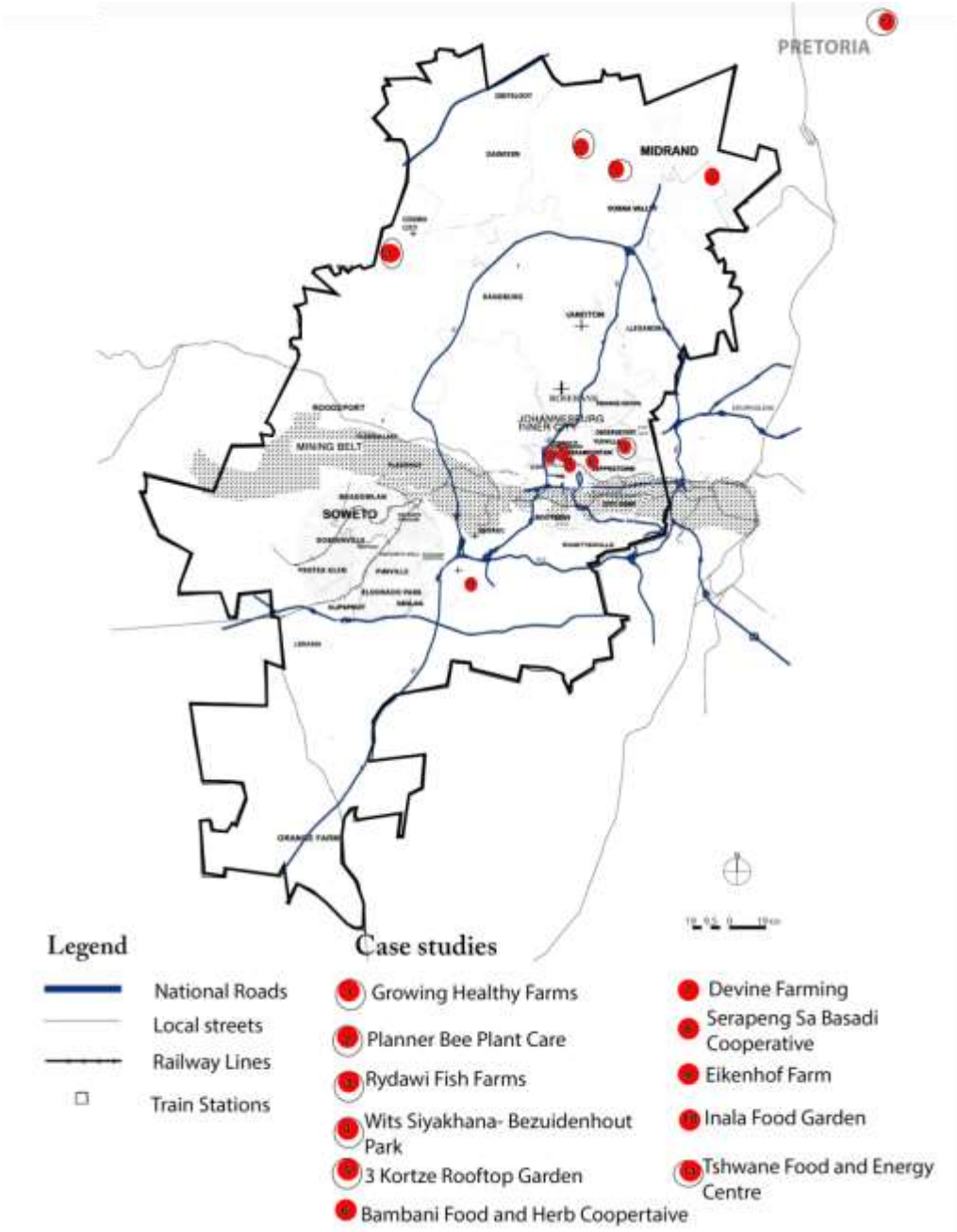

Figure 5-1: Non-innovating farming entities (with not circles), (source, adapted from City of Johannesburg, 2018)

5.2.1 Urban agriculture productivity and land utilisation

To understand the productivity and effective utilisation of land by UA entities, the study presents their value chain focusing on the inputs, the production process and marketing farm products.

- **Inputs into a non-innovating farming value chain**

The three non-innovating farming entities presented in this section have diverse inputs and use different tools and farming methods. The first farming entity is Bambanani Food and Herbal Cooperative (BFHC). The chairman explained that the cooperative employs rudimentary tools such as simple hoes and farms on the open space but mixes this method with innovative farming equipment such as tunnels, drip irrigation, cold rooms and storage facilities (personal communication, 11 November 2016). BFHC prepares inputs for its vegetable through simple compost made on site. Typical of traditional farming approaches, the compost is practised on a small-scale and is augmented by chicken droppings and organic fertiliser bought from Talborne Organics Pty Ltd. Thus BFHC combines traditional and improved farming practices.

The second farming entity is CoJ's Eikenhof Farm that has 35 farming cooperatives. Participant observations and interviews of the Chairman of the Eikenhof Farm Secondary Cooperative elaborated that the individual farming cooperative again uses simple inputs such as compost supplemented with organic fertilisers, chicken droppings, or cow manure (personal communication, 25 July 2018). Through the support from CoJ and DGARD, Eikenhof Farm acquired modern equipment and machinery such as tractors, tunnels, cold rooms and storage facilities and training rooms (*ibid*.). However, farmers also use simple digging hoes in open space. The farming cooperatives also keep some free-range chickens, goats and pigs.

The third farming entity, Wits Inala Forum is a student forum that cultivates open space gardens using rudimentary tools at Wits campus. When I interviewed the President of the Wits Inala Forum, she highlighted that the Forum makes

compost on the site and procures seeds and seedlings from fellow organic farmers (personal communication, 04 May 2017). Unlike the BFHC and Eikenhof Farm cooperatives, the Wits Inala Forum has no tunnels, or cold rooms and storage facilities. The student forum harvests vegetables and supplies the Wits Community and Citizenship Organisation directly to feed deserving students.

- **Production process for non-innovating farming entities**

Turning to production, the Chairman explained that the Bambanani Food and Herbal Cooperative members take routines to work the whole plot; this includes weeding, pruning, planting, harvesting or processing farm products (personal communication, 11 November 2016) see Figure 5-2. My observation is that since the BFHC members jointly own and work the whole garden, this disincentivises members to work; they own come late or even abscond from work.



Figure 5-2: Showing BFHC vegetable tunnels, BFHC making juice and jam, (source, adapted from CoJ, 2017).

The main project funders, CoJ and GDARD, designed Eikenhof City Farm as a resource centre that includes all farming processes such as production, processing and packaging ‘under one roof’. This was designed to transform the farming entities into small businesses. From our discussions, the Chairman of the Eikenhof Farm Secondary Cooperative reported that cooperatives use both traditional open field methods, as well as modern farming within tunnels (personal communication, 25 July 2018) see Figure 5-3.



Figure 5-3: Gardening at Eikenhof Farm showing both open space and tunnels (source, author)

The Wits Inala Forum runs a vegetable garden as a social event every Saturdays and Sundays where members work for half a day, and share lunch thereafter (President Wits Inala, personal communication, 04 May 2017) see Figure 5-4. My observations are that maintaining the garden is complex as students and Wits staff volunteers have busy programmes.



Figure 5-4: Wits Inala Forum garden at Wits West Campus Village (source, author)

A common characteristic across these three non-innovating farming entities is that they use basic inputs and use rudimentary tools and farming methods. As a result, their output is very low. From my observation, of the eleven farming entities, Wits Inala Forum garden is the least productive and utilised. The forum wants to feed about 1,000 deserving students with greens but they cannot manage (President Wits Inala, personal communication, 04 May 2017). During fieldwork, my observations were that all the vegetable beds were badly kept and showing little activity. This could be because Inala members are too busy with studies, but I would equally think that the Forum uses the garden primarily for advocacy and are therefore not worried about productivity. If Inala is not concerned about productivity, then the forum would be narrowly thinking about their impact because increased production would greatly improve their advocacy. On the other hand, when I discussed BFHC's productivity with the Director for the Rippon and Ntsele Consultancy, the organisation had conducted a benchmarking exercise showing that BFHC only utilises about 50% of their garden (personal communication, 21 November 2016).

- **Marketing and consumption for non-innovating farming entities**

BFHC received training from CoJ and GDARD and uses the agriculture hub to process jam and juice. However, agro-processing is still erratic because production is limited. BFHC did not conduct market research before production and most of its buyers are locals that buy food at farm gate (Chairman Bambanani Food and Herb Cooperative, personal communication, 11 November 2016). Though the cooperative successfully negotiated to supply vegetable to Spar Supermarket and could not meet quality standards. BFHC could not consistently meet the supermarket's quality standards (*ibid*.). Secondly, my discussion with a supermarket officer shows that the supermarket and BFHC could not agree on the price, since the cooperative charged its farm products above the Johannesburg Fresh Produce Market prices (personal communication, 11 November 2016). Secondly, the Spar Supermarket pays a relatively higher price for packaged fruit and vegetables, however, BFHC sells vegetables 'as they are', attracting lower prices from the supermarket (*ibid*.). The contradictions confirm that traditional UA cannot supply the formal economy. This finding support Malan's (2015b) study in Johannesburg where UA contributes towards the informal or semi-formal economy.

Asked by marketing farm produce, the Chairman of the Bambanani Food and Herb Cooperative responded that Izindaba Zokudla linked the cooperative to the MoneyTree Group, a marketing company that created a mobile phone platform where urban farmers meet customers (personal communication, 11 November 2016). The Founding Director, Izindaba Zokudla commented that this marketing system collapsed because of a combination of limited quantities of farm products by the cooperative and complaints about low prices paid by the company. He further argued that the idea was noble but implementation logistics should be tested and refined (personal communication, 07 April 2017). As a result, of the failure with the formal economy, BFHC sells most of its farm products to local communities at farm-gate, or deliver farm products in boxes directly to customers. The cooperative's activities along the food value chain from inputs to production and marketing are summarised in Figure 5-5.

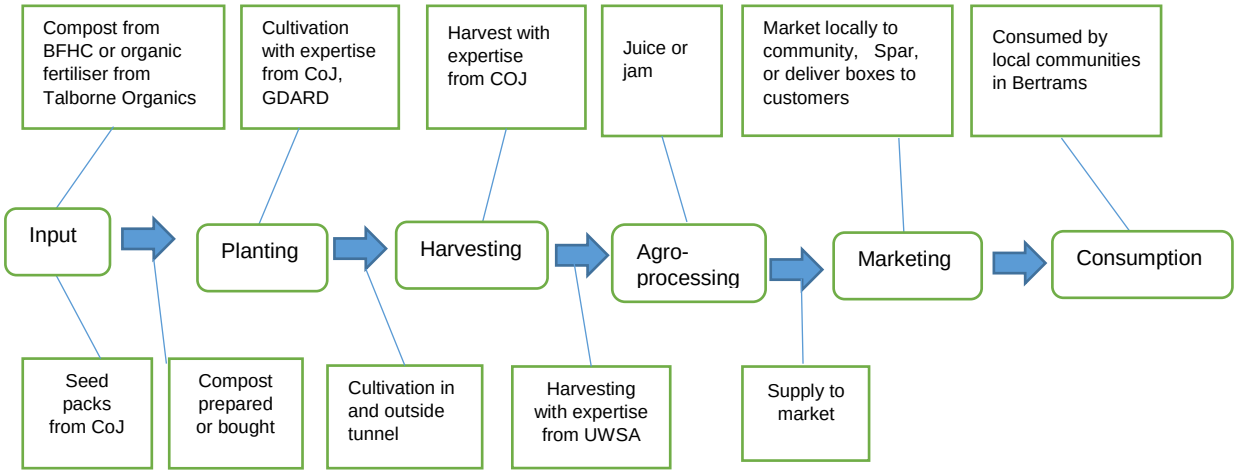

Figure 5-5: BFHC food value chain (source, author)

The 35 farming cooperatives at Eikenhof Farm received training for agro-processing from the CoJ and GDARD and use the Hub and Spoke Centre to store and sort their vegetables before delivery to the market. The farmers use cold rooms, packaging houses and sorting facilities at the Hub and Spoke Centre to grade and package the final product before delivery to the market (Chairman, personal communication, 25 July 2018). The chairman further elaborated that the 35 cooperatives produce food for consumption and sale surpluses to local communities at farm-gate, to the Johannesburg Fresh Produce Market, and supermarkets such as Boxer and Pick 'n Pay (*ibid*.). During my fieldwork, some pig farmers were negotiating to jointly supply their pigs to Colcom Foods and thus bypass intermediaries.

My observations are that besides the isolated marketing initiatives by the 35 farming cooperatives, marketing strategies for the Eikenhof Farm were disjointed. As a result, some cooperatives at Eikenhof Farm are dissatisfied with the low prices offered by the Johannesburg Fresh Produce Market, and the supermarkets. Again, these findings support mainstream literature that UA offers an alternative food system to the formal economy (Malan, 2015b). Similar to other parallel economies such as informal transport, non-innovating farming entities are often misunderstood by municipal authorities and governments as their benefits are undocumented by the formal economy. However, Battersby and Marshak (2013) argue that UA also contributes towards non-quantifiable social

and community benefits. Commenting on UA benefits, the Chairman Eikenhof Farm Secondary Cooperative elaborated that the cooperatives provide a social platform to meet and share experiences with likeminded people (personal communication, 25 July 2018). For instance, he explained that though cooperative members take turns to work in the garden, however, some members come to the garden every day because this has become like home when you meet friends (*ibid*.). However, during my long term participant observations, I encountered many disputes and weak group cohesion as opposed to mutual working relationships among cooperatives at Eikenhof Farm. The disputes even affected the morale and the mobilisation of labour to work in the gardens. The summary of activities of the Eikenhof Farm cooperatives along the value chain is presented in Figure 5-6.

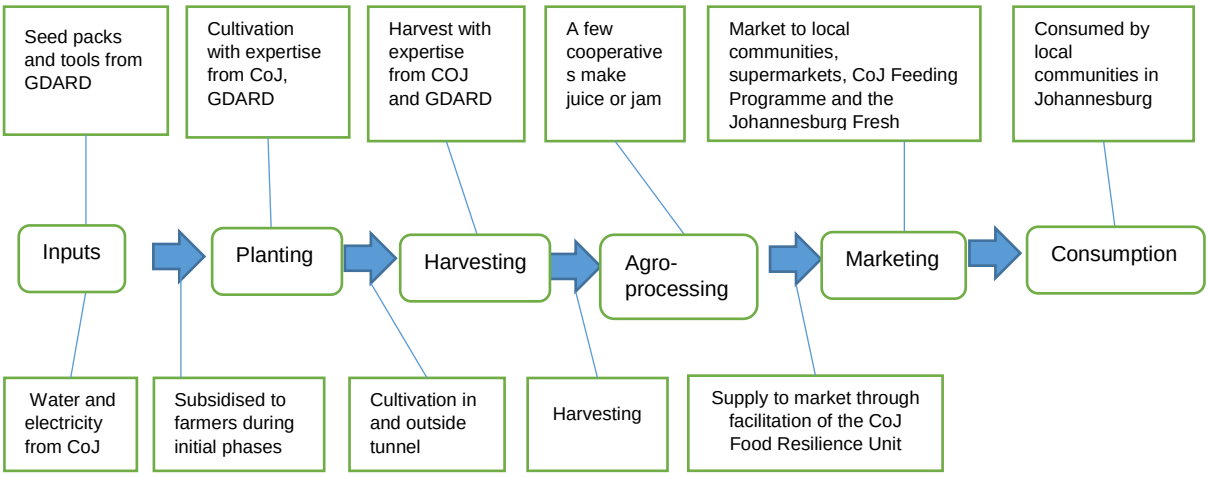

Figure 5-6: Eikenhof Farm food value chain (source, author)

The Wits Inala Forum produces vegetables solely for supplementing the Wits Community and Citizenship Organisation food bank (President Wits Inala, personal communication, 04 May 2017). I observed that the Wits workers and Inala Forum members freely take some of the vegetables home. The Forum uses Facebook and Twitter to mobilise membership and fundraise for its gardening and food sovereignty campaigns, rather than market its products or improve farming practice (*ibid*.). The activities for the forum in the value chain are presented on Figure 5-7.

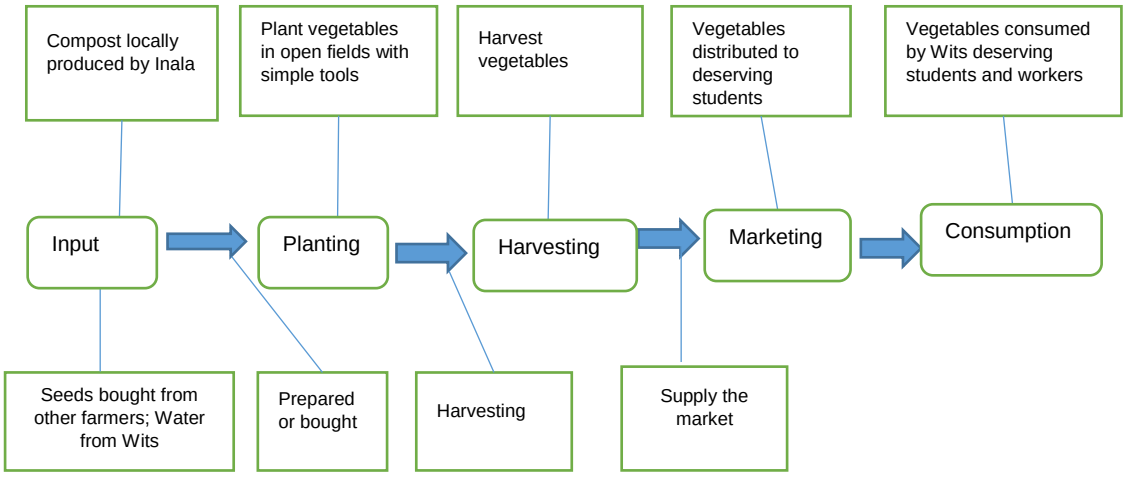

Figure 5-7: Wits Inala Forum food value chain (source, author)

5.2.2 Non-innovating farming entity food value chain

Findings from the marketing activities of the three farming entities show that non-innovating farming entities supply clients primarily in the short value chains. Bambanani Food and Herb Cooperative has short and intermediate value chains and supplies farm products to the local community in Bertrams at farm-gate and occasionally a Spar Supermarket (Chairman Bambanani Food and Herb Cooperative, personal communication, 11 November 2016). My observations are that agro-processing is still in its infancy, and the cooperative processes jam and juice only sporadically. Poor productivity affects the availability of farm products for processing.

Similarly, the farming cooperatives at Eikenhof Farm have both short and intermediate value chains. The cooperatives sell vegetable and small livestock to local communities at farm-gate. Some cooperatives, however, supply the Johannesburg Fresh Produce Market and supermarkets in the city. The city farm also has cold rooms and agri-hubs for agri-processing and value-addition through processing juice and jam, grading and packaging farm produce. During my fieldwork, only a few cooperatives were processing their farm produce.

The Wits Inala Forum has the shortest food value chain among all the farming case study sites. The Forum grows vegetables at Wits University and feeds

deserving students on the same campus, though some Wits workers and students take vegetables home for consumption. Asked whether Inala envisages processing farm products, the President of the Wits Inala Forum argued that the Forum do not need any semi-processing or packaging associated with marketing, and delivery to the market since they hand over the vegetables directly to the consumer without intermediaries (personal communication, 04 May 2017). The Wits Inala Forum also teaches fellow students about healthy eating, and growing food. In April 2018 they launched an awareness campaign on food sovereignty and climate justice on the Wits Campus (Mabena, 2018). The findings demonstrate that all non-innovating farming entities have a short value chain and only a few have an intermediate value chain. The value chain is, however, undocumented, again contributing towards the contentious issue of UA's quantifiable benefits.

5.2.3 Lack of an innovation network platform for UA and land use planning actors

This section assesses the failure by non-innovating farming entities to establish collaborations towards the formalisation of their farming practices in land use planning. I would begin by highlighting that while the three farming entities are predominantly non-innovative, they also engage in some networks with other stakeholders. Some cooperatives engage in networks towards promoting innovation, though some are for social capital. For instance, Bambanani Food and Herb Cooperative and Eikenhof Farm are collaborating with the CoJ, GDARD and UWSA through training towards promoting formalising land agreements, and investment in irrigation infrastructure. The Chairman for BFHC confirmed the findings that his cooperative employs rudimentary farming methods and tools. He observed that "BFHC combines subsistence and innovating farming practices in its operations and grows crops in four tunnels but also in the open fields using traditional farming tools" (personal communication, 11 November 2016). The BFHC utilises the following networks: (i) Open knowledge and technology sources to collaborate with customers and stakeholders through exhibitions, for instance, the Arbor Day Celebration in 2016 where farmers showcased their work to city stakeholders (Chairman personal communication,

11 November 2016). I observed that BFHC used the exhibition to secure the market for its farm products though the cooperative failed to deliver the products. (ii) Acquisition of machinery and equipment through the grant from GDARD the CoJ. The BFHC acquired tunnels, drip irrigation kits, a computer, and a cold room. Unfortunately, during the fieldwork, the cooperative did not fully utilise the equipment because of limited expertise. (iii) Innovation collaboration with GDARD towards training in permaculture, drip irrigation and hydroponics. The cooperative also received training on agro-processing from the CoJ and the development of a business plan from UWSA. One key stakeholder, on condition of anonymity, lamented that BFHC was a 'donor darling' that received gifts from too many stakeholders because of its central location within the inner city. I would agree with the above argument and further comment that the cooperative failed to transform itself despite the assistance received.

Similar to BFHC, the cooperative at Eikenhof Farm combines innovative and rudimentary farming practices. Many of the networks by the farmers are predominantly for social capital. Some of their networks have been used to share information on solving disputes, securing jobs outside the farming business or securing advice on college degrees for their children (Chairman Eikenhof Farm Secondary Cooperative, personal communication, 25 July 2018). The farming cooperatives at Eikenhof Farm have the following networks: (i) Open knowledge and technology sources through collaborations with the CoJ and GDARD. Farmers organise exhibitions to showcase their products and best practices. However, these networks have not improved their farming methods. (ii) Acquisition of knowledge and technology, with funding from the CoJ and GDARD the Eikenhof Farm cooperatives, acquired irrigation and agriculture equipment and built agriculture hubs. During fieldwork, it was evident that most of the equipment and facilities at the farm were underutilised. (iii) Innovation collaboration where the CoJ and GDARD organise training on farming methods, soil management and business skills. Again the training on farming methods and business skills have not transformed the operations of the farm.

Similar to the BFHC, the collaboration platforms at Eikenhof Farm are spearheaded by the City and GDARD. Such interventions follow a top-down development paradigm which makes farming entities passive adopters of technologies and equipment and thus goes against the principles of innovation

networks where members make active contributions to the network. A GDARD officer supporting the Eikenhof Farm was frustrated that some farming cooperatives lacked a sense of ownership and needed to be motivated to work their garden.

The Wits Inala Forum is a unique case study. The forum cultivates the garden using basic farming methods and tools. However, the Forum developed innovative approaches towards lobbying and advocating for food sovereignty. Thus the Wits Inala Forum combines traditional farming practice with modern advocacy methods. Its networks are: (i) Open knowledge and technology sources, where Inala organises seminars, debates, and attend farmer workshops to promote food sovereignty and learn from similar-minded organisations. Inala uses Facebook and Twitter to mobilise support and promote awareness of its project, seminars and workshops. (ii) Acquisition of knowledge and technology, where – Inala uses basic farming tools for its garden at the Wits West Campus Village. (iii) Innovation cooperation, where the Forum collaborates with organisations such as WCCO to promote food sovereignty and feed deserving students.

These three farming entities show a common thread. They have networks that do not lead to innovation but rather emphasises on building social capital. Some of the farming entities have the potential to innovate but are blocked my limited expertise. Secondly, as outlined in Chapter 4, these networks do not involve the CoJ Department of Development Planning that is responsible for land use planning and thus fails to contribute towards the formalisation of UA through land use planning.

5.2.4 Non-innovating farming entity network power relations

The networks for these three farming entities do not result in innovation or formal land use zoning for UA, but they certainly create power relations. As a result, of its prime location in the inner city, the availability of water and equipment, the Bambanani Food and Herbal Cooperative collaborates with many stakeholders. They include the CoJ, Rippon and Ntsele Consultancy, GDARD, UWSA, private companies and the Johannesburg Cricket Club. These collaborations provide

inputs, manage review meetings and exhibitions, access to equipment, training, and organise research and secure a formal land access agreement with Johannesburg Property Company (see Figure 5-8). The key actors are highlighted through thick lines. Within this network, the CoJ, GDARD and UWSA influence over BFHC because of the resources they bring to the network.

However, assemblages broaden the concept of network relationships to include the actor's history of engagement, and experiences with other partners (McFarlane, 2009; 2011). When analysed from the concept of assemblages, BHFC is one of the most empowered farming case study sites. The cooperative increased awareness from training sessions, seminars and stakeholder engagement by the City, NPOs, the private sector, and research and training institutions. For instance, I observed that before to one farming exhibition in 2016, BFHC conducted background checks of key stakeholders attending the exhibition. As a result, the cooperative secured support from one private company that was impressed by their level of engagement and knowledge. Additionally, the reason behind BFHC's survival since its formation in 2006 when many such cooperatives have collapsed is attributed to these networks.

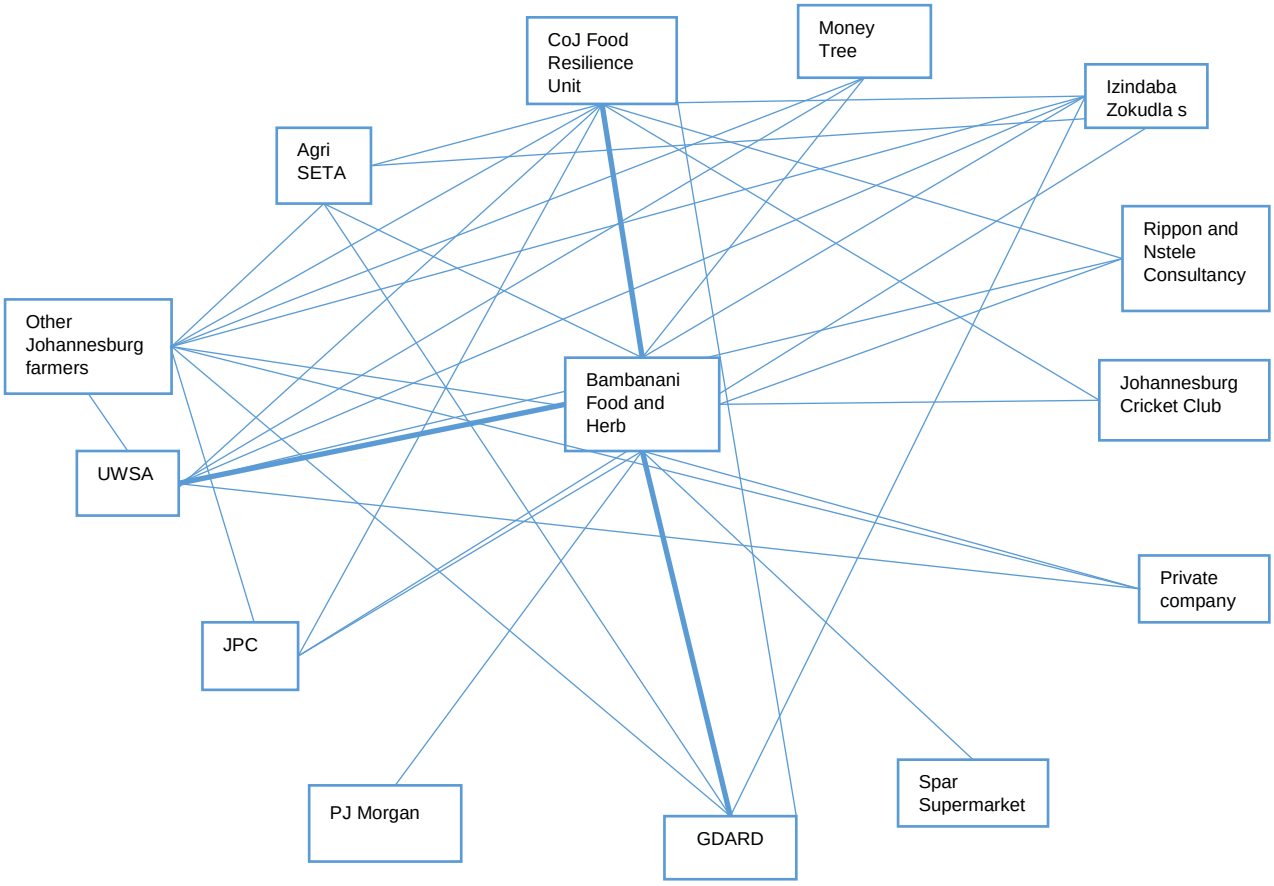

Figure 5-8: Bambanani Food and Herb Cooperative sociogram (source, author)

Similarly, the CoJ and GDARD are the key actors (among nine stakeholders) in the Eikenhof Farm network. The CoJ supplies land, water and equipment, while GDARD provides equipment and training. Other partners include the Agriculture Research Council, and United Way South Africa, which also provide training. The Agricultural Sector Education Training Authority (AgriSETA) partners unemployed youths with farmers to learn farming skills as interns. The Izindaba Zokudla, through the Farmer School, provides a platform for its farmers at Eikenhof Farm to share experiences and best practices (Figure 5-9).

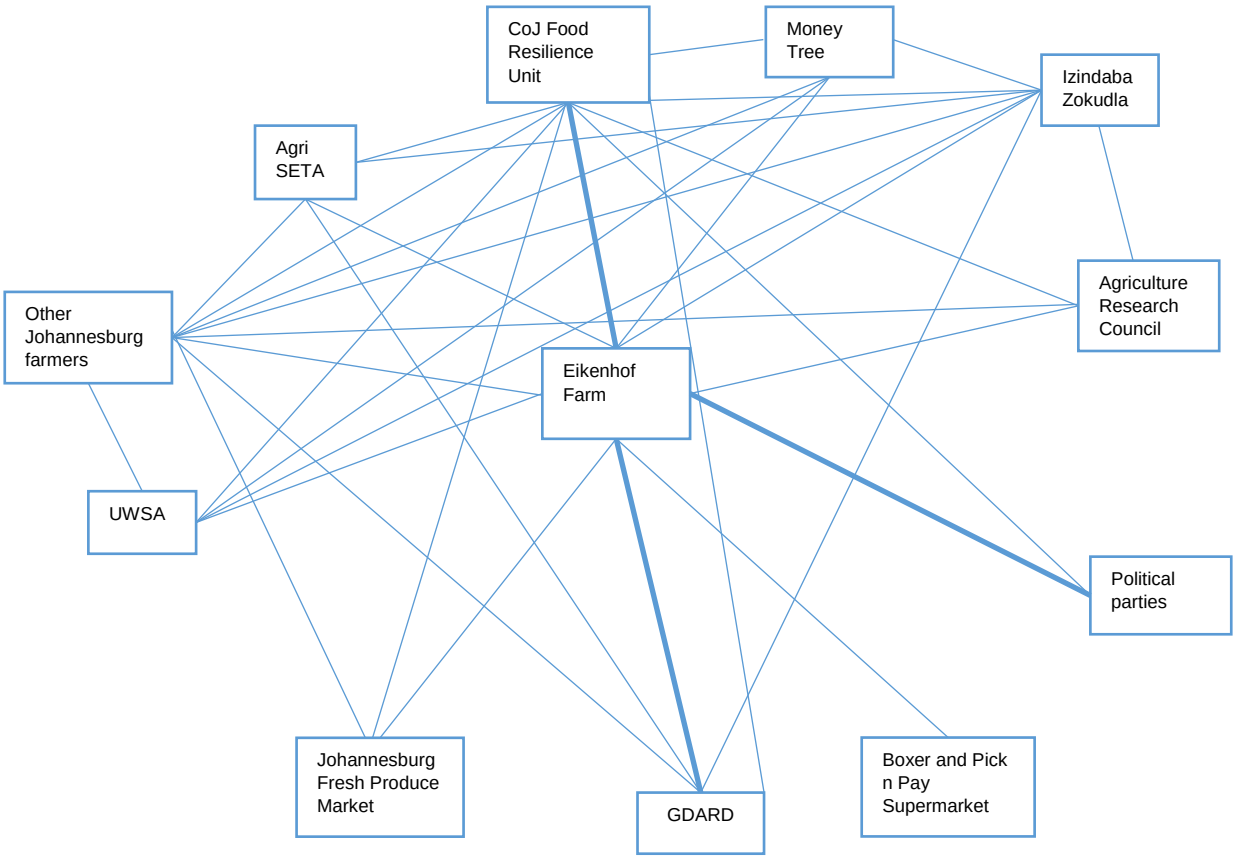

Figure 5-9: Eikenhof Farm sociogram (source, author)

In relation to Eikenhof Farm, it must be noted that politics plays an influential role in UA in Johannesburg. Here, I have noted a point of power interface between individual farmers and political parties in general. For example, during the selection of pilot farmers at Eikenhof Farm some cooperatives affiliated themselves with the ruling African National Congress (ANC). They hence secured some political mileage in their dialogue with the city and GDARD. This political manoeuvring translated into access to resources such as land allocation, investment, and equipment for political party members. The scenario complicated the CoJ's response to the UA project when the Democratic Alliance (DA) took over control of the City of Johannesburg after municipal elections in 2017. To support the above augment, a GDARD officer observed that

> "Politics at the municipal level is crippling the Eikenhof Farm project; some actors feel the criteria for choosing farmers were not strictly followed. The original project design targeted a few emerging farmers.

However, the Eikenhof Farm currently has hundreds of farmers who forced themselves on the project through their political affiliations" (personal communication, 2 May 2017).

The Wits Inala Forum networks with COPAC to lobby Wits University and the government on food sovereignty, and climate change initiatives (Figure 5.10). Inala also secured funding from 350 Africa.org and the World Wide Fund for Nature for its activities, and Wits offered land for gardening. Inala is a rights-based organisation which seriously safeguards its network power relationships. For instance, the Forum partnered with CoJ to start an orchard on the Wits Braamfontein Campus but the project could not proceed. Commenting on this Inala – CoJ relationship in the project, the Inala 2017 President was categorical that "as a grassroots forum we had a problem with CoJ red tape. We worked with Jozi farmers who donated 12 apple trees for establishing an orchard on campus". However, we fought over publicity and kicked the city out of the project" (personal communication, 04 May 2017). The Inala Forum experience gives another layer of understanding to power relationships arising from assemblages. The Wits Inala Forum's level of awareness empowered it to confront the CoJ when it felt it was being overshadowed in the project, even though it was a recipient of resources from the City.

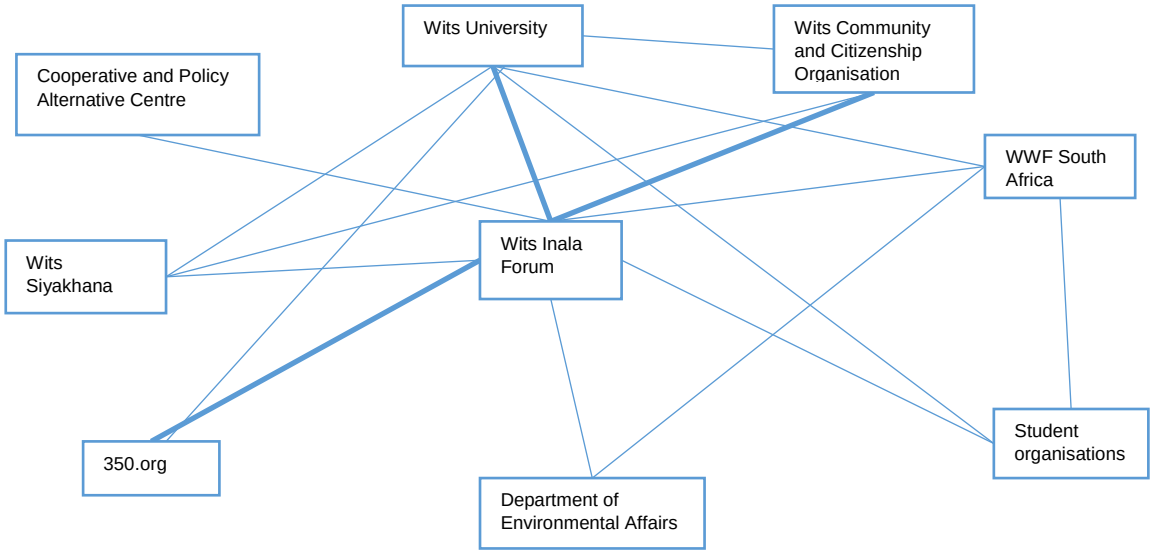

Figure 5-10: The Wits Inala Forum Sociogram (source, author)

5.2.5 Nature of land access for the non-innovating farming entities

This section presents land access arrangements for traditional farming entities such as Bambanani Food and Herb Cooperative, Eikenhof Farm and Wits Inala Forum. The key point to note is that they all have different land access agreements with their respective landowners. Bambanani Food and Herb Cooperative, and Eikenhof Farm's 35 cooperatives have formal lease agreements with the City of Johannesburg. As a result, of these lease agreements, the farmers were able to mobilise funding to promote innovation through the city, NPOs and the private sector. However, Wits Inala Forum, Devine Farming and Serapang Sa Basadi Cooperative have informal land access arrangement with the University of Witwatersrand, the church and an NPO respectively. Consequently, the Inala, Devine Farming and Serapang failed to mobilise investment related-funding for their gardens. Inala even struggles to secure funds from the Student Representative Council which funds all formally registered student organisations at Wits. Therefore, only two out of the three non-innovative farming entities have formal land access agreements and were able to mobilise investment for their operations. Additionally, all the traditional farming

entities failed to innovate due to lack of technical skills, the inability to develop strategic networks with stakeholders, and the cooperative farming model that discourages members from dedicated work in the gardens.

5.3 The Effectiveness of Innovation within Networks in Overcoming the Marginalisation of Urban Agriculture in Land Use Planning

This section presents levels of productivity of farming entities within the food value chain, and whether these levels shift power relationships and therefore land access arrangements for innovating farming case study sites. Critically the chapter assesses innovating farming entities in Johannesburg how this impacts on land use planning. They have short, intermediate and long (national and international) food value chains. They supply farm products to surrounding communities, restaurants and food markets in Johannesburg, and some to the whole of South Africa, or the Southern Africa Region. The food value chains for innovating farming entities are:

5.3.1 Urban agriculture productivity and land utilisation

This section presents the inputs, production and marketing activities of farming entities to assess their level of productivity and land utilisation.

- **Inputs into the innovating farming entity food value chain**

The six innovating farming entities (two in the appendix) have diverse inputs into their value chain (Figure 5-11). Explaining the design of the farm, the Managing Director of Growing Healthy Farms pointed that it is divided into sections, which include a nursery that grows seedlings, a farming hub for storage of equipment, grading and sorting farm products before delivering to the market (personal communication, 16 March 2017). Based on the principle of soil conservation, the

farm makes manure from a fish pond, a duck dam and chickens (*ibid*.). Also, the NPO practices vermiculture and developed an elaborate composting process that produces compost for the whole farm.

Another innovating farming entity, Planner Bee Plant Care restores soil nutrients by producing organic fertiliser. The raw material for Planner Bee Plant Care is cow dung that is collected from organic farmers around Johannesburg. According to interviews with the Managing Director, the cow dung is broken down on-site and processed into *Fertilis,* using vermiculture - a process where worm castings breakdown organic waste (personal communication, 02 March 2017). The cow dung is covered in black plastic sheeting during decomposition to maintain the required temperature.

The Rydawi Aquaculture Managing Director pointed out that he imports the fish generics from the Netherlands which are transferred into the Farm-in-a-box system after three months from hatching and weighing around 20 grams each (personal communication, 23 March 2017). Besides producing fish at its farm in Muldersdrift, Rydawi Aquaculture sells the fingerlings together with the Farm-in-a-box to small-scale farmers and offers them backup training. Rydawi Aquaculture organises training and facilitates the selling of fish keeping equipment as part of the sales package to small-scale farmers since most of them have rudimentary knowledge about fish farming.

The last innovative farming entity is the Tshwane Food and Energy Centre, which according to the Chairman, procures seed packs, poultry feeds, veterinary medicines and day-old chickens in bulk as inputs, and distributes them among its 25 members (personal communication, 08 March 2017). Through bulk purchases, the cooperative enjoys discounts and secures transport delivery for inputs. The initial inputs for the cooperative were funded by the City of Tshwane for the inception phase of the project. A common attribute for all the four innovating farming entities is that they have new or improved inputs as defined according to the UA definition of modern farming inputs in Johannesburg (in Chapter 3).

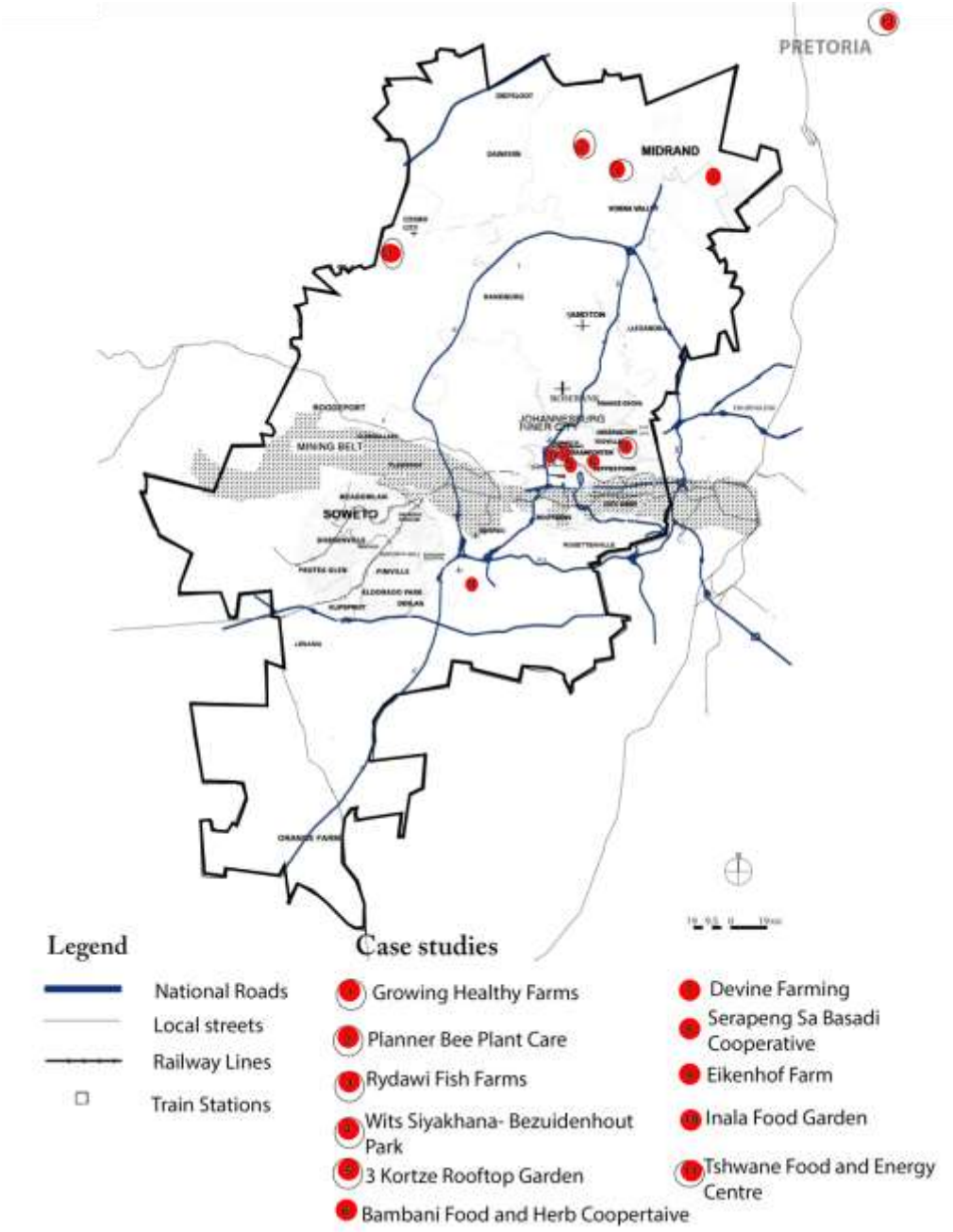

Figure 5-11: Innovating farming entities (circled), (source, adapted from City of Johannesburg, 2018)

- **The production stage of the innovating farming value chain**

Growing Healthy Farms operates an organic produce farm based on permaculture principles with minimal land tillage. Since Kyalami is relatively dry the Managing Director designed a system of interlocking swales that harvest runoff from adjacent properties to replenish the water table (personal communication, 16 March 2017). Through this water harvesting technology, Growing Healthy Farms has sufficient water for the whole year and uses seasonal variations to grow different crops. The farm grows a variety of leaf and root vegetables (*ibid*.). Vegetables are grown on the crest of swales during the rainy season and in the trough after the rainy season (Figure 5-12). Towards the dry season, the farm is irrigated through a system of drip irrigation with water pumped from the duck dam or wells. The Managing Director encourages chickens and ducks to roam freely as 'live tractors' that scratch and loosen the soil (personal communication, 16 March 2017).



Figure 5-12: showing a tour of Growing Healthy Farms, vegetables on the farm, packaging farm products for delivery to the market, (source Growing Healthy Farms, April 2017)

The second innovating farming entity, Planner Bee Plant Care, produces *Fertilis* by converting cow dung into useful organic fertiliser (Managing Director, personal communication, 02 March 2017). During the production process, the cow dung is dried, broken down into small pieces, sieved, and covered in black plastic sheeting in small heaps to keep the temperature favourable for the earthworms (Figure 5-13). The cow dung is repeatedly turned to quicken the decomposition process. This innovation produces an odourless and non-clumping organic fertiliser.



Figure 5-13: Showing the breaking down cow dung to make *Fertilis*, packed *Fertilis* ready for delivery to market, and water heating using compost (source, author)

The third innovating farming entity is Rydawi Aquaculture. The Managing Director explained that to produce fish, one production system can start from a small-scale practice in a tunnel of about 40 x 10m that houses 15 *Farm-in-a-box* systems (personal communication, 23 March 2017). The system requires 10 000 litres of water, and from such a system a farmer can harvest 500 fish per month on this 400m^2 piece of land (*ibid*.) see Figure 5-14.



Figure 5-14: Showing Rydawi Aquaculture fingerlings, mature fish in *Farm-in-a-box* ready for harvesting, Rydawi training programme (source, Rydawi, 2017)

The fourth innovative farming entity is Tshwane Food and Energy Centre where each member of the cooperative has a section for intensive poultry production, and tunnels for vegetable production. The cooperative members buy seedlings from one cooperative member who uses a single tunnel primarily for seedling production till their gardens and manages their fowl runs independently (Figure 5-15). After harvesting, all cooperative members share the cooperative cold rooms used for sorting and dressing chickens, packaging, and storage for vegetables before delivery to the market. Similar to cooperatives in Johannesburg and South Africa in general, the Tshwane Food and Energy Centre has group cohesion problems. For example, some members do not cultivate their plots during the agreed time, thus negatively affecting the time for harvesting, and delivery to the market.



Figure 5-15: Showing storage for poultry feeds, the nursery, a vegetable tunnel, and a fowl-run (source, author)

- **Marketing and consumption for the innovating farming value chain**

According to the Managing Director of Growing Healthy Farms, he recently undertook market research from November 2016 to February 2017 (personal communication, 16 March 2017). The research guided the NPO to secure a market for its fruit and vegetables with Jackson's Real Food Market, the Bryanston Organic and Natural Market and the Riversand Incubation Hub, and the surrounding communities (*ibid*.). The three restaurants are certified organic restaurants and they buy everything produced on the farm. The NPO's relationship with Jackson's Real Food Market, Bryanston Organic and Natural Market, and the Riversand Incubation Hub creates De Man's (2004) vertical supply marketing network. The farm uses open information and knowledge innovation networks sources such as the Facebook page and website for advertising products to clients and stakeholders such as. The activities of

Growing Healthy Farm's food value chain from inputs, production, and marketing are summarised in Figure 5-16 below.

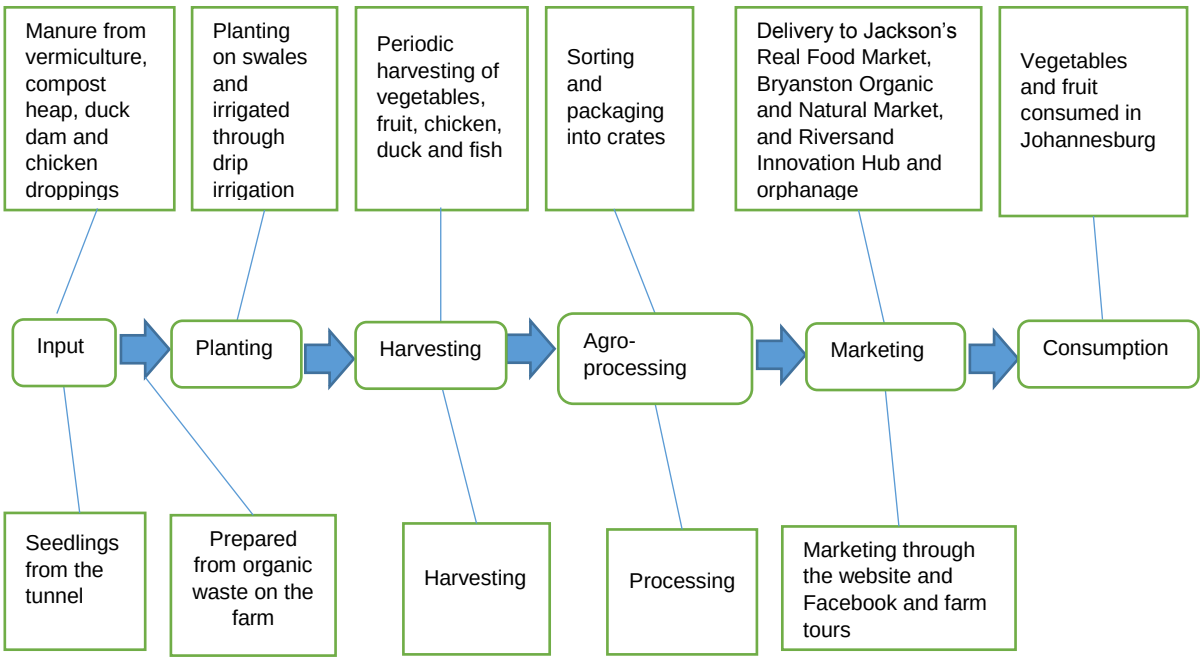

Figure 5-16 Growing Healthy Farms food value-chain (source, author)

The final product for Planner Bee Plant Care, explains the Managing Director is *Fertilis*, which is sieved and packaged in three dry matter (dm) measurements of 15dm, 30dm and 60dm, and sold to customers (personal communication, 02 March 2017). According to the Director, *Fertilis* is a weed-free organic fertiliser that is registered and certified by the Department of Agriculture and is applied to vegetables and plants in gardens, lawns, crop farming and comfortably in flowerbeds in the homes because it is odourless (*ibid*.). Planner Bee Plant Care creatively markets *Fertilis* and *Earth Buddies* to the whole country using open information and knowledge innovation networks sources such as its website, and Facebook page. The company also sells fertiliser through Talborne Organics Pty Ltd, which has distributors and stockists countrywide. Recently, the company exported a sample of *Fertilis* to the Middle East and is assessing opportunities to expand to this market (*ibid*.). Planner Bee Plant Care is one of the unique farming case study sites with a local (short), citywide (intermediate), national and international markets (long food value chains). The company's food value chain activities such as input, production and marketing are shown in Figure 5-17.

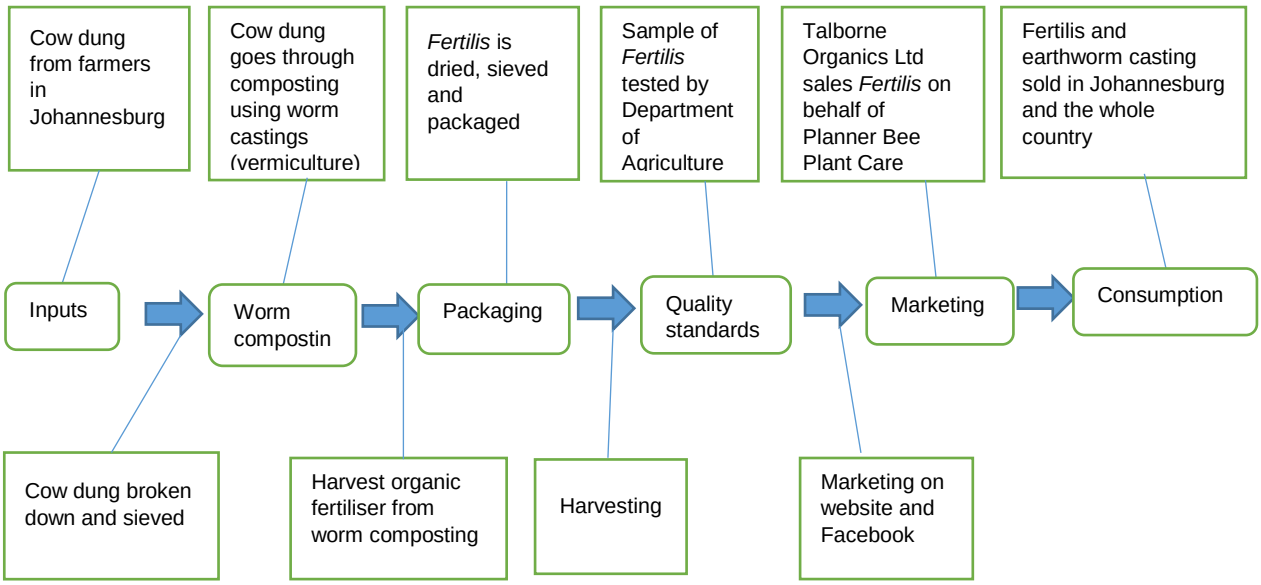

Figure 5-17: Planner Bee Plant Care food value chain (source, author)

Explaining the demand for fish for Rydawi, the Managing Director argued that though South Africans do not eat much fish by world standards, the demand for fish still outweighs the supply (personal communication, 23 March 2017). In response to this demand, Rydawi Aquaculture markets fish and its *Farm-in-a-box*[es] in Johannesburg, the whole of South Africa and Southern Africa. The *tilapia* fingerlings take about four to six months to grow from 20 grams to a marketable size of 150 - 350 grams (*ibid*.). Most supermarkets and food stores in Johannesburg accept fish from Rydawi Aquaculture. Small-scale farmers buy fingerlings, grow them and sell directly to consumers or through Rydawi Aquaculture, which has an established market. The company's input, production, and marketing activities along the value chain are summarised in Figure 5.18. The unique innovations by Rydawi Aquaculture are it's fish keeping equipment and training programmes for emerging fish farmers.

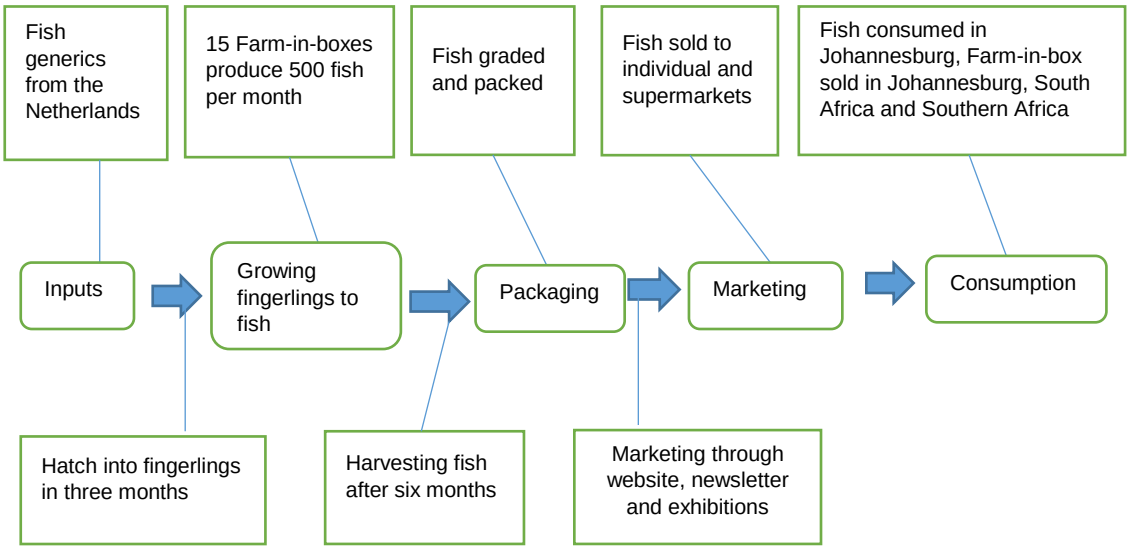

Figure 5-18: Rydawi Aquaculture food value chain (source, author)

The Tshwane Food and Energy Centre markets all its vegetables and chicken produce jointly for all its 25 farmers. The cooperative then deducts the inputs advanced to members at the beginning of the season before paying them their net income (Chairman, personal communication, 08 March 2018). The current market for the cooperative is limited and members take turns to produce limited quantities that can be sold to the local market. However, the profitability of the centre could not be ascertained as the project is relatively new (it was established in April 2016). The innovative farming practices include the use of tunnels for vegetable production, intensive poultry production as well as the packaging of vegetables, and poultry products. The summary of activities of the value chain is shown in Figure 5-19.

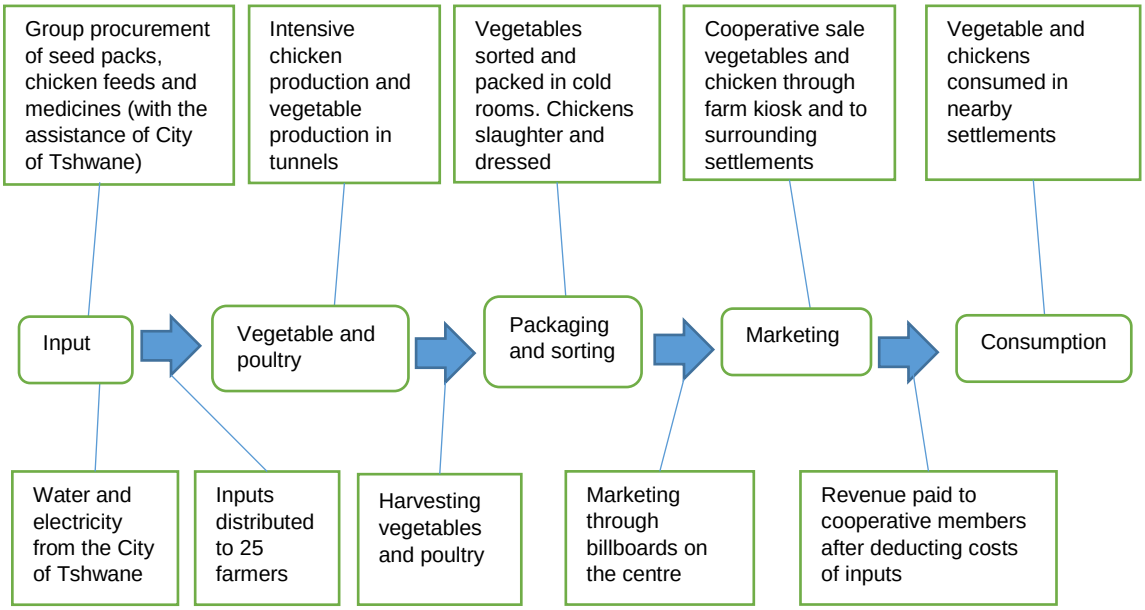

Figure 5-19: Tshwane Food and Energy Centre food value chain (source, author)

The four farming entities have improved inputs, production and marketing methods. They also diversify their farming activities. Unlike traditional farming entities, they have to increase productivity and competitiveness throughout the value chain. Some of these farming entities such as Planner Bee Plant Care and Rydawi Aquaculture can pay for land rent. The networks developed to promote innovation have been instrumental in ensuring that the farming entity meets industrial standards which are central to making the farming practice formal.

5.3.2 Innovating farming entity value chain

Findings from the four farming entities show that they predominantly supply clients in short and intermediate value chains. Growing Health Farms has a short food value chain and sells vegetables, chickens and ducks to local communities in the Kyalami area. Further, the farming entity has an intermediate food chain and supplies vegetables to orphanages and organic food markets in Johannesburg outside Kyalami. Growing Healthy Farms diversifies its farming activities by growing vegetables, fruit, keeping chickens and ducks, and additionally organises tours on UA that attract residents of the greater

Johannesburg area (Managing Director, personal communication, 16 March 2017). On the tour, the Managing Director lectures to residents on the farm's unique design, the use of herbs, environmentally friendly pest control, permaculture principles, composting, water conservation, and organic waste recycling (*ibid*.). Growing Healthy Farms developed a short and intermediate value chain, packages and sell vegetables and fruit to local community and organic restaurants across Johannesburg. The farm, therefore, packages and labels its products for the formal economy.

Planner Bee Plant Care sells its farm products on the short, intermediate and long food value chains. Through the short value chain, the company sells *Fertilis*, *Earth buddies* and chickens to local communities at farm-gate. Additionally, through the intermediate value chain, they market fertiliser and vermiculture equipment within the whole of Johannesburg. The company's long value chain markets its products to the whole of South Africa (Planner Bee Plant Care, 2017). The company also offers training on composting, soil science, gardening, landscaping, permaculture design, soil and environmental rehabilitation to small-scale farmers in collaboration with NPOs within and outside Johannesburg. The training activities are often closely related to and promote the use of organic fertiliser. Responding the UA productivity, the Managing Director, Planner Bee Plant Care argues that urban farmers:

> "Need to pay rates and taxes and should, therefore, generate a certain level of income. However, many small-scale farmers are not able to sustain their businesses. I supplement what I buy from the supermarket by the food I produce on the property such as vegetables, eggs, chicken and fish" (personal communication, 02 March 2017).

To this end, with her awareness of the need for diversifying revenue sources, she designed an innovative water-heating system where water pipes from her geyser go through a compost heap to heat her household water. This technology enabled her to save about R1 000 on her monthly electricity bills (*ibid.*). This case study shows that farming innovation can improve products, as well as reduce running costs.

Similar to Planner Bee Plant Care, Rydawi Aquaculture engages in short, intermediate and long food value chains. Through the short and intermediate

food value chains, the company sells fish at the farm gate. The company also sells *Farm-in-a-box* product and offers training on aquaculture in Muldersdrift, and to the whole city. The training and mentorship programme for small-scale farmers is offered on-site in Muldersdrift, or at premises of the farming groups. Rydawi Aquaculture has a long food value chain where it markets the *Farm-in-a-box* system and it offers aquaculture training across sub-Saharan Africa. To date, "Rydawi Aquaculture exported 98 *Farm-in-a-box* systems to the Democratic Republic of Congo, Malawi, Zimbabwe, Tanzania, Burundi, Nigeria, Angola and Kenya; and sold over 40 systems in South Africa" (Rydawi Aquaculture, 2017). I would argue that the intermediate and long value chains of Growing Healthy Farms, Planner Bee Plant Care and Rydawi Aquaculture feed into the formal market that requires the semi-processing and packaging of products.

Tshwane Food and Energy Centre has a short food value chain and markets vegetables and chickens at farm-gate to Rethabiseng Township, Ekandustria Estates, and the surrounding neighbourhoods. The cooperative diversifies its farming activities through the cultivation of vegetables such as cabbage, kale and chomolia, with keeping chickens. Tshwane Food and Energy Centre innovate through a concept of energy-saving, where individual members have solar PV installations on their houses and the whole cooperative has a biogas digester for electricity generation to offset energy costs.

What is emerging from the four innovating farming entities is that they sell their farm products at farm-gate to local communities, to city restaurants and some to the rest of South Africa. As such they market through the formal economy which entails activities such as advertising, signing offtake agreements with buyers and packaging.

5.3.3 Innovating farming entity innovation collaborative platform

The four farming entities are part of an innovation collaboration platform that includes different UA stakeholders. The key networks to Growing Healthy Farms' innovations are: (i) Open knowledge and technology sources – Growing Healthy Farms keeps an active Facebook page. The Managing Director experiments with many ideas to improve the soil, and farming methods. His Facebook page

captures his lifelong learning experience and reads: ‘studies organic gardening at the University of Life’ (Growing Healthy Farms, 2017). (ii) Acquisition of knowledge and technology – the farm acquired different types of equipment, such as tunnels for growing seedlings, vermiculture equipment for composting, drip kits for irrigation, and moisture detecting equipment, (iii) Innovation collaboration - the NPO collaborated with a private consultancy that designed the farm. The farmer also trains emerging farmers on natural farming methods such as permaculture practices. The Managing Director conducts training on soil management and conservation to emerging farmers for a workshop in collaboration with NPOs such as UWSA and the CoJ.

Planner Bee Plant Care developed a novel approach that makes organic fertiliser from ordinary cow dung by using worm castings. *Fertilis* meets the South African organic fertiliser standards. Planner Bee Plant Care innovates through different networks: (i) Open knowledge and technology sources – The company has a website that details its work, as well as interacts with stakeholders and customers for comments and suggestions. The Managing Director participated in UA seminars and exhibitions organised by Izindaba Zokudla, that discusses farming experience, and best practices (personal communication, 02 March 2017), (ii) Acquisition of knowledge and technology – Planner Bee Plant Care tailor-makes worm castings equipment from Johannesburg, called *Earth Buddie*s, (iii) Innovation collaboration – In addition to collaboration with Izindaba Zokudla, the Managing Director of Planner Bee Plant Care participated in the metropolitan agriculture study in the 1990s organised by the University of Amsterdam in the six cities of Johannesburg, Sao Paulo, London, Chennai, Amsterdam and Detroit (personal communication, 02 March 2017). An important result of the six-city study was a better understanding of UA among city administrators, universities and NPOs. Her comments affirm that the mind-set of many city stakeholders still needs to change (*ibid*.).

Rydawi Aquaculture came third in the Green City Start-up small entrepreneurship competition run by the CoJ, and the University of Johannesburg in November 2016 (Rydawi Aquaculture, 2017). The Green City Start-up is a city-wide competition that rewards innovating entrepreneurs in energy, water, transport,

and waste (the Green City Start-up, 2017). The competition recognised Rydawi Aquaculture creativity and the collaboration with the CoJ, the University of Johannesburg, and farmers in the Netherlands to improve its work (Managing Director, personal communication, 23 March 2017). Rydawi Aquaculture also re-uses wastewater, which is rich in nutrients from fish droppings for irrigating vegetable gardens. The *Farm-in-a-box* system is energy efficient and uses 200 watts each per day, equivalent to running two light bulbs (*ibid*.). Looking into the future, the Managing Director proposes that:

> "We need to develop the right technology for growing fish in Africa. We still use fish generics from hatcheries in Holland and we are 20 years behind their technology. If we develop our technology today, in 20 years we can develop our generics in South Africa" (personal communication, 23 March 2017).

The company innovates through different networks, which are: (i) Open knowledge and technology sources – Rydawi Aquaculture keeps an active website that disseminates information and interacts with partners such as the CoJ, and the University of Johannesburg. The company circulates monthly newsletters highlighting its business, seminars, and workshops to showcase its experiences, and best practices. (ii) Acquisition of knowledge and technology – The company markets its creative fish farming equipment, the *Farm-in-a-box,* to emerging fish farmers in South Africa, and Southern Africa Region. (iii) Innovation collaboration – After winning the Green Start-up competition, Rydawi Aquaculture collaborates with the Resolution Circle at the University of Johannesburg, which assists small-scale entrepreneurs with technology commercialisation, and incubation. In turn, Rydawi Aquaculture passes on this knowledge through training small-scale fish farmers and selling fish farming equipment. The company hosts five to ten visitors daily at the site who wish to learn about fish farming (Managing Director, personal communication, 23 March 2017).

As highlighted in Chapter 3, one of the key innovations at the Tshwane Food and Energy Centre is the cooperative model that combine working and living on the same farming site which thus saves travel time, and resources for farmers. From discussions with the Chairman of the Eikenhof Farm Secondary Cooperative,

some farmers at Eikenhof Farm travel for more than 20km daily from SOWETO to work in their gardens (personal communication, 25 July 2018). Moreover, the Tshwane Food and Energy Centre cooperative model separates joint procurement of inputs and marketing products from individual gardening and poultry production by members.

5.3.4 Innovating farming entity power relations

Innovating farming entities in Johannesburg collaborate with different stakeholders to promote innovation, which in turn creates power relations in the networks. As highlighted earlier, Growing Healthy Farms partners with Rippon and Nstele Consultancy, United Way South Africa (UWSA), and the CoJ Food Resilience Unit for training farmer in technical skills. The NPO also collaborates with the Bryanston Organic and Natural Food Market, Jackson's Real Food Market, and the Riversand Incubation Hub on a produce-supplier relationship basis. Growing Healthy Farms collaborates with GEKCO on sharing information on farming and ecological experiences. It is noteworthy that the NPO has a few strategic networking partners on marketing and technical skills training with a relatively non-hierarchical relationship based on mutual benefit. The CoJ wields power and influence, though limited since the city does not provide any inputs, equipment or training to the NPO. The NPO collaborates with the CoJ Department of Social Development and indirectly with the Department of Development Planning which is responsible for land use planning. Growing Healthy Farms networks with eight partners for promoting innovation, as is shown in Figure 5-20.

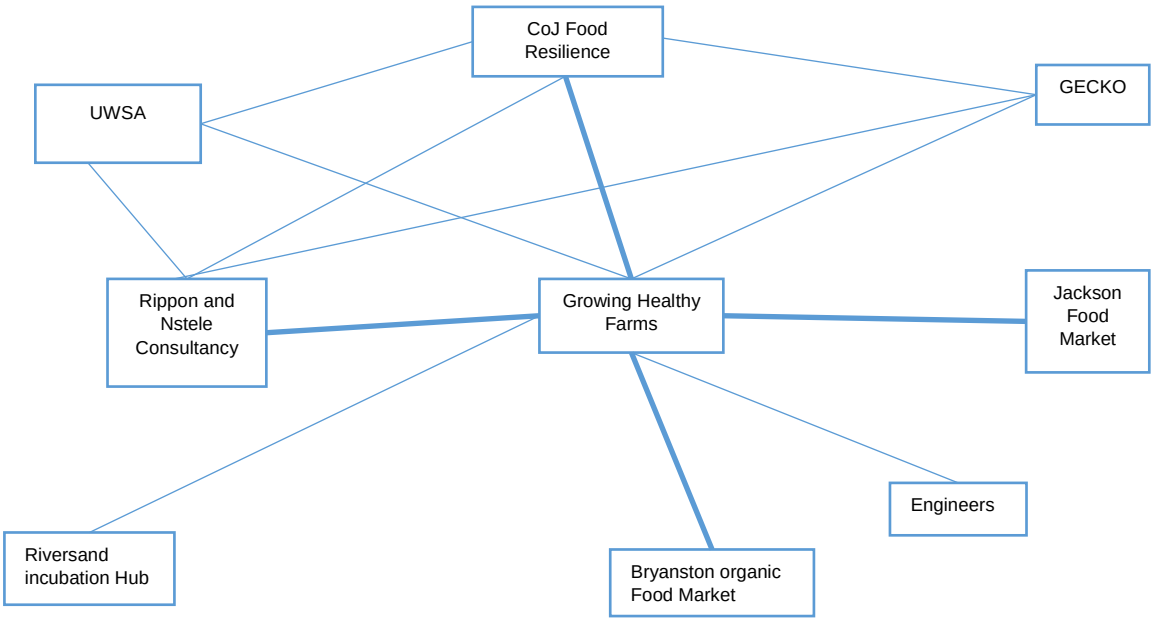

Figure 5-20: Growing Healthy Farms sociogram (source, author)

Planner Bee Plant Care networks with different actors in producing and marketing *Fertilis* and *Earth Buddies*. These actors include GECKO, through sharing experiences on UA, and ecology within the Kyalami area. Izindaba Zokudla facilitates seminars, exhibitions, and best farming practices with different actors in the city. Planner Bee Plant Care developed a vertical supply marketing network relationship with Talborne Organics Pty Ltd for marketing *Fertilis* throughout South Africa. Planner Bee Plant Care's networking relationships with other farmers and marketing companies are generally non-hierarchical business approaches. Additionally, Planner Bee Plant Care liaises with government departments such as the Department of Agriculture that certifies organic fertilisers, and the Agriculture Research Council on research on organic farming. The company also collaborates with the CoJ Department of Economic Development on entrepreneurship promotion, and indirectly with the Department of Development Planning. However, similar to Growing Healthy Farms, the city wields limited power and influence over the company because it provides land. Planner Bee Plant Care also maintains a few strategic networking partners (six partners) as presented in Figure 5-21.

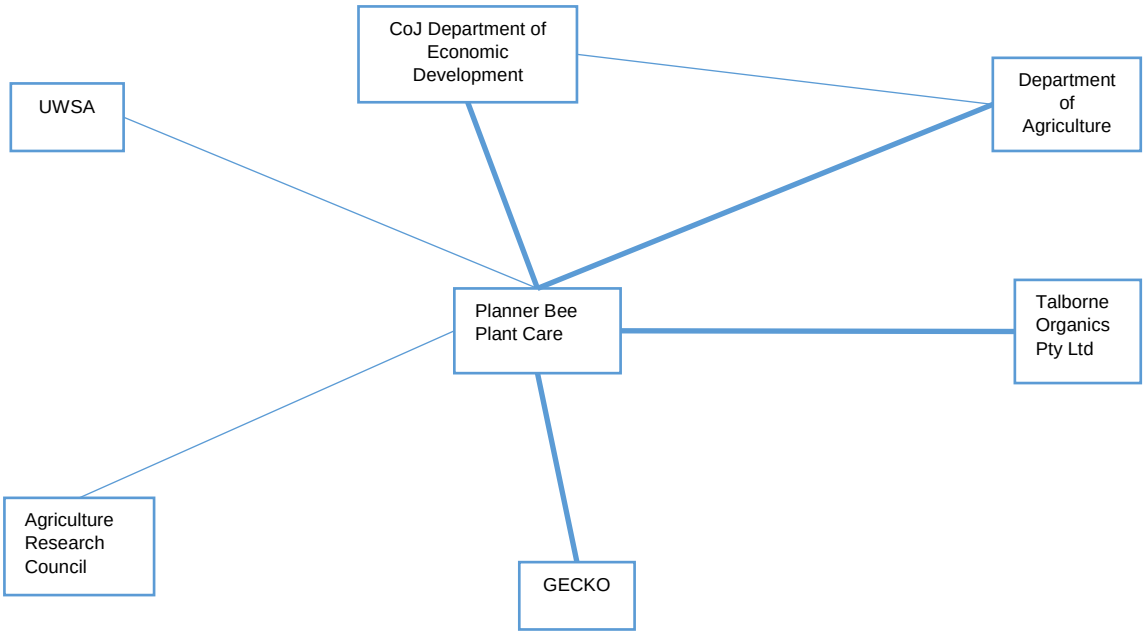

Figure 5-21: Planner Bee Plant Care sociogram (source, author)

Rydawi Aquaculture collaborates directly with the CoJ Department of Economic Development, which supports small-entrepreneur development, and thus in-directly with the Department of Development Planning, responsible for land use planning. The city wields some considerable power and influence over Rydawi Aquaculture as the provider of the land, and more so as convenor of the Green Start-Up Programme. The networks with the Green Start-up Programme was further strengthened by the collaboration with the University of Johannesburg (UJ) with regard to research on aquaculture. Rydawi Aquaculture's collaboration with the city was beneficial; this experience runs contrary to arguments from other farming entities that the city blocks innovation its initiative through the bureaucracy. Rydawi also developed a producer-supplier relationship with farmers in Holland who supply fish generics and locally collaborates with emerging farmers to provide aquaculture training and market *Farm-in-box[es]* and fingerlings. Similar to Growing Healthy Farms and Planner Bee Plant Care, the company has a limited number of strategic partners to share ideas, expertise and best practices and to market final products (Figure 5-22).

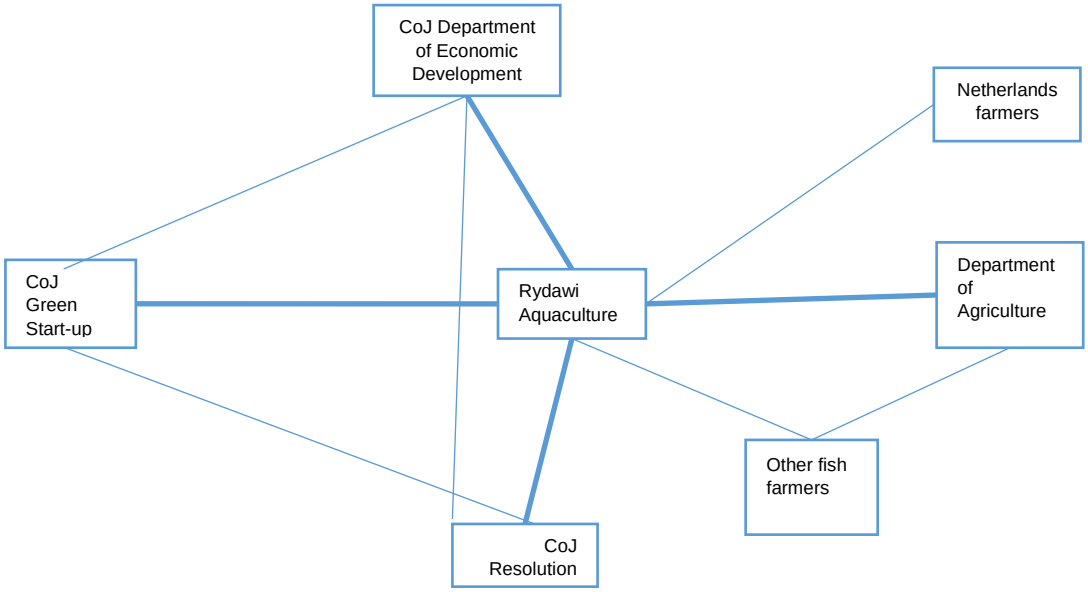

Figure 5-22: Rydawi Aquaculture sociogram (source, author)

The three farming case study sites (above) show the significance of choosing quality partnership based on strategic collaboration in technical training, research, and supply relationships. Such relationships tend to be mutual, and less hierarchical. These networks are different from those of many farming entities (especially the non-innovating ones) that seem to join a large number of connections, some of which have minimal benefits.

Tshwane Food and Energy Centre collaborates with diverse actors to promote farming and innovation. The City of Tshwane is the major actor in this network and provides land, irrigation infrastructure, water, initial inputs, and training. The City wields power as the provider of most of the project resources. Another significant role-player is the Gauteng Department of Agriculture and Rural Development, which provides training, and extension services. The cooperative also collaborates with the Danish company that designed the project and continues to give technical support. However, the cooperative has power derived from the concept of assemblages based on the histories and stakeholder engagement that makes them an important player in food security. These power relationships are shown in the sociogram in Figure 5-23.

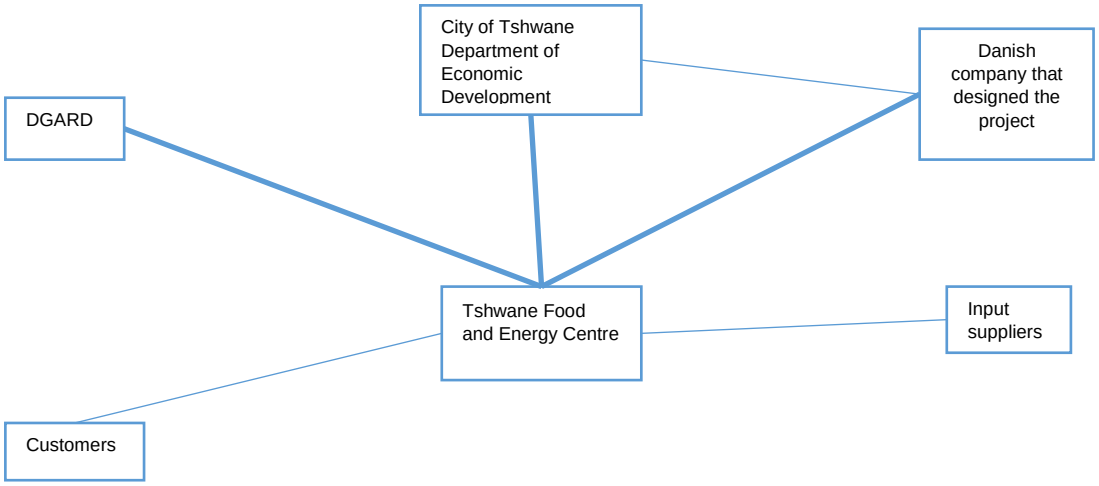

Figure 5-23: Tshwane Food and Energy Centre sociogram (source, author)

5.3.5 Nature of land access for innovating farming entities

The land is central to urban farming globally and more so for Johannesburg where there is stiff competition with other land uses. All the innovating farming entities have formal land access arrangements with the cities of Johannesburg and Tshwane. Growing Healthy Farms and Planner Bee Plant Care utilises residential properties in the peri-urban Greater Kyalami Conservancy that is formally zoned for UA. Both Rydawi Aquaculture and Tshwane Food and Energy Centre are located informally zoned small-scale farming areas in Muldersdrift and Ekandustria. It is noteworthy that formal land access was critical for mobilising investment, and subsequent innovation for all four innovative farming entities. An emerging finding is that though the innovation collaborative platform lacked the presence of the Department of Development Planning, the interdepartmental relationships with the CoJ ensure that UA issues were communicated to planning and vice versa.

5.4 Comparisons between Innovating and Non-innovating Farming Entities

This section discusses the findings on the marginalisation of UA by land use planning and the effectiveness of innovation within networks to shift rigid planning decisions and marginalisation. The section reflects on the three themes of land use planning, power relations and micro-macro level relationships. The macro-micro level relations manifest the contradictions between neoliberal real estate developments sponsored by international investment, and the local food security debates.

5.4.1 Urban farming food value chains, productivity and marginalisation

The findings from this study show that UA has short, intermediate and long value chains. All innovating and non-innovating farming entities (Table 5.1) have a local (short) food value chain. This value chain comprises of practices where farming entities consume and sell some of their farm produce at farm-gate, to surrounding communities, vegetable markets or local restaurants. The short food value chain corroborates the insights from literature appraisal that interest in the origin of food for the city residents promotes UA (Aubry and Kebir, 2013). Short UA food value chains are traceable by customers who can ascertain the quality of the food. However, these short food value chains could be linked with the alternative or informal economy, which may or may not require packaging and semi-processing which would thus suit non-innovating farming entities.

The five farming entities have intermediate food value chains. In addition to household consumption, they supply food to markets, restaurants, and supermarkets in Johannesburg. The findings show that the intermediate food value chain is linked to the formal economy, and therefore requires farming entities to package and semi-process their products.

In addition to the short and intermediate food value chains, Planner Bee Plant Care and Rydawi Aquaculture have long food value chains. Rydawi Aquaculture

imports fish generics from the Netherlands and sell its *Farm-in-a-box* in Johannesburg and the whole of South Africa, as well as southern Africa. Similarly, Planner Bee Plant Care markets organic fertiliser through Talborne Organics Pty Ltd in Johannesburg and all over South Africa. Both the intermediate and long food value chains are directly linked to the formal economy thus requiring food processing, and packaging, as well as formal contracts and supply agreements. The long food value chain also requires specific quality, minimum quantities, and terms of payment that are only achievable by innovating farming entities.

Table 5-1: Innovation within networks for innovating and non-innovating farming entities

UA attributes	**Innovating farming entities**				**Non-innovating farming entities**		
	Growing Healthy Farms	Planner Bee Plant Care	Rydawi Aquaculture	Tshwane Food and Energy Centre	BFHC	Eikenhof Farm cooperatives	Wits Inala Forum
Farming type	NPO (vegetable production)	Business (organic fertiliser production)	Business (aquaculture)	Cooperative (individual owned and cultivated plots and individual incomes) – poultry + vegetable	Cooperative (group owned and cultivated plots with shared incomes) – vegetable production	35 farming cooperatives (Group owned and cultivated plots with shared incomes) – vegetable + small livestock production	Student forum (Group owned and cultivate plot) – vegetable production
Land access arrangements	Formally zoned UA	Formally zoned UA	Formally zoned UA	Formally zoned UA	Formal agreement (temporary)	Formally zoned city farm, temporary agreements with individual farmers	Informal land access
Food value chain	Short Intermediate	Short Intermediate Long	Short Intermediate and long	Short	Short	Short , and intermediate	Short

Marketing	Through website, Facebook and blogs	Through website, Facebook, blogs and Talborne Organics Pty Ltd	Through website, Facebook, blogs and newsletters	Locally	Through city markets or exhibitions	Through city markets or exhibitions	Locally through Facebook and blogs
Common innovation networks	Innovation collaboration	Innovation collaboration	Innovation collaboration	Acquisition of equipment	Acquisition of equipment	Acquisition of equipment	Network collaboration
Role of the city in the network	Weak and distant	Weak and distant	Strong and close	Very strong and very close	Very strong and very strong	Very strong and very close	Weak and distant
Ability to cover operating costs	Require subsidies	Covers operating costs	Cover operating costs	Subsidised by City of Tshwane	Subsidised by CoJ and GDARD	Subsidised by the CoJ and GDARD	Subsidised by Wits and NPOs

5.4.2 Land access arrangements for urban agriculture practices

The eleven farming case studies access land under different arrangements. Five out of the eleven farming entities have lease agreements with the city. Three of them use private properties and three others access to land from institutions. As stated earlier in this chapter, land use planning and land access arrangements are critical for urban farming. Funders such as CoJ departments, GDARD, NPOs, and the private sector require formal land access for UA initiatives. All the innovating farming entities have formal access to land (three under formal zoning and three under leases from the City). In contrast, only two out of five non-innovating farming entities have user agreements for their land. The remaining four non-innovating farming entities have informal agreements with landowners.

A key finding of this study is that innovation networks across UA and land use planning actors result in informal access to land. Though UA and land use planning do not interact directly, their indirect interactions were facilitated through interdepartmental collaboration with CoJ. Findings show that innovation within networks opens platforms bridging across the two sectors enabling the sharing of information, sector requirements and standards which influence actors to comply with the requirements. The case studies confirm the potential of virtuous relationship through innovation networks that could shift power dynamics and thus lead to the formalisation of UA as a land priority. The study findings show that innovation promotes productivity and diversification of farming activities which presents UA as a positive contributor towards food security and efficient land utilisation. On the other hand, non-innovating farming entities in this study underutilise their gardens which presents them as land uses that are temporary and transient and thus replaceable by future real estate development. It should be noted that this reflects a narrow view of UA contributions within land use planning.

5.4.3 Urban agriculture innovation and networks

While all the eleven farming entities developed networks, some of the networks were designed to promote innovation as some promoted social capital. Some network promoted innovation only within the UA sector. However, my interests in this study are on networks that cut across the UA and land use planning sectors in order to bring about collaboration that foster an opportunity to bring sectors into dialogue.

The most common innovation within networks among farming entities was found to be innovation in collaborations especially in research and training which emphasis farming entities to identify knowledge gaps required in addressing market needs and opportunities. Collaborative research supported the development of zoning codes and identifying land that can be earmarked for UA in Detroit and Portland (Balmer, et al., 2005; Paddeu, 2017). Findings from the study show that non-innovating farming entities tend to concentrate on developing networks towards the acquisition of equipment and machinery. My observations are that while such networks can lead to innovation, acquisition of equipment should be complemented by the empowerment of farmers to fully utilise the equipment. In other words, the acquisition of equipment should be viewed as a step towards innovation rather than innovation itself.

One of the assumptions of this study was that CoJ should be one of the actors within all the UA innovation networks. Indeed all the eleven farming entities collaborate with the city. However, farming entities end up collaborating with different city departments. The Food Resilience Unit has a strong and close relationship with non-innovating farming entities. The Department of Economic Development has strong relationships with innovating farming entities that are regarded as small businesses and therefore falls within its jurisdiction. The fragmentation within CoJ results in the Food Resilience Unit working with traditional urban farming entities towards transforming them into a small business. Once a UA entity becomes small businesses, they are ‘transferred’ to collaborate with the Department of Economic Development whose goal is to build capacity small enterprises in order to become medium to large businesses. The CoJ, therefore, actively promotes innovation in UA through two platforms led by two separate departments. This amounts to fragmentation of innovation initiatives

and support for UA. I would argue that these two departments require a streamlined inter-departmental collaboration such that traditional farming entities would initially join the Food Resilience Unit and after graduating an innovating farming entity would join the Department of Economic Development. Currently, this relationship does not exist.

In contrast to these departmental innovation initiatives, the city has in some instances been accused of 'blocking innovation' through bureaucracy and political interference. Wits Inala Forum, for instance, stopped collaboration with the CoJ because of municipal bureaucracy as well as disagreements over the publicity. Similarly, some farming entities are frustrated by City officials who attend farmer stakeholder meetings late or poorly organise seminars and exhibitions (Poultry Farmer, personal communication, 09 December 2016).

Besides the two departments promoting innovation among UA practices, the core argument of this study is that there should be innovation networks across UA and land use planning to ensure formalisation. However, the Department of Development Planning is absent in network of all the eleven farming entities which collaborate more with the Food Resilience Unit or the Department of Economic Development. Even though there are platforms where the two departments present their land requirement to the Department of Development Planning at the beginning of each financial year. This process could be shortened if the Department of Development Planning set around the same table and interacted more directly with farming entities.

Another hindrance to the application of innovation networks is the frequent mismatch between partner expectations. For instance, I observed that on the one hand private companies often worked with strict timetables for meetings and project deliverables. On the other hand, farming entities are often slow to learn new farming methods and have limited skills and capacity to transform these networking relationships into improved farming practices. The differences are interpreted by the private sector as signalling farmers' lack of commitment to the project, while farmers interpret the push for deadlines as a lack of respect for them.

5.4.4 Farming entity power relations

The degree centrality (number of connections) for the farming case studies ranges from five for Rydawi Aquaculture to twelve for BFHC (Table 5.2). These findings are of particular interest because they contradict the claim by Vonortas (2009) that an actor with more connections derives more resources from the network. In this study, innovating farming entities have been shown to choose their networking partners more strategically than non-innovating farmers. Non-innovating farming entities develop more connections for building social capital, in addition to connections needed for innovation. Innovating farming entities have fewer strategic partners since network responsibilities such as communication, attending meetings, and workshops take time and resources. Indeed findings from this study show the importance of critically choosing collaboration partners. The findings from Chapter 4's sociograms showed that the CoJ is the key stakeholder followed by a financier, for innovation networks to transform UA towards formalisation there must be a shift in this city/market relationship.

As stated above, findings show that CoJ is a common partner to all farming networks (Table 5.2). This is not surprising especially given the city's controls on access to land and water which are critical inputs for farming. However, city-UA power dynamics is complex as it is represented by departments within these UA networks. The same departments have different power relationships between themselves that also affect how much they can assist farmers, especially towards land access. Therefore, urban farming entities may find one city department accommodating and other rigid, depending on their relationships. For instance many farming entities found other city departments to be accommodating and forthcoming unlike the CoJ Department of Development Planning that has developed a reputation of offering prohibition rather than enabling the process (Poultry Farmer, personal communication, 09 December 2016; Managing Director, Planner Bee Plan Care, personal communication, 02 March 2017; President Wits Inala Forum, personal communication, 04 May 2017).

Another critical element is the absence of the CoJ Department of Development Planning in the farmer's networks. The Food Resilience Unit networks directly with seven non-innovating farming entities and the Department of Economic Development networks with three innovating farming entities. In these networks,

no farming entity (innovating or non-innovating) collaborates directly with the CoJ Department of Development Planning which is responsible for land use planning. This secondary relationship begs the question: is this a tell-tale sign of UA's sub-ordinate standing in the municipal hierarchy? First, this indirect relationship between planning and UA may explain why the CoJ Department of Development Planning appears slow or less responsive to UA. Secondly, the indirect relationship between the CoJ Department of Development Planning and farming entities also justifies the need for inter-departmental collaboration to harmonise innovations in UA and land use planning.

Table 5-2: The case study relationships between innovation in networks and land use planning

Case study	**Attributes**		**Presence of absence of city planning in the network**	**Significance of city planning presence or absence**
	Type of food Value chain	**Type and number of innovations within network connections**		
Growing Healthy Farms	Local and intermediate	Collaboration (8 number of connections)	No city planning, indirectly through the CoJ Food Resilience Unit	Greater Kyalami Conservancy hired planning consultancy to inform them of planning requirements – able to attract investment and innovate
Planner Bee Plant Care	Local, intermediate and national	Collaboration (6 number of connections)	No city planning, indirectly through the Department of Economic Development	Greater Kyalami Conservancy hired planning consultancy to inform them of planning requirements – able to attract investment and innovate
Rydawi Aquaculture	Local, intermediate and national	Collaboration (5 number of connections)	No city planning, indirectly, through the Department of Economic Development	Land formally zoned for UA - able to attract investment and innovate
Wits Siyakhana Initiative	Local, intermediate and international	Collaboration (11 number of connections)	No city planning, indirectly through Food Resilience Unit.	Land formally leased for UA - able to attract investment and innovate
Tshwane Food and Energy Centre	Local and intermediate	Acquisition of Equipment (5 number of connections)	No city planning, indirectly through the City of Tshwane Department of Economic Development	Land formally zoned for AU - able to attract investment and innovate

3 Kotze Rooftop Garden	Local	Acquisition of Equipment (4 number of connections)	No city planning, indirectly, through Food Resilience Unit	Rooftop leased for UA - able to attract investment and innovate
Bambanani Food and Herb Cooperative	Local	Acquisition of Equipment (12 number of connections)	No city planning, indirectly, through Food Resilience Unit	Land utilised with a verbal agreement – unable to innovate despite investment
Devine Farming	Local	Acquisition of Equipment (5 number of connections)	No city planning, indirectly, through Food Resilience Unit	Land utilised with a verbal agreement from church – unable to innovate and attract investment
Serang Sa Basadi	Local	Collaboration (4 number of connections)	No city planning, indirectly, Food Resilience Unit	Land utilised with a verbal agreement from Green House Project – very limited investment and innovation
Eikenhof Farm	Local and intermediate	Acquisition of Equipment (7 number of connections)	No city planning, indirectly, through Food Resilience Unit	Farming cooperatives has formal agreements – unable to innovate despite huge investment
Wits Inala	Local	Collaboration (8 number of connections)	No city planning, works with Wits University	Land utilised with a verbal agreement with Wits – innovation in advocacy

This study originally planned to assess whether UA-land use planning networks were active. This would be by assessing feedback mechanisms between farming entities and their partners. However, this was impossible because only a few innovating farming entities had websites (Planner Bee Plant Care, Rydawi Aquaculture and Wits Siyakhana Initiative), and some innovating and non-innovating farming entities had Facebook Pages (Growing Heath Farms and Wits Inala Forum). As a result, I could not assess the feedback process among the majority of the farming entities. It was also not possible to get minutes of meetings or emails between farming entities since the farming entity either did not keep records or were not willing to share the data. The lack of evidence on the level of communication shows the weakness and informal nature of many innovation collaborations, and hence their limitations in promoting change.

To unravel and understand the power relationships within UA's networks, it is useful to return to McFarlane's (2009, 2011) notion of assemblages. He emphasises that power relations are more complex than mere connections. Applying this concept to UA, we can extrapolate that farmers are not entirely powerless in these networks as they use religious, social, and political connections to access resources. The ability to use both the 'backdoor' (unofficial, informal, familial ties and social ties) and 'front door' (formal, municipal sanctioned and NPOs) gives farmers a lot of leverage and enables them to accomplish much on the ground. The farmer experiences and histories of engagement through farmer training and investment through procurement of equipment constitute 'sunk costs' in farmer capacity building. This investment makes farming entities critical players in food security. The farmers' awareness of policy and their rights gives farmers bargaining powers when engaging other stakeholders.

5.4.5 Urban agriculture micro-macro level relationships

UA initiatives fit into the micro-macro level agriculture discourse where the broader policies affect the local programme and projects implementation on the ground. In the macro-level dialogue of urban development, discussions on UA's contributions are often limited to quantifiable benefits of addressing food security or poverty (Battersby and Marshak, 2013). In this context, UA makes a limited contribution to the urban food system. This dialogue is often driven by the power of neo-liberal economic trends, and it becomes easy to dismiss the value of UA and thus afford its low priority in land use planning. However, the CoJ's sustainability and resilience discourses acknowledge the local level initiatives towards food security for the household and local communities as critical. At the household level, with increasing urban poverty and vulnerability in Johannesburg, individuals welcome such strategies as UA initiatives towards food security. The added nuances of these discourses enhance our understanding of UA's potential to contribute to the city through several initiatives such as open spaces, awareness of the environment, and creating community cohesion. Juxtaposed against this food security argument, is the neoliberal development paradigm (explained in a subsequent section), and its influence on the local food systems and land use or planning patterns.

- **Food Security**

Findings show that all the farming entities in Johannesburg first consume some of their farm produce such as poultry, fruit, fish and vegetables, and then sell the surpluses. The empirical evidence from the eleven farming entities supports the prevailing finding that at household levels, UA primarily contributes towards household food security (Van Averbeke, 2007; Malan, 2015a).

Urban farming entities also contribute to community food security by selling farm produce within their neighbourhoods. Farming entities in this study sell farm produce at farm-gate, and through vegetable markets. The local community, however, often

constitutes an informal or alternative economy where traded goods are undocumented. It is here that we begin to see the hard to quantify the value of non-innovating farming entities, which contribute towards a local or informal economy that is largely unaccounted for. The lack of data for substantiating UA's food security contribution at both household and community levels has been raised by Webb (2011), as discussed in Chapter 2, as one of the weaknesses in the UA debates.

- **Neo-liberal arguments for urban agriculture**

At the micro or farm level, this study initially intended to compare the proportion of monetary investment on innovation as a percentage of operations and investment costs for each farming entity. However, necessary data were not available because many farming entities do not keep records of their expenditures and costs. The lack of records on expenditures, investments and operating costs may imply that many farming initiatives do not acknowledge the importance of innovation, to the extent that they can track their efforts and results.

Instead, the study, therefore, focused on whether farmers were able to generate enough revenue to cover their operations. Based on this, I was able to show different farming models perform differently (Table 5.1). Two of the innovating farming entities are run on business models, and generate enough revenue to cover operations. The NPOs (one innovating and one non-innovating) can break even only through grants and subsidies. In contrast, one innovating and two non-innovating farming cooperatives are the entities with the weakest performance.

Four out of five non-innovating initiatives in this study plan to generate income from their farming operations (Poultry Farmer, personal communication, 09 December 2016; Member Serapang Sa Basadi Cooperative, 09 December 2016; Chairman Bambanani Food and Herb Cooperative, 11 November 2016). In other words, these small-scale farmers want to run their farms as businesses. Further, key stakeholders such as the CoJ Food Resilience Unit, GDARD, United Way South Africa, and

private corporates are promoting enterprise development among urban farmers. To this end, the priority of key stakeholders is to link farming entities with the formal economy in the form of supermarkets, the Johannesburg Fresh Produce Market, and the CoJ Feeding Programme. Battersby and Marshak's (2013) study in Cape Town shows that focus on quantifiable benefits of UA has even influenced policies such as Cape Town's Urban Agriculture Policy of 2007. Similarly, the CoJ's policy and programmes become limiting because of their narrow neoliberal market focus. However, this study found that the formal economy is not always a perfect fit for UA, especially for the non-innovating entities because of stringent quantity and quality requirements. Innovating farming entities such as Planner Bee Plant Care and Rydawi Aquaculture are able to supply the formal economy. In addition, the Department of Economic Development is successfully promoting innovating farming entities by linking them with the formal economy. This is also a common response for the international case studies where farmers in Almere (the Netherlands) were integrated to supply the city supermarket after formalisation of UA in the city (Jansma and Visser 2011). The experiences only show us the UA manifests itself in different forms and planning should acknowledge this.

Another strategy for small urban farmers to supply the formal economy, I return to De Man's (2004) notion of quasi-integration networks. In these networks, small actors join efforts to aggregate supplies for a large customer. However, cooperative dynamics does not stand up to the findings of this study, as non-innovating farming entities are predominantly uncoordinated and cannot jointly supply a big customer. For instance, the 35 farming cooperatives at Eikenhof Farm failed to supply big customers because they could not bring themselves to cultivate the same crop and plant at the same time. Even where farm produce is available, the distribution of such farm produce to the market requires specialised skills, which are rarely available among non-innovating farming entities.

Under such circumstances, farmers can succeed where their efforts are coordinated by an entity such as an NPO. For instance, the Abalimi Bezekhaya supply customers such as the Mount Nelson Hotel in Cape Town by collecting farm products, and undertaking the packaging and delivery from its network of 779 garden centres

(Abalimi Bezekhaya, 2015). Similarly, the Tshwane Food and Energy Centre buy inputs and sell output in bulk for all its 25 farmers. Experience elsewhere shows that Zanele Ntuli, a small-scale urban farmer in Pretoria, was able to supply the formal economy with the support of an intermediary organisation called Made with Rural, which promoted bulk procurement of inputs and the selling of produce among emerging farmers (Macupe, 2016). UA is largely a micro-industry and can supply the macro-economy through the collaboration of many individual farmers.

5.4.6 Marketing urban agriculture products

Findings of this study have shown that three out of six innovating farming entities conduct market research, and advertise their business through a website, Facebook and or blogs. In addition, Growing Healthy Farms, Planner Bee Plant Care and Rydawi Aquaculture developed vertical supply network relationships with customers where they deliver specific farm produce and quantities.

In contrast, only one of the non-innovating farming entities advertises its product through its Facebook page. Three out of five non-innovating farming entities sell their products through city vegetable markets and exhibitions. The remaining non-innovating farming entity, Serapang sa Basadi, markets its products through its networking partners such as the Green House Project. The findings show that non-innovating farming entities make and maintain key relationships with local communities through farm-gate sales.

5.5 Summary

Based on the experiences of eleven farming entities in Johannesburg, this chapter focused on drivers of marginalisation of UA by land use planning and how innovation within networks influences the power relations between network actors. The farming entities in Johannesburg have short, intermediate and long food value chains. The

food value chain is even shorter for non-innovating farming entities that supply households and local communities, restaurants and vegetable markets. Another key finding is the inability of non-innovating farming entities to meet the quality and quantity requirements for the formal economy becomes an insurmountable obstacle to joining that sector. Productivity for non-innovating farming entities is low and their products are marketed through the short value chain that is largely undocumented. Within the neoliberal development paradigm where the benefits of UA are measured in quantifiable contributions, this form of farming is treated a temporary and therefore unreliable. It, therefore, continues to be undervalued when viewed within the lens of the formal economy.

The study findings show that innovating farming entities have formal zoning or lease agreements with the City or landowners. The non-innovating farming entities have informal access or verbal agreements with their respective landowners. As a result, they cannot attract adequate investment to improve their farming businesses and thus promoting the vicious cycle of marginalisation and exclusion. However, there are instances where the City proactively zoned land for UA to promote investment and innovation.

This exemplifies how innovation network theory applied within UA can create more supportive ecosystems through the channelling of resources to actors within the network, and in turn, these resources stimulate innovation and also influence power relations. However, unlike the dominant dialogue in the literature that more connections imply more resources for the actor, this study shows that more network connections may translate into more responsibilities, which does not necessarily translate into innovation. Instead, the innovating farming entities have strategically chosen partners strictly suited to their needs, thus they gain critical resources while at the same time they cut down on network management burdens. This study, therefore, shows that whereas a high number of network partners are desirable, the quality of the partnership and the ability to effectively manage them is more critical.

Another misconception came to light where large levels of investment translate are expected to innovation on the ground. Instead, the study found that skills development should be prioritised in promoting innovation among farming entities.

BFHC and Eikenhof Farm cooperatives are prime examples where large investments in irrigation equipment from the city, the provincial government and the private sector, are all but wasted because the equipment is not fully utilised as a result, of limited expertise. Technical skills are critical to innovation as it changes how resources are managed.

Turning to food security within the urban context, another key finding is that all of the innovating and non-innovating farming entities consume some of their farm produce. These findings support literature that UA directly contributes to food security largely at household and local community levels – which translate to the short food value chain. However, it must be noted that most of the transactions in the short food value chain follow the informal economy, which is undocumented. On the one hand, acknowledging these informal short value chains contradicts the common view that UA contributes little to the city. On the other hand, the lack of documentation about the contribution of UA creates another challenge since funders of UA innovation would require tangible evidence to justify their investment. The eleven farming entities in this study show that UA contributes to food security and livelihoods across multiple facets.

These roles to which UA contributes are crucial in promoting city sustainability, and resilience. For this reason, the relationships between actors within UA and land use planning are complex, such that mere network connections are insufficient to explain such interactions, but instead assemblages that acknowledge histories and experiences of engagement through training seminars and workshops between farmers and stakeholders do. These relationships also include formal and informal interactions within the city and NPOs, in addition to informal political and religious connections.

CHAPTER SIX: EFFECTIVENESS OF INNOVATION NETWORKS AS A MECHANISM TO OVERCOME THE MARGINALISATION AND ENHANCE FORMALISATION OF URBAN AGRICULTURE

"Innovations … at first, are ill-shapen … They are like strangers … what is settled by custom is fit ... whereas new things piece not so well ... They trouble by their conformity. Yet, he that will not apply new remedies, must expect new evils … A forward retention of custom is as turbulent a thing as an innovation" (Godin, 2015:4).

6 Introduction

As Godin (2015) alludes to, innovation challenges the existing status quo. When analysing the effectiveness of innovation networks across UA and land use planning, it is critical to acknowledge that changing institutional set-ups both within the municipal council and the farming entities affect the ways of 'doing business' (and consequently may be openly opposed). Chapter 6 substantiates sub-question 3, the effectiveness of innovation network as a bridging mechanism to overcome the marginalisation of UA in land use planning and guide our understanding of current and future formalisation of UA within land use planning practices. Here, I situate insights from the international case studies discussed in Chapters 3 and 4, and this study's fieldwork finding in Johannesburg from Chapter 5 within the principles of innovation network theory (Chapter 2).

The chapter focuses on the dynamics of connection that are created by a collaborative platform of stakeholders that interact towards the formalisation process. The current and future experiences of formalisation will also be rooted in experiences from the cities of Almere, Berlin, Dar es Salaam, Detroit, Havana and

Portland. Chapter 6 has ten sections that assess the existence of the principles of innovation networks in current practices, the network power relations and how these impact the formalisation process.

In articulating the effectiveness of innovation networks in the formalisation of UA as an urban land use within planning practices, I would propose planning that acknowledges cities as comprising of complex rationalities and layers of realities. The complexities in Johannesburg, reported in Chapters 4 and 5, affirm Harrison's (2006:328) assertion that:

> "To think 'about planning from Johannesburg' means thinking about influencing the outcome of urban processes that are often highly elusive and unpredictable as they are shaped at the intersection of multiple rationalities. For planners and policymakers … Johannesburg is often bewildering and frustrating as planned interventions, more often than not, have outcomes that are unintended, unexpected and, even, quite contrary to original designs".

The multiple rationalities and unintended outcomes within the interactions between UA and land use planning are situated within the innovation networks to acknowledge (towards realisation) the multiple contributions of UA towards larger urban development goals of food security and sustainability. Here, the CoJ gleans successful experiences from cities such as Almere, Detroit and Havana that created a multi-stakeholder platform for dialogue between the two sectors that reached consensus on the contributions of UA. Cities such as Berlin, Dar es Salaam and Portland, that had varying successes on formalisation and suffer conversion of UA to real estate land offer further understanding of the complexity (and pitfalls) of network relations within the neoliberal market environment.

6.1 Parameters for Measuring the Insights on Effectiveness of Innovation Networks in Overcoming Marginalisation of Urban Agriculture towards its Formalisation

This chapter presents experiences from both international case studies and Johannesburg on the emerging issues from the effectiveness of innovation networks towards the formalisation of UA. The effectiveness of innovation networks to overcome marginalisation is assessed through parameters that include: (i) existence of innovation networks (in other words the environment in which an innovation network could thrive), (ii) the influence of power relations, (iii) the presence of formalisation policy, processes and practices.

These parameters were used to analyse the study's data to establish the inter-relationships between land use planning innovation and the role of UA in the city. Lastly, the sub-findings in this chapter assess how UA can play a significant role in Johannesburg as it moves towards goals of food security and sustainability as well as integrating viable resilience into its existing development strategies (for instance IDPs discussed in Chapter 4).

6.2 Innovation Networks as a Collaborative Platform for Stakeholder Engagement

This section assessed the establishment of the innovation network platform or innovation network principles that can be detected as key to stability in UA/land use stakeholder relations in the international cities and how such network succeeded or failed to mobilise stakeholders towards formalisation of UA. These experiences were used to answer questions on the future of formalisation of UA as a sustainable land use. As was discussed in the literature in Chapter 2, the theory of innovation networks reflects recent trend on how firms innovate through outsourcing or collaborating with other organisations (Ahuja, 2000; Pittaway et al., 2005; Torok et al., 2018). Given the definitions developed earlier, the formalisation of Almere, Detroit, Havana and Portland can be viewed through the lens of innovation networks.

Unlike cities where conversion of UA land into real estate is a problem. The Almere case study presents successful innovation networks within a neoliberal planning environment that is presented in the next section.

6.2.1 Successful innovation networks towards formalisation of UA in a neoliberal planning environment – experiences of Almere

The case study of Almere is presented in this section to show that even in a neoliberal planning environment, the principles of innovation networks pull stakeholders together towards with a common vision of formalising UA. The case study is unique in that it protects UA from real estate development. The City of Almere created a platform that included a neighbouring town, the provincial department, farmers' representatives, the private sector and the Ministry of Agriculture among other stakeholders (Jansma and Visser, 2011). The composition of the platform was broad-based and inclusive taking participants from the grassroots (concerned farmers), government, private sector and the civil society. The planning process itself developed a creative approach towards incorporating the environment in the city; especially when the existing Dutch planning framework promoted compact development that tended to leave agriculture outside the city (*ibid*.). This effort was meant to preserve the environment while also avoiding displacement of farmers in this city that has been rapidly developing from populations coming from neighbouring Amsterdam (*ibid*.).

What does Almere's formalisation of UA mean for Johannesburg and the future of formalisation of UA in general? The IDPs in South African and Johannesburg entail planning innovations that promote participation; acknowledge local development issues and addressing segregation, poverty, environment and climate change (Watson, 2009; Todes, 2012). Interviews with the CoJ senior town planner revealed that IDPs created a platform where city departments and stakeholders jointly plan for the future development of the city (personal communication, 09 May 2017). The IDPs and policies such as the Food Resilience Strategy made provisions for food security in Johannesburg. However, against the principles of both innovation

networks and IDPs, the CoJ departments tended to pull their sections from the IDPs and implement them independently. Looking at the city systemically, this practice has weakened the ecosystem that could support innovation networks in Johannesburg.

For instance, the CoJ Growth and Development Strategy (GDS) of 2040 intends to secure peri-urban areas for UA through the Urban Development Boundary (CoJ, 2016c). However, unlike Almere, there was no consensus on the location of the greenbelt (CoJ senior town planner, 09 May 2017). As a result, the Provincial Housing Department as well as property developers want to build housing in the area going against the principles of the GDS and the Urban Development Boundary.

6.2.2 The success of innovation networks theory towards formalisation of UA 'outside' a neoliberal environment – experiences of Detroit and Havana

Similar to Almere, Detroit and Havana offer some of the most successful examples of applying the principles of innovation networks towards formalisation of UA as long-term land use. Detroit responded to a shrinking economy and population by identifying UA as a sustainability and resilience strategy towards city greening, food security and community engagement (Paddeu, 2017, Meenar *et al*, 2017). As such UA found a 'home' in the collective vision of the city's way forward. The city, therefore, created a stakeholder collaborative platform that includes city departments, universities and civil society organisations that agreed on the role of UA as well as related land access arrangement (Mogk *et al*., 2010; Paddeu, 2017).

Havana had a slightly different story. The city and national leadership acknowledged that UA would provide for food security after the collapse of the Soviet Union that used to supply food (Novo and Murphy, undated). Principles of innovation networks were upheld in creating an ecosystem that included stakeholders such as city departments, provincial departments, research and training institutions and central government (Cabannes, 2012; Battersby *et al*., 2013; Novo and Murphy, undated).

The collaborative ecosystem developed policies, programmes, extension services and secured land tenure for UA (Cabannes, 2012).

Again what experiences do we have from the effectiveness of innovation networks in the formalisation of UA in these two cities? The Detroit and Havana case studies give a practical example of how a city with a collapsed land market and neo-Marxist development paradigm would dialogue and support the formalisation of UA. Central to these two case studies was the consensus among city stakeholders that UA offers the solution to existing city problems. Reaching and upholding consensus on the role of UA is the greatest challenge to the formalisation of UA in Johannesburg and other cities in the world. While statistics for the CoJ show that nearly half of the population is food insecure (CoJ, 2012), no consensus has been reached on the strategy to address this food insecurity. Unlike Detroit and Havana, the CoJ has different collaborative platforms on UA that are led by the Department of Social Development targeting traditional UA entities; and the Department of Economic Development targeting innovating respectively. As such the city does not have a common vision.

Besides the fragmentation of this collaborative platform towards supporting UA; the different platforms miss the CoJ Department of Development Planning which is a key department towards land use planning for UA, in other words, to a more equitable re-patterning of the city. In addition to the collaborative platform, institutional support to promote UA in the city is necessary. Almere established the Development Centre for UA to spearhead UA in the city (Jansma and Visser, 2011). According to interviews with the Head of Agro-processing, Food Resilience Unit, the CoJ established a similar structure, in the form of a Mayoral UA Advisory Council (personal communication, 8 November 2017). Unfortunately, the advisory council was established by the previous ANC Mayor and disbanded by the current DA Mayor over political expedience more than programme implementation. While the dissolution of the mayoral advisory committee is not unexpected in politics, the lack of prioritisation of UA within the CoJ is a critical challenge towards the formalisation process.

6.2.3 'Innovation networks towards formalising UA' where land reverts to real estate – experiences of Dar es Salaam and Portland

The two case studies of the cities of Dar es Salaam and Portland offer a failed 'innovation networks toward the formalisation of UA' because of the reversal of UA land through conversion to real estate. As was discussed in Chapter 4, both cities developed the collaborative platform. In other words, the principles of innovation networks only created a formalisation façade when the underlying neoliberal forces still worked against the process. This section interrogates that phenomenon.

The Dar es Salaam narrative on the formalisation of UA offers both success and failures. Similar to South Africa's IDPs, the planning framework was transformed to become participatory by the introduction of the UN-Habitat supported Urban Management Programme (Watson 2009; Kasala, 2015). Further, the UMP process mandated working groups to developed programmes, projects and specific actions towards implementing quick wins from the plan proposals (Kasala, 2015). The process created multi-stakeholder groupings and collaborations in planning, which resulted in the formalisation of UA (Halloran and Magid, 2013a). The strategy of working groups was adopted when Sustainable Cities International created a collaborative platform with the intent of the formalisation of UA through municipal strategies in 2012 (*ibid*.). However, it is noteworthy that these innovation networks where municipal departments responsible for planning and UA were 'invited' to this process by the leading facilitator, and though city formally zoned UA in the current master plan (*ibid*.), the collaborative platform was affected by the city departments taking a backbencher approach.

Besides the management of what I suggest as 'an innovation network', the collaborative platform in Dar es Salaam promoted dialogues among actors without promoting innovation in UA and therefore the issues of UA productivity was not addressed. As a result, within the formalised zones UA is still characterised by poor productivity and continues to be threatened by property development (Halloran and Magid, 2013b).

In Portland, the multi-stakeholder collaborative platform towards the formalisation of UA included city departments, universities, civil society and farmers' representatives (Balmer et al., 2005). The platform identified land and developed zoning codes for UA practices with different options on land access (*ibid*.). However, similar to experiences in Johannesburg, UA zoned land in Portland is converted to real estate (*ibid*.) and thus the formalisation only temporary.

The Dar es Salaam and Portland collaborative platforms have three points to learn from on formalisation of UA in general and Johannesburg in particular. Firstly, the collaborative platform should ensure that the city departments and especially the department responsible for planning play an active role in the formalisation process. Secondly, the principles of innovation networks should stir the UA and land use planning sectors to innovate within themselves and how they relate to each other. Thirdly, within the neoliberal planning environment, UA land is still converted to real estate and therefore still temporary. This is a key finding for this study because it represents a hurdle to the CoJ. In fact, all these scenarios are true for Johannesburg. These three reasons, which effectively characterise the 'ecosystem' in which UA must thrive, undermine the establishment of innovation network platforms and therefore formalisation process and presents a critical challenge towards formalisation of UA.

6.2.4 Innovation network principles and the diversification of UA practices

The experiences from Berlin, Dar es Salaam, Detroit, Havana and Portland show that collaborations towards formalisation of UA acknowledged the diversity of the farming practices. Though the UA networks towards innovation in Berlin lacks the participation of city departments, UA entities have different farming practices which include; (i) *kleingarten*, (ii) *gartenarbeitsschule* and community gardens (Matthei, 2017). Dar es Salaam, Detroit and Portland have backyard and community gardens, gardens run by schools, institutions and NPOs, as well as small businesses enterprises (Balmer et al., 2005; Halloran and Magid, 2013a, 2013b; Paddeu, 2017).

Havana has the most elaborate category of UA practices that range from factory gardens, household gardens, basic production units, individual farms, and state farms (Altieri *et al*., 1999, Cabannes, 2012).

These international cases show that the future of UA lies in appreciating its diverse typologies and multi-functionality. This recognition thus calls for a policy framework that accommodates different zoning and land access agreements. Findings from Chapter 4, shows that Johannesburg has rooftop and backyard gardens, school and institutional gardens, small businesses farms, city farms, cooperatives and recreational UA by NPOs. While Johannesburg's UA experiences on the ground mirror international typologies, the policy responses towards formalisation seem to have remained frozen in a neoliberal guided interpretation of UA practices. Commenting on such neoliberal bias, Battersby and Marshak's (2013) study in Cape Town argue that the city's Urban Agriculture Policy seems to have followed narrow focus on quantifiable benefits towards defining UA. The CoJ replicates the Cape Town experience. While the city has many UA practices on the ground, the policy towards zoning and capacity building seems to be driven by neoliberal tendencies of transforming UA practices to formally operated businesses with a focus on intermediate to the long-term value chain.

6.3 The complexity of the UA formalisation process

Formalisation, which is often referred to as legitimisation (Halloran and Magid, 2013b) has connotations of integrating a function of the city and may include recognition in city plans or layouts (Huchzermeyer, 2011; Halloran and Magid, 2013b). International city case studies such as Almere, Dar es Salaam, Detroit, Havana and Portland have formalised UA to their city plans.

However, the formalisation of UA into city plans is controversial. For instance in Dar es Salaam where informality is 70% (Halloran and Magid, 2013a), what does integration mean when most land uses take place outside the formal planning process? In Berlin and Portland, experiences show that even formal UA land uses

are frequently converted into real estate. Given the Berlin, Dar es Salaam and Portland experiences, I would wonder the significance of the effort by UA supported should be towards the integration of urban farming into city plans when such efforts have no guarantees. The pressure on formalisation, from findings, in Johannesburg, emanate from investors who want guarantees for their funds. However, these findings show that legitimisation or formalisation could be difficult to achieve.

Findings in Johannesburg show an increasing number of formal land access agreements for urban farming entities that do not necessarily entail formal zoning. The formal agreements are popular in the inner city on vacant plots for instance at BFHC, Wits Siyakhana and were accepted by financiers as guarantees for investment (Chairman Bambanani Food and Herb Cooperative, personal communication, 11 November 2016; Head of Agro-processing, Food Resilience Unit, personal communication, 8 November 2017). Another interesting scenario is when permanently zoned UA practices such as the Eikenhof Farm, gives farming cooperative five-year lease agreements. These leases were also accepted in securing investment from UA stakeholders. In this regard, future research should, therefore, question formal land access agreements for rather than merely zoning, especially since zoning may not be permanent after all.

6.3.1 The local plans and their provision for urban agriculture

Some of the controversies on the formalisation or legitimisation of UA are not only integrating UA into city plans but mainstreaming subaltern activities. For instance, globally the Barcelona Strategic Spatial Plan is regarded as a successful innovation model that promoted a compact urban development framework with robust urban designs and local projects (Watson, 2009). However, the Barcelona model is criticised as a corporate plan with strong economic development and global positioning emphasis where social and environmental factors are only supportive of this grand plan (*ibid*.). In other words, the successes of this plan were not measured on upholding local priority but the overarching global positioning agendas.

The experiences of the Barcelona Strategic Plan present a challenge where the integration of subaltern activities is concealed in bigger goals. Insights from neoliberal planning frameworks in Dar es Salaam and Portland indicate that even with the best intentions for formalising UA in the city plans seem to be biased towards the market logic that values productivity above social and environmental benefits. The CoJ IDPs seem to have followed the same development trajectory. While the broad goals of the IDPs are inclusivity, addressing poverty and the environment; the overall strategy may also work as a broad corporate plan towards a world-class African city (Todes, 2012). Such grand plans overlook grassroots guided initiative such as UA. Not everyone is supportive of these broad development approaches especially that there are some lawsuits against this slogan in Johannesburg by sections of the society that feel that it is not inclusive.

In practice, it must also be acknowledged that a downside of UA projects is that they may have relatively weak economic benefits thus making them unattractive to traditional investors. Commenting from his experience in Johannesburg, the Director of the Wits Siyakhana Initiative admits that securing large investments for UA is contentious since farming does not derive as much income nor creates as many jobs as other investments (personal communication, 24 November 2016).

- **Balancing global and local prioritise**

The question then translates to how can cities balance global projects as well as address local needs such as promoting inclusivity, addressing poverty, environmental issues within a context where UA may not have huge economic benefits. This begs the question; can experiences of innovation networks be shared across large and small scale UA projects? As appraised in Chapters 2 and 5, innovation networks are critical in promoting learning exchanges, information sharing and best practices across industries in general and in UA specifically. For instance, if we view the International Garden Exhibition in Berlin (which I attended as part of the International Urban Farming Conference) as an innovation network platform, we see

that it attracted exhibitors from government, civil society and the private sector as well as farmer's associations. Such large national and citywide exhibitions and multi-stakeholder engagements promote awareness on the environment, climate change and urban farming. They also create a platform to lobby for policy support for UA.

That said, it must be acknowledged that to date one cannot draw a causal link between innovation networks and UA exhibitions in Johannesburg. The study's findings show that on the one hand exhibitions attract low profile, poorly organised and predominantly non-innovating farming entities that are already working with the city. While on the other hand, innovating farming entities organise separate exhibitions making such events fragmented. Here it should be stressed that Johannesburg can learn from the Berlin International Garden Exhibition that pools many stakeholders and integrates diverse farming systems.

Similarly, when we turn to innovation in planning this notion of scale is critical. Some critiques of planning innovation, question whether the IDPs have achieved much since coming into effect after 1994. While their queries are valid, it can be a matter of over expectations to anticipate one big solution from one planning instrument alone. In response to what planning innovation has achieved since the fall of apartheid, a Manager for South African Cities Network cites the Cosmo City, a mixed-use housing development in Johannesburg as an example. The mode is considered a successful model in providing accommodation to low-income residents. She explains that:

> "Planning in Johannesburg has been experimenting with one park or one building after another and many planners would refer to projects such as the Cosmo City to show that planning has evolved… [she asks] … why do we still have one Cosmo City by now; besides even the Cosmos City has so many challenges of its own" (personal communication, 04 January 2017)?

The Cosmo City project as a unique planning innovation to improve previously disadvantaged neighbourhoods espouses the strategic planning approaches that acknowledge multiple approaches and scales. This is unlike the broad conventional and master planning approach that seeks to provide an overview of the development

of the whole city. Therefore the 'success' of the Cosmos City initiative may require that we narrow our evaluation of plan provisions and IDPs to micro-level projects rather city scale. Therefore, similar to Cosmos City, our assessment of the CoJ's planning innovation for UA may require the assessment of micro-projects. However, the question by the SACN manager remains - these innovation initiatives may result in isolated projects that are not coherently aggregated into a whole.

In the same vein, planning innovation in assigning land for urban farming in municipal plans may require that our analysis should focus on specific and multiple zones and multiple types of formal land agreements for urban farming. As argued on the diversification of UA practices, we can, therefore, highlight peri-urban UA zoning and inner-city temporary lease agreements as successful planning initiatives for UA, while at the same time pointing to the need to address the disparity in the subsequent challenges such as the conversion of UA land to other urban land uses.

6.3.2 Urban agriculture – a subset of land use planning

The Manager for SACN articulates UA's tenuous position by arguing that urban farming is on the fringes of the planning discourse and that its intended benefits are misunderstood (personal communication, 04 January 2017). She bases this on the experiences of SACN, where the section that deals with UA are only invited once out of every ten meetings that other SACN departments attend under CoJ collaboration meetings (*ibid.*). She further observed that this is problematic as the other nine out of ten collaboration meetings discuss crucial city, and planning decisions while UA champions are absent (ibid.). This experience of SACN is among many examples that underscore that UA is relegated to the fringes of the urban management dialogue.

The above findings from SACN as well as interviews with CoJ planners substantiate that the current urban development debates in the built environment are about real estate and transport more than preserving land for UA. A positive development, however, is that the conversations about the environment and city greening are

gaining momentum, which in turn could leverage UA's position in the hierarchy of priorities. That said, the sobering reality is that even this discourse concentrates on public open spaces, preserving waterways, and wetlands more than UA.

The findings from this study reflect that many city greening debates, and land uses are not necessarily about producing food but rather about preserving forests, and biodiversity, endangered wild animals and birds species. Adding to this hurdle, the Manager of SACN acknowledges that the environmental, and city greening debates are still not prominent within city departments, and that in fact "UA is a fringe issue within environmental, and city greening issues that are treated as fringes in urban development" (personal communication, 04 January 2017).

To further unpack the critical issue of prioritisation in land use planning, findings from this study to show that UA is not prioritised by the CoJ Department of Development Planning during the preparation of plans because of the broad neo-liberal development approach that prioritises real estate development. The current peri-urban Urban Development Boundary (discussed in Chapter 4), and the inner city land access arrangements (mostly short to medium-term agreements) make provisions, albeit temporary for urban farming before a planned real estate development. These zoning arrangements are critical in providing land, on short-term, for UA that would not have been available. This strategy also undermines the long-term viability of UA as farmers are incentivised to invest in short-term infrastructure. Despite the IDPs strategies for assigning land for UA, as discussed in previous chapters, these *de facto* realities are fragmented as city departments often contradict each other, as do their differing land use agendas.

Why does this matter? It is critical to understand that efforts to prioritise UA in land use in Johannesburg are undermined by perceptions that UA is temporary, and only makes an insignificant contribution to the city, a view held by planners from both the CoJ and the South African Cities Network. Commenting on these perceptions on UA in Johannesburg, the Chief Executive Officer of the South African Council for Planners observes that:

> "Agriculture land is seen outside the traditional categorisation of land uses in the true sense that includes housing. Agriculture is seen as environmental land use, and this is probably why officials would say our key performance indicators do not include zoning land for farming. They [planners] will see UA on a land use map but that type of zoning is not seen as part of the developed part of the city" (personal communication, 01 August 2017).

UA's lack of priority in the land use planning debates is further underscored by the Head of Agro-processing, Food Resilience Unit who argues that "UA does not feature as a city priority at all in its planning and programming". He further explains that UA is side-lined despite overwhelming evidence that "food security and poverty are realities in Johannesburg" (personal communication, 8 November 2017). However, despite these discouraging findings, it is critical to note that against all these odds UA is an integral part of the city, similar to other subaltern activities as expounded by Miraftab (2009). The subaltern activities such as informal housing and transport, though less prioritised by the city, form an important lifeline and livelihood strategy for residents in Johannesburg. And it is here that this study argues on the relevance of innovation to bridge across these activities that conventional planning would normally side-line.

6.4 The Broad Roles of Urban Agriculture

The sub-section presents the alternative economy and the food security contributions of UA to the city.

6.4.1 Alternative economy for urban agriculture

The research findings suggest that much of UA in Johannesburg cannot supply the formal economy but rather focus on the short value chain (household and local economy). In an effort to address this dichotomy between UA, and the formal

economy, Malan (2015b:62) writes that "if UA aims to relieve food insecurity, it has to develop enterprises that supply fresh locally produced food to those in the informal or almost-formal sector". During fieldwork interviews, the Founding Director for Izindaba Zokudla further expanded this point arguing that the formal economy was designed for large-scale farmers and damage small-scale urban farmers by its pricing and payment models (personal communication, 07 April 2017). The Director's experiences at Izindaba Zokudla were that non-innovating farming entities cannot supply the formal economy but have a massive market next to their gardens, and therefore should target their local communities (*ibid*.). Unfortunately as noted earlier this short value chain supports the local economy that is undocumented and therefore less preferred by UA financiers.

Although it has been pointed out earlier, it is worth stressing again that the analysis of quantifiable benefits of UA is a narrow perspective that under-values it's social and the parallel economy contributions. Unbelievably, that the CoJ Food Resilience Unit supports the narrow quantifiable benefits definition of UA when many of its farmers do not generate income. Battersby and Marshak's (2013) study in Cape Town shows that the focus of UA can also be shaped by institutional factors; arguing that the Urban Agriculture Policy of 2007 contributed towards the UA focus on the quantifiable benefits. These findings explain the neoliberal discourse on the food system in Johannesburg that is acknowledged by Malan (2015b:65) who argues that:

> "The development of packing houses as part of the "Hub and Spoke" facilities and Agri-resource Centres seems to be premised on a mainstream commercialisation model for urban farmers, which is at odds with a local market and retail system, and the need to devote attention to the informal sector".

In addition to the above argument; the Founding Director of Izindaba Zokudla argues from his experience supporting the Imvelo Market, that though this is an informal economy, SOWETO has about a million people, and its vegetable markets is worth more than a million Rand of business per month for urban farmers (personal communication, 07 April 2017) His argument makes the case that UA thrives in the local economy and further elaborates that while a local economy that is well suited to UA exists, it needs to be accepted and restructured (*ibid*.). The Director's main

premise is that the business for UA can thrive even though its philosophy (selling through the informal economy) may not be fully compatible with the expectation of the mainstream economy.

Findings from the study also thus uphold claims by Chitja, and Mabaya (2015) that the formal food chain and supermarkets in South Africa bypass small-scale, and traditional urban farmers. This is despite efforts by some chain stores to link UA with the supermarkets. Interviewed on the role of supermarkets in UA, the Impact Coordinator for UWSA reports that supermarkets such as Pick 'n Pay, and Woolworths have programmes that support small-scale farmers to become their suppliers, consistent with the country's Broad-Based Black Economic Empowerment codes (personal communication, 09 March 2017). However, many such initiatives have proven unsuccessful. For instance, in 2015 a private company in collaboration with an NPO and the CoJ unsuccessfully contracted a farming entity to supply vegetables to its six canteens. This contract collapsed, because, on one hand, the cooperative failed to deliver the vegetables, complaining of low prices paid by private companies, while on the other hand, the company was unhappy with the cooperative's poor health, and safety standards, and failure to deliver the required quantities. This experience typifies the uneasy relationship between the formal economy and non-innovating farming entities in Johannesburg.

With this in mind, it is worth turning to the study by UWSA (2016a) that shows that the supermarkets are not the appropriate market for non-innovating farming entities. The UWSA (2016) study interviewed the City of Cape Town staff and the University of Cape Town researcher. It found that the market solutions for UA do not necessarily lie with the formal economy, such as large supermarkets. Since most urban farmers produce small quantities, value addition through processing, packaging, and labelling becomes an important aspect of the sector to generate more revenue, and hence the necessity of innovation. This claim supports the earlier argument by Malan (2015a) that UA is generally geared towards supporting the local economy. However, a recent study by Battersby and Watson (2019) from the African towns of Kisumu, Kitwe and Epworth shows a symbiotic relationship between supermarkets and the informal economy that include UA.

Since the benefits of UA in the informal economy are clear, one would question why city officials are indifferent about the urban farming sector. This issue is addressed by Watson's (2016) overview of the dilemma of the informal economy in the global South. She argues that cities (especially of the global South) operate in conflicting rationalities between the "states and market-driven by the logic of modernisation, control and profit, and poorer communities are driven by the logic of survival" (*ibid*.:37). This argument speaks to Harrison's (2006) quote at the beginning of this chapter that differing rationalities create elusive, and unpredictable characteristics with regard to planning, and its outcomes in Johannesburg.

With regard to UA in Berlin, Detroit, Havana, Dar es Salaam and Johannesburg, the rationalities for survival, food production, educational purposes, healthy eating, and physical exercise (Novo and Murphy, undated; Halloran and Magid, 2013a, 2013b; Matthei, 2017) motivates urban farming entities to utilise open spaces. In contrast, the market logic of the municipal council prompts them to allocate land to sectors that most effectively utilise land, and generate more revenue. Herein lies the argument that innovation networks support viable avenues that would bring together these competing ends to increase UA productivity and thus enable planning to identify those land parcels that cannot be efficiently developed into real estate.

6.4.2 Urban Agriculture and the Food Security Debates

As has been shown in the discussions above, and in previous chapters, UA makes a variety of contributions to diverse groups of urban residents. This section substantiates the food security and social contribution of UA. From the international case studies, UA contributes towards food security and environmental awareness to large populations in Havana (Altieri *et al*., 1999) and Dar es Salaam (Halloran and Magid, 2013a; 2013b). In Detroit and Portland, low-income residents use UA for subsistence (Rhoads and Quentin, 2009; Paddeu, 2011), while Berliners use the *kleingarten* to 'get back to the soil' in an effort to alleviate the stresses of modern life, as well as for fresh fruit and vegetables (Matthei, 2017). In Almere, UA provides

food, recreation, education and elderly care (Jansma and Visser, 2011). These findings support recent studies in African cities that UA contributes towards improving food security, nutrition as well as social ties (Batterby and Watson, 2019).

In Johannesburg, it is worth re-stating that all eleven farming entities in this study consume some of the food they produce. For this reason, it is significant to delineate the contribution of UA as a sector within the city. Commenting on UA, the Manager of SACN argues that:

> "I cannot see where you can do farming at the scale that can feed the city; my background is planning, and I could be reflecting on this with a planning bias, which could be the same bias from the city planning department. This also explains the reason why they do not talk about farming in the city" (personal communication, 04 January 2017).

This claim critically represents the dominant view of UA from city planning departments. The argument support a study by Horst et al (2017) in the USA and Canada that concluded that UA is a subset and therefore cannot solve all food injustices and urban poverty. The above claim holds water because UA's contribution at the city level is small. The Chief Executive of the South African Institute of Planners broadens the benefits of UA arguing that contributions urban farming should be measured by the savings by communities who cultivate their food, or by improved mental, and physical health as a result, of good eating, and exercise in the garden (personal communication, 01 August, 2017). Adopting such an understanding of UA and could broaden its benefits to residents.

This argument contradicts many UA critics who claim that food security contributions are insignificant because most city residents buy food from the formal economy. In Johannesburg, for instance, some nay-sayers argue that potential UA customers such as supermarkets, restaurants, and street traders buy fruit, and vegetables from the Johannesburg Fresh Produce Market. Both the Manager of SACN (personal communication, 04 January 2017) and a CoJ Senior Town Planner (personal communication, 09 May 2017) affirms in separate interviews that UA contributes less than 5% to the food consumed in Johannesburg. While this study has substantiated

that these statements could be misleading especially in the absence of records. Such claims cannot be ignored because they reflect the dominant perception on the significance of UA in the eyes of bureaucrats, and thus shape their response to UA initiatives in the city.

There are, however, innovative marketing responses that ensure that urban farmers can supply the formal markets especially when supported by a system that subsidises both farmers, and residents. For instance, Malan (2015b) documents the Urban Agriculture Ordinance of 1984 by the City of Detroit that was formulated from a collaborative engagement of academics, planners, and social movement activists. Through the ordinance, farmers sell their products both on the farm and through the American Supplemental Nutrition Assistance Programme (popularly called Food Stamps). Through this system, low-income residents buy local food discounted at 50% through the Food Stamps at municipal markets (*ibid*.). The subsidy is a 'win-win' as it works for both residents and farmers, as farmers are paid the full amount when they cash the food stamps.

The CoJ Department of Social Development's Extended Social Package Programme follows a similar design and links urban farmers, and low-income residents (*ibid*.). The programme buys farm products from urban farmers, and sells, or donates them to low-income residents. However, as highlighted in the findings earlier, non-innovating farming entities (such as BFHC and cooperatives at Eikenhof Farm) cannot supply the city programmes because they cannot meet the required quantities, and consistency in quality required. When this dilemma is situated alongside the international case study, it suggests the need to revamp the Johannesburg programme rather than classify it as a failure.

Contrary to popular views that urban farmers cannot produce enough quantity (Webb, 2011; Seigner et al.,2018), interviews with the Director for Izindaba Zokudla argues that their supported farmers produce enough to supply small business (personal communication, 07 April 2017). He identified a small entrepreneur who produces 30kg of *chakalaka* (a South African mix of vegetable that is served with pap) per day, based on buying all his ingredients from Izindaba Zokudla farmers (*ibid*.). In support of the above, a Head of Agro-processing, Food Resilience Unit

makes an important point in the food security debate by situating the size of the farming enterprise, and scale of production within the production costs:

> "Urban farmers produce for their immediate consumption from their backyard gardens. Those operating from larger plots above a hectare are able to contribute towards food security in the city. Income-generating farmers can pay up to R5 000 per month for land, water, and electricity rates" (personal communication, 8 November 2017).

One of the contributions of UA is that it provides food security to the poorest households (*ibid*.). However, this claim is contested by an AFSUN study in poor areas in Cape Town that concluded that only 5% of the very poor households engaged in UA (Battersby et al., 2013). In the report, the poor resort to other livelihood strategies such as casual labour, self-employment, and letting space (*ibid*.). The Cape Town study concludes that UA is not a significant source of food to the poor households who access food through the social safety nets, and social networks (*ibid*.). My study indicates that some of the farming entities in Johannesburg involve low-income households. Thus, the argument that low-income households access food through social safety nets may explain why non-innovating farming entities in my study have more networks for building social capital over and above the networks for innovation.

6.5 Innovation Network Power Relations and the Institutional Housing for Urban Agriculture

This study has shown that innovation networks can result in shifter power relations between actors within the UA networks. This section narrows down this analysis of power relations to municipal institutions and farming entities, and supporting institutions such as city departments that oversee UA.

6.5.1 Power relations and institutional housing for urban agriculture

The study has found that the challenges affecting UA prioritisation go beyond mere assigning land for farming, and securing the market for farm products. The international evidence shows that UA has a weak institutional setup in municipal departments in Berlin, Portland, and Dar es Salaam that have no department of UA (Table 6.1). As an exception, the city of Havana has an Urban Agriculture Department that collaborates with the Department of Urban Planning in developing zoning plans, and guidelines for securing land tenure, thus providing a firm framework for allocating land for farming (Novo and Murphy, undated). This strong departmental structure could be credited as the basis for the success of UA in Havana.

In contrast, the Berlin's Senate Department for Environment, Transport, and Climate Protection has three sections of Environment, Transport and Climate Protection that are responsible for green spaces, but none of them works with UA, food production or landscaping (Matthei, 2017). Likewise, in Portland, the Community Garden Program is run by the Department of Parks and Recreation providing primary focus on land for gardening, training as well as equipping farmers. However, this department is largely responsible for and would prioritise parks.

Within the southern African context, experiences from Dar es Salaam show that the municipalities of Kinondoni, Ilala, and Temeke have Agriculture and Livestock Units responsible for the capacity building of farmers, and extension services. Despite this

level of institutional recognition, the units are sections of other departments, with weak mandates for promoting UA. This poor institutional setting for UA in Berlin, Portland and Dar es Salaam could relate to the lower prioritisation of the sector.

Similar to the international experiences, the CoJ Food Resilience Unit is a section of the Department of Social Development that support non-innovating farming entities. Additionally, the CoJ Department of Economic Development works directly with small farming businesses (innovating farming entities) in promoting the development of small enterprise. This further fragments the structure that supports UA in Johannesburg, especially in the absence of a clear strategy of how non-innovating farming entities in the Food Resilience Unit graduate to innovating farming entities in the Department of Economic Development. This fragmentation between departments working with innovating and non-innovating farming entities at CoJ further weakens their ability to engage the Department of Development Planning, which is responsible for land use planning. Despite this weak structure, Malan (2015b) acknowledges the CoJ's efforts towards the recognition of UA at a higher level through the establishment of a Mayoral Expert Panel on Food Resilience. An officer within the Food Resilience Unit commented that the panel only advised the previous ANC mayor on food policy, and strategies and this approach was discontinued under the current DA Mayor (personal communication, 8 November 2017).

Acknowledging this weak UA institutional structure, the South African Cities Network (SACN) comments that "there are [in South Africa] no local government departments of Agriculture, Forestry and Fisheries, Health or Education (with the exception of the City of Tshwane's Agriculture and Environmental Management Department), food security is overwhelmingly identified as a rural problem" (SACN 2015: 54). The insights from these city studies converge on the view that UA is not sufficiently prioritised at the municipal level, which in turn influences the continued marginalisation of UA through land use planning instruments.

Table 6-1: Municipal department or unit for UA

City	Key actors in UA innovation	City Department assisting UA	International city experiences
Almere (neoliberal planning innovation network platform)	City departments, Ministry of Agriculture, Farmer's representatives, business associations	Not stated	Consensus on the integration of peri-urban agriculture into the city plans
Berlin (neoliberal planning innovation)	City, Federal Association of Kleingarten, NPOs such as GRÜNE LIGA, Humboldt University and schools	Environmental, Transport and Climate Sections are responsible for green spaces but not UA	A strong association of farmers and NPOs are critical to support farmers where the city does not deal directly with UA
Dar es Salaam (pro-socialist government with neoliberal planning innovation)	City, municipalities of Ilala, Kinondoni and Temeke, University of Dar es Salaam, Ardhi University, Sustainable Cities International, UN-Habitat, Food and Agriculture Organisation	Agriculture and Livestock Unit	Strong collaboration between city, NPO and universities
Detroit (neoliberal planning innovation network platform – collapsed land markets)	City departments, government departments, Farmer's representatives, NPOs	Not stated	Strong vision that UA is strategy towards sustainability in the shrinking city
Havana (neo-Marxist planning innovation)	City, Ministry of Agriculture, Provincial Departments, research institutions	Urban Agriculture Department	Strong will from state and municipal department promoting UA supported by extensions services

Portland (neoliberal planning innovation)	City, NPOs e.g. Zenger Farm and Growing Garden, Portland State University, Portland Food Policy Councils, Bureaux of Water, Parks and Environmental Services	Community Garden Program in the Department of Parks and Recreation	Strong collaboration between the city and other actors, especially the university

6.6 Micro-macro Level Debates on Urban Agriculture

The findings of this study show that the micro-macro-level discourses affect, and shape UA at local levels. An understanding of macro and micro contexts helps us appreciate how local realities interplay with the dominant global international economic, and development trends, national policies, and frameworks. The success of UA in Havana after the Cuban food crisis shows the influence of macro-level policies on UA programmes and projects at the local level. Cuba's political isolation (though it still had links with the communist bloc) was not overly influenced by global macro-economic trends; similar to South Africa during apartheid (though it had strong influence from neo-liberalism). Cuba's national policies and programmes supported nation-wide agriculture interventions with an emphasis on UA in Havana. As a result, food production increased from almost nothing to 8 000 official agriculture production units employing 30 000 workers in less than ten years by 1998 (Novo and Murphy, undated).

Study findings affirm Battersby *et al.*'s (2013) argument that a gap exists between the policies, and practice where the central government supports provincial departments with resources, and expertise for agriculture in line with the National Constitution of 1996, and the NDP of 2030. However, the CoJ departments are empowered by IDPs, and Food Resilience Policy to implement programmes, and projects in UA with no central government budgetary allocations. In support of Battersby *et al.* (2013), the South African Cities Network (2015:54) concludes that "there is currently no formal mandate for local government to address food security". Unlike the strong political will that transformed UA in Havana, the micro-macro level support programmes in Johannesburg send a weak signal for the sector, hence the half-hearted support from other municipal departments, apart from the Food Resilience Unit, and the Department of Economic Development implementing it.

A key finding in response to this fragmentation is that innovation network across UA and land use planning in Johannesburg offer solutions to micro-macro level distortions such as farmer support programmes. For instance, the fragmentation between national and local policy, where the National Constitution gives the mandate

for food security to provinces whereas city departments have a similar responsibility with no budget was streamlined through multi-stakeholder collaboration at the Eikenhof Farm project. In this project, the central government, through GDARD, provides funding while the city provides land, and identifies pilot farmers, and has mobilised NPOs to offer training.

The micro-macro level relationships are also affected by policy contradictions. In Johannesburg, the Department of Development Planning and the Food Resilience Unit support UA in opposing directions. As described earlier, the Food Resilience Unit recognises UA as a long-term initiative to support households, and promote food security for the city. On the other hand, the Department of Development Planning, and the Johannesburg Property Development Company perceive UA as a temporary 'place holder' before the planned long-term development.

A prime example is when the Johannesburg Property Development Company (JPC) gives UA leases on council land with the aim to generate income for the city. Therefore, the company would rather prioritise property development initiatives that pay land rent, or give temporary leases to farming practices until an appropriate offer is received. It is important to note that these neo-liberal perceptions strongly influence JPC's responses and efforts towards UA.

6.7 The Economic Argument for Urban Agriculture in Johannesburg

A critical question in the UA debates is whether farming is economically viable to generate sufficient income to cover its operation costs, or not. Such debates have stretched the question further to ask whether UA can compete with other economically viable land uses. The second half of this question cannot be answered by this study, since from the onset it accepted that unless under a collapsed land economy as such as was experienced in Detroit, UA cannot compete with real estate under conventional urban development. However, the first half of the question on UA covering its operational costs aligns well with the idea of innovation that requires

farming entities to improve operations and organisational management. Innovation requires UA to adopt improved farming methods, and utilise land optimally.

6.7.1 Urban land economics

The value of land is a unique determinant of what activity is located where in urban land use planning for the city. In support of this claim, the senior town planner of the CoJ argues that the importance of UA in land use planning is influenced by the ability of the sector to pay land rent (personal communication, 09 May 2017). He argues that this concept explains why the CoJ is largely an urban municipality, and agriculture is a small part of the economy, and most of the food consumed in the city (probably more than 90%) comes from outside the city (*ibid*.). To prove this point, the senior town planner argues that homeowners in SOWETO make more income from letting a backyard room than from a garden, even though this is outside the inner city (*ibid*.). In line with this argument, in peri-urban Johannesburg, the demand for rental accommodation declines and residents in these outskirts may make better use of the land through gardening.

The zoning of Johannesburg mirrors the above arguments. The peri-urban areas such as Eikenhof, the Greater Kyalami Conservancy, and Klipriviersberg Economic and Ecosystem Development Zone are known for UA initiatives. However, even in this peri-urban area, the land is under threat from property developers who contend that they can make more income through property development than farming. UA may indeed improve output through innovation, However, using this argument, farming land cannot compete with property development, and would, therefore, require some municipal protection beyond urban land economics. To justify such protection measures, it should be emphasised that apart from economic arguments UA has social benefits, as has been alluded to earlier, and also discussed in detail further on in this chapter.

The same scenario affects decisions by the Johannesburg Property Company (JPC), which manages and leases out council land (*ibid*.). The dilemma is that JPC has

both an economic and environmental as well as a social mandate to preserve the city. The JPC has a financial mandate to increase its revenue for the city to ensure efficient service delivery. In this regard, the senior town planner reasoned that when City departments meet in high-level meetings, the financial mandate on how the City can increase its income on a proposed piece of land gets the upper hand over environmental, ecological, or UA issues. However, the urban land economy has a bias towards a narrow aspect of the City economy. There is a strong argument that this approach should change since there are many social and recreational benefits that the City offers to residents that make cities more liveable spaces.

6.7.2 Neo-liberal planning and urban agriculture in Johannesburg

One may query why economic arguments for UA are so important in Johannesburg. Historically, the neo-liberal development paradigm for the CoJ dates back to pre-1994. Harrison (2006) documents the central government's intervention to rescue the CoJ from the financial crisis in 1997, and the resultant commitment by the City manager to create an efficient business environment, emphasising competitiveness, and global city status. While the ruling ANC policies in 1994 were more social-driven, under former President Thabo Mbeki a little later on this position significantly shifted towards a neo-liberal economy. In support of the above Todes (2012) observes that Mbeki challenged the CoJ to prioritise economic growth in 2007 in support of the country's planned 6% growth rate. These developments further entrenched the city's business-friendly competitive strategy, and business principles in operations as well as planning instruments.

Commenting on the *de facto* consequences of this neo-liberal planning framework, the Manager for SACN argues that South African cities are privatised, and designed for users who pay for services rendered (personal communication, 04 January 2017). However, this planning framework is contra-indicated for a city suffering from a high unemployment rate of about 26.2% (CoJ, 2016a), and thus many residents cannot afford the cost of services without some form of subsidy. This contradiction

leads to the conclusion that there are many residents engaged in parallel economies such as informal trading, and transportation which is similar to non-innovating UA practices.

On the other hand, measuring the financial viability of UA projects is relevant since the sub-sector also requires capital investment from municipal authorities, central government, and the private sector for the procurement of equipment, and machinery. Project financiers may want to compare the investment in UA infrastructure *vis-à-vis* the opportunity costs of alternative projects. In support of the literature reviewed, cooperative farming entities in Johannesburg such as Three Kotze Street Rooftop Garden, Tshwane Food and Energy Centre, BFHC, and Eikenhof Farm Cooperatives cannot cover their operating costs. NPOs such as Growing Healthy Farms, Wits Siyakhana, and Wits Inala Forum also struggle to cover their operating costs, and only survive through grants, and subsidies. Innovating farming entities, for instance, Growing Healthy Farms, Planner Bee Plant Care, Rydawi Aquaculture, Wits Siyakhana, and Serapang sa Basadi diversify their operations through initiatives such as organising tours, ecotourism, training other farmers, selling semi-processed products, and equipment to raise additional revenue. However, even innovating farming entities cannot compete with real estate development. Therefore, UA requires an innovative response through land use planning.

When the argument of economic viability is contextualised within local governance, the senior town planner comments that when one analyses the three pillars of sustainability, which are economic, social, and environmental, the economic issues are prioritised by CoJ. This is because it is easier to measure, report, and put on the scorecards. He adds that the city is under pressure to deliver on economic rather than environmental targets because of existing inequalities. City entities such as Johannesburg Property Company, City Parks, and City Water (that have a bearing on land, and water, and thus interact with UA) are private companies fully owned by the city with a strong mandate to be economically viable. However, the scale of economic activity is also critical, as will be discussed in the next section.

6.7.3 Economic and Local Economic Development

During fieldwork interviews, the Manager for SACN elucidates that Johannesburg's economic initiatives are divided into two categories: (i) local economic development, and (ii) formal economic development (personal communication, 04 January 2017). She elaborates that on the one hand, economic development is concerned with the formal economy that comprises large corporates, supported by good legislation at both local and national levels (*ibid*.). This claim supports earlier arguments by the CoJ senior town planner to the effect that for CoJ planning is neo-liberal, and prioritises financial viability. South Africa priorities neo-liberal policies and the investment climate are critical for attracting investment that targets large corporates. In contrast, Local Economic Development (LED) concentrates on small projects for poverty alleviation, targeting low-income residents at the local level (*ibid*.). The LED programmes are made up of community projects such as small enterprises (such as bakeries), or UA projects. The Manager at SACN's assessment is that municipal LED projects are divorced from real economic development policies, and programmes that target big corporates, and retailers (*ibid*.). Similar to the fragmentation in UA that separates innovating, and non-innovating farming entities between the Food Resilience Unit, and the Department of Economic Development; this is another example of fragmentation between departments working with small, and large-scale economic investment projects. The trend of disjointed efforts between actors is mirrored in City departments working with UA, and economic development which further undermines the effectiveness of development strategies. This begs the question, how these two factors can be reconciled with the UA dialogue.

At CoJ, and other cities in South Africa the two economies (formal and informal) are treated separately. They are run by different departments, hold separate investment promotion *indabas,* and target different audiences. The Manager for SACN adds that LED initiatives target low-income residents while major decisions on the future development of the city are made in consultation with the large corporates (*ibid*.). The *de facto* upshot is that UA is treated as an LED project with the involvement of

urban farmers, and supporters which contrast strongly with major decisions and process for the City. In other words, the farmers, and their land use needs are excluded from the critical land allocation decision making process.

The two economy discourses support earlier arguments that UA is only discussed in one out of ten CoJ stakeholder meetings. Speaking to this dynamic, and its impact on UA, the Chief Executive Officer for SACPLAN concurs that UA becomes relegated to an alternative economy because it cannot produce the volumes to supply the formal Johannesburg Fresh Produce Market, or supermarkets (personal communication, 01 August 2017). Even with current initiatives in South Africa where big companies partner with, and build the capacity of small UA entrepreneurs, the Chief Executive Officer for SACPLAN argues that supermarkets would rather work with one large supplier delivering a ton of agriculture products than enter into agreements with a 100 small-scale urban farmers delivering small quantities (*ibid*.).

6.8 Challenges of establishing Innovation Network Platforms for Land use Planning and Urban Agriculture at the City of Johannesburg - Old Habits Die Hard

Given the analyses thus far, the key question becomes: how successful are innovation networks in influencing innovation in assigning land use planning for UA? Findings from this study are explicit that there are potentials for establishing a platform for innovation networks across UA and land use planning in Johannesburg. But that this potential will only be realised with a broader understand (and 'buy-in') of the real, non-economic value that UA can contribute to the city.

The marginalisation of UA may show that Johannesburg has not significantly changed to reflect the new planning regime since 1994. One would pose the question: are there not sufficient principles of innovation networks present across the two sectors? Studies on the shift from master-planning to contemporary approaches show the stubborn resilience of the apartheid planning system in Johannesburg, and South African cities (Watson, 2009, Todes *et al*, 2010). The land is so critical to UA

that the systems managing land should be influenced by the changing planning instruments to support the sector and to accomplish any of the re-patterning of the city discussed above.

One reason why conventional planning approaches persist is the system of access to land is land tenure. Analysing the land management system, Watson (2009) observes that whereas plans are sometimes changed by the new administration; however, outdated urban land laws persist and are the hardest to change since they allocate rights to the powerful groups, a practice all too often supported by the state. In Johannesburg, IDPs are examples of planning innovation that changed the planning terrain at the city level. However, the land management systems that control land sub-divisions are still largely pre-1994 tools. In this context, the new planning frameworks, the IDPs, appear as a parallel planning system, similar to new wine in old bottles.

6.8.1 The city structure for land use planning

At the core of the value, I see in innovation networks for UA is the need for municipal councils and urban farmers to transform their operations and thus their organisational structures. It's critical to understand that innovation networks do not only use inter-relationships that improve products or services, they also influence changes in the organisational structure itself.

In her study of innovation systems in planning in Pretoria, Karuri-Sebina (2014:241) queries "whether planners have the competencies and ideological inclination to be trusted with genuinely driving a transformative agenda". This question boldly challenges planners and municipal councils to proactively facilitate rather than inhibit change. The risk that innovation networks pose to the old frameworks at the city level is thus the changing power dynamics and undermining the privileged role of planners in guiding urban development. Therefore it is likely to experience push back.

In reality, innovation requires a total mind shift and, therefore, entails new processes that require knowledge, and expertise to foster change in perceptions, and operations. The study findings show that planners, and even farming entities, are often impatient with the long and protracted processes of up-skilling towards utilising the new technologies. For example, I observed during my extended participant observation that many farming entities do not complete the training required to operate new equipment, thus resulting in under-utilisation of the new technology.

Commenting on planning innovation in Johannesburg, the Chief Executive Officer of SACPLAN was categorical that:

> "City planning has not changed and is not going to change in the near future. There are sections of CoJ [that have changed], such as Forward Planning which typically works towards innovation. However, the general trend is that the day–to-day operations are not going to change" (personal communication, 01 August 2017).

He further added that:

> "Planning is too legalistic, it is largely driven by 'lawyers', rather than 'planners', who would want to figure out how we can stop a new development rather than [asking] how can we work within the existing legislation to enable something" (*ibid*.).

The above claims elaborate the tendency by planners to deny new development applications if it does not meet the requirements rather than asking how best they can accommodate it (*ibid*.). The foregoing summarises the gatekeeper mentality among planners and city officials that negatively impacts on dialoguing towards formalisation of UA.

6.8.2 Has planning fully transformed?

Under the conventional planning model, planners enjoy the driver's seat in guiding urban development. Planning innovation, on the other hand, increases networks, and hence stakeholder engagement, making planners only one type among many other professionals in urban development. This result in a scenario where planners are likely to resist or may lack the confidence to manage the process. This is supported by Watson (2009:158) who argues that planning innovation entails a change in the roles of planners from a dominant one to "just one of a range of players" which leaves many planners confused about their new roles, and thus, all too happy to support the status quo. With this gatekeeper attitude, even though a UA project may not contravene any planning provisions, and is supported by other actors, the immediate response may be that farming proposals are illegal. An officer of the Food Resilience Unit concurred during fieldwork that planners are often too rigid addressing new development proposals when they do not meet the rigidly set status quo criteria.

It is critical to underscore that innovation in assigning land uses for UA requires planners to go beyond their normal guidelines, and actively consider opportunities to assign land for farming in open spaces, parks, and vacant plots. The CoJ planning legislation already offers these land use options. However, the challenges in accessing temporary land use relate to bureaucratic procedures by the Department of Development Planning, and the JPC in processing the Food Resilience Unit, and farmer applications.

Parallels can also be drawn with farming entities that show a lack of enthusiasm for embracing innovation, despite findings that non-innovating farming entities in their current state will not derive maximum benefits from UA. Findings on the eleven farming entities show low productivity among non-innovating farming entities in comparison to innovating ones. However, some non-innovating farming entities have also demonstrated a lukewarm approach to the adoption of new technology. The call for the transformation of planning, and UA thus supports Schumpeter's innovation

theory which argues for structural, and technological reconstruction of the economy, firms, and institutions to ensure dynamic economic growth (Bazhal, 2016).

An academic from Wits (personal communication, 04 January 2017) concludes that the current friction between planning, and environmental issues, which include UA, indicates that the South African planning system is still untransformed. The academic's working experience with the Commission and Research on Policy and Land Use Planning indicates that residents are afraid of developing land where historical experience and the legal system are not supported. In summary, the fragmented policy provisions, and departmental collaboration for UA, the diverse land access arrangements, and the lack of municipal support for UA thus constitute an inhibitive hurdle to investment in urban farming.

6.8.3 Who benefits from planning and urban agriculture innovation networks?

Although it is useful to draw from international experiences, it is essential to point out that planning innovation in the global South should be driven as a response to local, specific conditions such as poverty, informality, environmental issues, and climate conditions, or change. It is also worth remembering that innovation has strong business connotations, and, therefore, municipalities may need to operate like business entities that organise their visions and organisational structure for guiding their investment decisions.

Given these two statements, it is necessary to acknowledge that implementing such platforms of an innovation network within existing local conditions creates dichotomies. The consequence can be seen in the conventional master plans that have tended to persist despite lack of systematic implementation. In contrast, contemporary planning instruments such as IDPs are strategic, integrative, and inclusive of local conditions as well as connecting plans to budgets in order to aid implementation. Surprisingly, principles of conventional planning remain entrenched within municipal authorities long after they have been replaced by the new planning

framework, with Dar es Salaam and Ekurhuleni as prime examples (Todes, 2012; Kasala, 2015). Among other driving factors the inertia sustained by the fact that planners continue to be trained in schools that still teach these outdated approaches (Siame, 2018).

It is critical to question who benefits from planning innovation. For instance, the celebrated Barcelona Strategic Plan focused on positioning the city in Europe rather than addressing environmental concerns (Watson, 2009). Similarly, the CoJ IDPs are biased towards positioning Johannesburg as a world-class African city. The world-class city project mobilises resources towards massive "global positioning" projects and one can (should) question how these projects promote city resilience and sustainability, especially with regard to the urban poor. Such massive projects predominantly shape and give a certain identity to the city, when what is needed is a balance between poverty alleviation and inclusivity, and global positioning.

One of the challenges of innovation networks is that they become the space where these differing agendas meet, thus have the potential to incite power hierarchies. Some city departments and communities are invited to spaces where network actors have little power during the planning process. A key question stemming from this is: to what extent will the CoJ Department of Development Planning allow communities to influence planning and with what results?

To explore this concept, I consult Miraftab's (2004) notion of invited spaces where grassroots organisations either occupy spaces legitimised by the authority or invented spaces where they confront the status quo. Karuri-Sebina (2014), in her study in Pretoria, applied Miraftab's concept of invited spaces, showing that peripheral issues and groups have little leverage on the planning system. UA is a peripheral subject in city planning that faces the same scenario, and as a result, UA practitioners and champions (city departments, NPOs, and farmers) have little leverage for its inclusion through such invited spaces.

In another example, the local/global binary that has played out in the transport industry in Johannesburg offers experiences for planning innovation for UA as well. The planning of the Bus Rapid Transport System in Johannesburg is an example of

the global positioning projects discussed above. It was coordinated with the Gautrain (a high-speed train implemented for the 2010 FIFA World Cup) and included intensive negotiation with the informal taxi industry which serves the everyday transport needs of the majority of lower-earning urban residents to the black townships (Todes, 2012). As a peripheral industry, though the taxis have had some innovations over the years that include terminals, bigger vehicles and rank marshals who organise passengers, the industry remains informal and not fully integrated into the city's overall public transport system.

In Johannesburg, it can be said that UA appears to follow the taxi industry trajectory. While innovation improved the taxi industry, do the industry's negative aspects - for instance, poor safety and violence - outweigh the benefits? While innovation and networks were shown in Chapter 5 to improve farming methods, quality of products and targeting of customers, the question arises if these improvements enable UA to effectively utilise land, pay land rents and turn a profit as demanded by planning decision-makers?

To this extent, UA and the taxi industry exemplify what Watson (2007) acknowledges as the conflicts of rationalities and Harrison (2006:328) terms 'the intersection of multiple rationalities' in cities of the global South. These conflicts are "between an increasingly informalised and marginalised population and techno-managerial and marketised systems of government" (Watson, 2007:2272). She further elaborates that these conflicts are a "conflict between the rationalities of governing and administration, and rationalities of survival" (*ibid*.:2272). This is a dynamic that parallels the food security dialogue above. It, therefore, begs the question of how cities can balance the different logics of governance with strategies for community survival, and resilience.

6.9 Innovation Networks and the Sustainable Cities Debates – Social and Environmental Arguments for Urban Agriculture in Johannesburg

Findings from this study confirm the argument by the Resource Centres on Urban Agriculture and Food Security (RUAF) that UA is not always financially viable. At the same time, it should be pointed out that the findings also support significant unquantifiable value in UA, as was outlined above. The Director of the RUAF Foundation, in her keynote speech at the International Urban Farming Conference in Berlin in 2007 (Dubbeling, 2017), questioned the expectation that UA should be financially viable. Instead, she argues for subsidies for those urban farming practices that have social and environmental benefits such as city greening, and agro-ecology, nutrition, and exercise (*ibid*.). The argument is supported by the experiences of Growing Power Aquaponics, one of the most successful urban farming initiatives in Chicago, and Milwaukee (Bybee, 2012). The NPO receives donations, and in turn, subsidises food to low-income city residents.

The CoJ IDPs present UA as a sustainability and city resilience strategy that provides food, livelihoods, and income to the poor, and city greening to all urban residents. This UA strategy supports Simon's (2016) claim that UA is a green agenda in the sustainability discourse that offers stormwater interception, subsistence, commercial livelihoods, and physical health. The sustainability debate is about striking the balance between the competing economic, social, and environmental sectors. This triple-bottom-line is based on consensus building which should be pursued through win-win solutions among competing ends (World Commission on Environment and Development, 1987). This factor ties into the CoJ senior town planner's earlier argument that the CoJ often prioritises economic targets which are easier to assess in projects. However, in reality, win-win solutions are rare to achieve since societal interests are often irreconcilable, and thus one sector may subordinate the other. In this regard, one may question whether innovation networks may result in win-win solutions between competing social interests in UA, and economic interests in urban land use planning.

In neo-liberal economies such as South Africa, the environmental and social sectors are often subordinate to the extractive industries. Even city planning policy discussions express this bias. For instance, I attended a CoJ presentation on the second draft of the City of Johannesburg Land Use Scheme of 2017. The meeting lasted for over two hours with lengthy discussions on broad sections such as land development rights, the management of land development, and the promotion of land development. During the last discussion on environmental issues, participants switched off, and started packing up their laptops, and folded their notepads to signal the end of business. This body language summed up the importance granted to the subject. With no more discussion, the convenors concluded by saying environmental issues will be streamlined into all the sections of the policy. A strong argument, (as presented below) can be made that CoJ planning treats the social sector in much the same way.

In Johannesburg, UA is classified among green spaces, and often rents parks, for instance, the Wits Siyakhana Initiative in Bezuidenhout Park. Within this classification, UA competes with recreational spaces, which are public spaces that constitute a public interest, and therefore have more support among city residents during negotiation of space within council plans. UA is also practised in private conservancies such as the Greater Kyalami Conservancy, such conservancies concentrate on biodiversity with endangered species as the key concern.

Practices on rooftops gardens, such as those located on 3 Kotze Street are on the rise in inner-city areas of Johannesburg such as Hillbrow, and downtown. For holistic city greening, and urban resiliency schemes to become viable, these rooftops gardens must be linked to sustainability strategies such as green building designs, and the recycling of greywater. Where the farming opportunities support Simon's (2016) urban greening initiatives such as the smart, and eco-city concepts. My interviews with an anonymous city planner indicate that the CoJ policy on rooftop gardens is unclear, and property owners can practice gardening as long as they do not alter the design of the building. However, the smart, and eco-city concepts are often criticised as being out of touch with the poor; rather emulating modern and

capitalist initiatives that erase local initiatives while targeting the middle-class and the elite (*ibid*.).

Interviews with the Managing Director for Planner Bee Plant Care, add another perspective of UA in Johannesburg. From the perspective of her experience with small-scale farmers, She argues that "UA may not be driven by profits alone, but caring for the environment, and providing nutrition to residents" (personal communication, 02 March 2017). She underscores that:

> "If you are an urban farmer, you will never drive a Mercedes Benz. But if you supplement your income by what you farm, you are healthier, and you have less medical bills; you don't destroy the soil with chemicals, and poisons" (*ibid*.).

This argument presents urban farming as an alternative economy that contributes to the household and the local community. The Managing Director for Planner Bee Plant Care further elaborates that:

> "A young high school, or university graduate with aspirations of a big car, and a big house will never get this from farming vegetables. This is the reason why UA is attractive to old *gogos* [grandmothers]. These women get R1 500 government subsidies; however, they supplement this income by growing food to send their grandchildren to school" (*ibid*.).

It is clear from the Managing Director for Planner Bee Plant Care's argument that non-innovating farming entities have low returns. This argument confirms findings from studies in Cape Town by UWSA (2016a) where the majority of Abalimi Bezekhaya farmers are old women with government grants who require additional income in order to survive. The youth with no additional income will, therefore, find UA an unattractive profession (*ibid*.).

To this end, Malan (2015b) argues that promoting UA requires a strategy that aligns with social innovation rather than classic economics as UA realises significant social benefits. Literature appraisals support views that UA increases the supply of fresh food to cities, creates decent livelihoods, reduces waste, and creates employment, and improve the adaptive capacity to climate change (Dubbeling *et al*., 2010; Van

Averbeke, 2007). An example of this strategy can be seen in UA supplying school feeding schemes, while subsidised by the state, as in the case of the Food Movement in Detroit (*ibid*.). In support of the above, a study in South Africa by UWSA (2016a) argues that many UA interventions address livelihoods, food security, and nutrition, including community building that creates social cohesion among residents.

In contrast to the academic studies supporting UA's value for social cohesion, or capital, residents suggest a different narrative. The Managing Director for Planner Bee Plant Care observes that UA in South African cities was traditionally practised by the white community during apartheid who had large gardens (02 March 2017). Many of these gardens were kept by cheap black labour, and the psychology and this history could have worked against UA's widespread acceptance. A GDARD officer also adds that UA is less attractive in many townships in South Africa because a good proportion of the residents traditionally gardening was used in elementary school as a form of punishment for bad behaviour (personal communication, 2 May 2017).

6.10 Summary

This chapter has presented substantive findings which show that due to prevailing marginalisation of UA the city fails to support an ecosystem with potentials to effectively innovate across farming and land use. This dilemma can largely be laid at the feet that UA does not make a significant contribution to the *economy* of Johannesburg.

At a macro level, South Africa's middle-income economy and neo-liberal planning framework relegate UA to the urban fringes both spatially as well as in the process of decision making. Firstly, this is significant because, from the experiences of Detroit and Havana, the macro-level policy support and politically mobilised actors towards a consensus that UA was a solution towards a shrinking city economy and food crises respectively. This consensus mobilised resources and created institutions

such as city departments, promoting liaison between the city and central governments, and research and training institutions to spearhead UA innovation for development.

At micro-level, the notion that UA makes a minor impact on the city economy is contested since parameters for measuring its contribution are biased towards quantitative evidence in line with the formal economic while contribution. Even given the policy support of the IDPs and the CoJ's moves towards a sustainable city and practices of resilience, while discounting UA's social, community and environmental benefits continue to be lost in the land use decision-making process.

This process makes the findings from this study, which show that UA (especially non-innovating farming initiatives) makes a significant contribution towards the local community in Johannesburg (which constitutes the short value-chain) and is largely part of the informal economy. Thus it should be argued that UA also contributes towards social issues which cannot be measured through quantitative data. However, these perceived minor contributions of UA strongly support the claim that the sector should be further enhanced through innovation even if it retains its informal character.

The chapter has also shown that the level of the organisational framework, as well as UA, presents critical limitations both at municipal authority and farming entity levels in Johannesburg. Similar to Dar es Salaam, the CoJ Food Resilience Unit is a section of a department with limited resources. Further, the farming cooperative model lacks group cohesion via a weak mandate for the chairperson which in turn leads to weak stimulation of innovation.

It's critical to note that just such institutional weaknesses affect power relationships at municipal council and farming entity levels, and therefore the overall capacity to transform the sector. Best practices from Berlin, Havana and locally farming networks such as Abalimi Bezekhaya offer critical experience on establishment of associations to support farmers, the collaboration between city departments, bulk procurement of inputs and the joint marketing of farm produce for urban farmers.

Importantly the dynamics in these examples address power relations in line with the principles of innovation network theory.

In contrast, in Johannesburg, at the city level, UA suffers from the fragmented institutional responses that effectively weaken its capacity building for farming initiatives and disaggregate programme support for farmers. The CoJ Department of Economic Development and the Food Resilience Unit support innovating and non-innovating farming initiatives respectively, nevertheless with no coordination of efforts or methods of graduating farmers from one department to other. As a result, any ecosystem gains – even if towards economic viability in the eyes of land use - are lost.

Supporting what is in effect a misalignment of a common vision forward the Department of Development Planning collaborates indirectly and offers land to farmers through the Food Resilience Unit and the Johannesburg Property Company. It is just such 'misalignments' that further strengthen the call for interdepartmental collaboration.

This fundamental crack in the city's response to urban farming presents a bottleneck to both planning and UA innovation as departmental and stakeholder collaborations, both of which are critical tenets to both innovation networks and South Africa's IDPs. The examples discussed of diverse programmes that in reality create disharmony in departmental efforts further undermines opportunities for collaboration and therefore towards innovation networks across UA and land use planning.

CHAPTER SEVEN: KEY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

7 Introduction

This study sought to understand the potential of applying innovation network theory across the sectors of UA and land use planning as a mechanism to overcome the deadlock of UA as a viable long-term land use within urban planning decision making. In other words, in the Johannesburg context, could inter-sectoral collaboration through innovation networks bring about a broader understanding of UA's contribution to the city sufficient to mitigate the power dynamics of the market-driven development environment, thus allowing a formalized existence for UA within South African's progressive development policies for spatial equity, sustainability and resilience?

To this end, the study brings together and shows the relationships between the three central themes that anchor the research, which are the marginalisation of UA, innovation networks and formalisation through land use planning. These themes revolve around the cities' needs for food security, UA's productivity and land utilisation, as well as a municipal response through land use planning. It's worth reiterating that the original research design using innovation network theory arose from my observations that despite innovations within farming practices, which can indeed increase productivity, and innovations in land use planning, such as the IDPs discussed throughout this study, such intra-sectoral innovation alone have not proven effective towards stabilising UA's place in the city.

The broad findings from this study are that: first, traditional urban agriculture is marginalised by conventional land use planning processes primarily due to its poor productivity and inefficient land utilisation, but similarly, innovating farms are also

marginalised. Second, the principles of innovation networks were identified in the practices carried out by some international case studies (Almere, Detroit and Havana) supporting my study's original supposition that innovation networks could provide the platform for a collaboration between urban agriculture and land use planning actors towards the formalisation of UA as an urban land use. Third, stakeholder power relationships display influential actors in both UA and land use planning. Forth, both food security and social capital, though often hard to quantify, have been substantiated in this study as the 'silent' but critical benefits of UA that justifies its role. Fifth, currently the formalisation of UA through permanent land use zones or formal temporary land access agreements continues to leave UA precarious because of the ongoing practice of reversing these decisions. Lastly, the neoliberal economic framework and its agendas for international investment and in support for resource extraction, overall influences land use planning and in turn UA policies, and thus the long-term relationship between them.

This final chapter revisits the study's research question through concretising the key findings along with its limitations and assumptions, theoretical and practical implications. It then summarises the study's contribution to knowledge around key areas of the relationship between UA and land use planning. Finally, it suggests areas for further research on the future of UA and contemporary planning.

7.1 Key Research Findings

I revisit my original research question as a way to highlight key findings from the study: What are the limits of innovation networks in urban agriculture and land use planning towards influencing the formalisation of urban farming within the market logic of assigning land use?

7.1.1 Marginalisation of urban agriculture by land use planning

Critical to informing this question became realising that currently marginalisation to peripheral – less valuable – land has become the prevalent trend in neoliberal market-driven land use decision making in cities around the world. This study shows through such international case studies as Berlin and Dar es Salaam and in empirical research from Johannesburg that traditional (and at times even innovating) urban agriculture is marginalised by conventional land use planning because it continues to be rooted in market logic. Traditional urban agriculture, whether subsistence in Dar es Salaam (Halloran and Magid, 2013a), recreational in Berlin (Matthei, 2017) or business oriented from empirical evidence in Johannesburg, are characterised by poor productivity and inefficient land utilisation and therefore become an easy target in the 'old wine' argument for real estate redevelopment. And as was shown in the findings in Chapter 5, even innovating farms cannot improve productivity to the point that they can viably compete with other land uses on a strictly economic level.

Further, the study shows that even in cities which have witnessed planning innovation that that innovation has not extended to UA. Even planning practices which show innovation continues to be characterised by the belief that UA is transitory and temporary and the undervaluing of AU's 'soft' contributions to the city. The consequence of the marginalisation is the undermining of the short value chain. And, as has been described in Chapter 5, it is in the short value chains that the most vulnerable residents can access more secure food sources. Further, marginalisation undermines much of the added resilience to the city that centrally located green spaces provide.

7.1.2 Innovation networks across urban agriculture and land use planning towards formalisation of urban agriculture as a land use

The conceptual framework in Chapter 2 suggested that innovation networks could create an 'ecosystem' which would nurture transformation not only through innovation within the two sectors of UA and urban planning but also through the structures collaboration connecting the two and that this would, in turn, move them towards formalisation of UA. To this end, I examined the relationship between land use and UA in Almere, Detroit, Havana and Portland (Altieri et al., 1999; Balmer et al., 2005, Jasma and Visser, 2011; Halloran and Magid, 2013a; Paddeu, 2017) for evidence of the principles of innovation networks within their successes. This included such stakeholders as: farmers' representatives; government departments; universities; and NPOs. Two key findings include: platforms that proved critical in identifying policy gaps, identifying land and developing codes for UA; and more significantly, in Detroit and Havana, these platforms led to a common vision in which UA was seen as a strategy toward food security, city greening and livelihoods (Altieri et al., 1999; Paddeu, 2017).

In Johannesburg, the study findings show greater consensus among actors in the land use planning network that includes the CoJ, South African Cities Network, and the South African Council of Planners. These stakeholders affirm that land use planning should evolve and become relevant to current city challenges. So here we see consensus in a way forward, and as was discussed in Chapter 4 there are policies in place to support such a direction. So why then is UA still losing out in land use decisions?

Equally, the perceptions among actors in local UA networks such as the CoJ, Gauteng Department of Agriculture and Rural Development, United Way South Africa, and Izindaba Zokudla are that UA should improve its operations, utilise land efficiently, provide good quality food, and package products to meet customer demands. That said, as has been discussed in Chapters 5 and 6, these expectations do not always coincide with the de facto capacities and realities of the farmers.

Also, decision making is still being hindered by an out-dated or ill-informed understanding of UA. As was shown in Chapter 6, CoJ Department of Economic Development and, the Department of Social Development spend much of their resources stressing entrepreneurialism among UA entities, but in reality not all farming entities are able to innovate in this way. However, such farming entities developed networks that are non-strategic which could still be viewed as innovation but that leads to social capital, therefore their collaborations lead to social capital resources, their skills necessary for survival in the city develop without transforming their farming practices. But this second category of farmers still fails to gain traction in the land use decision.

7.1.3 'Innovation networks' Acquisition of technology vs innovation collaboration

Expanding further on innovation's role key findings from the farming case studies and city departments in Johannesburg show that exhibitions and acquisitions of machinery and equipment are less effective if they are not accompanied by active innovation collaboration. In other words, in the *status quo* the principles of innovation networks – joint practices, training and research - are the missing links to promote successful outputs. And herein lie the current dilemma, that research and training are bridges to lasting results in improving products, service and transforming organisational practices. Hence, research and training should be mandatory in promoting UA and CoJ innovation networks.

Collaboration in training and research in UA and land use planning in Johannesburg are principally undertaken by the CoJ departments, GDARD, NPOs, Agriculture Research Council, the Agricultural Sector Education Training Authority, South African Cities Network, and local universities. Such innovation collaborations have been successful in developing and reviewing UA and land use planning policies, programmes, and projects such as IDPs, the Food Resilience Strategy and the Urban Agriculture Policy.

However, in reality, the innovation collaborations in research and training are very few among practitioners and researchers because it is difficult to strike a “perfect match” between the research and the training institution, especially university programmes and the farming entity’s or the city department’s research requirements. For instance, the Izindaba Zokudla’s Participatory Technology Development Programme had organised collaboration with farmers and the University of Johannesburg (UJ) departments. However, the programme was affected by the challenges of aligning UJ’s curriculum with the farmer’s training programmes, and tool development requirements. So while these connections seem promising through the lens of innovation networks that have not had the longevity need to bring about real system change – the structural change critical to innovation network success. The de facto upshot was that the short curriculum or semester programmes proved not sufficient for students to fully develop usable tools and/or programmes for farmers.

7.1.4 Innovation Network Power Relations

The study showed that networks across UA and land use planning are closely linked to inter-individual power relations and institutionalised power structures. In these relations, it should be emphasised that the urban farming entities are not neutral actors in these collaborations. But it must also be stated that certainly, their influence varies. For example, my fieldwork observations show that new farming entities at Eikenhof Farm are not as confident to engage or assert themselves with other actors as the old members of the network, signalling the usefulness of networks.

Findings show the complex socio-spatial realities of the histories and experiences of farmer collaboration with stakeholders such as the CoJ, NPO, GDARD, universities and the private sector significantly increased farmer awareness of their rights, and roles in food security (through gained knowledge of policy, legislation and land access requirements).

Further findings show that the CoJ's lack of inter-departmental collaboration treats collaboration with farming entities as simple networks when in fact they are complex and multi-dimensional. In fact, in contrast to this simplistic view, my findings align with McFarlane's (2011:649) understanding of assemblage, a "useful basis for thinking of the city as a dwelling process…particularly useful for conceiving the spatiality of the as processual, relational, mobile and unequal". It is here with a more complex view of UA that power relations can be dissected and in turn, mitigated.

Without this, seemingly in contrast to innovation networks, in cities such as Cape Town, Dar es Salaam and Portland, though UA is formalised the existing networks either 'downplayed' the roles of city departments. However, and this is a warning to cities like Johannesburg, despite formalisation the neoliberal development pressures are able to bring about the conversion of UA land to real estate. Such unfortunate experiences present unexpected findings for seemingly 'successful' networks and show that precariat continues even with formalisation. Thus the study shows that much of the success of innovation networks towards formalisation can be negated by (re-)conversion of UA land to real estate.

7.2 Limitations and assumptions of the study

As the previous paragraph suggests, there are critical limitations and assumptions experienced in carrying out this study.

As with previous studies by Ahuja (2000) in the US and Europe (discussed in Chapter 2) which identified the difficulty of getting information especially from small entrepreneurs. Similarly, this study could not get statistics on productivity and budgetary allocation for innovation among many of the urban farming entities, especially those that are informal or subsistence in nature. And it is just such 'soft' data that Ellis and Sumberg (1998) and Webb (2011) points to in his arguments against the contribution of UA to cities.

The study compared innovation networks across small business enterprises and individual backyard gardens. The small business-oriented UA had improved data

and platform to communicate with stakeholders such as Facebook and websites. Additionally, unlike a small business that sometimes sells through the formal economy, individual backyard gardens did not keep records and mostly sell products to the local community and thus there was no data for their sales. This lack of data for the less formal enterprises must be filled in with anecdotal observations, which in the eyes of many is weaker evidence.

Also, the study was based on the initial assumptions that the formalisation of UA will lead to a virtuous circle that would attract investment and increased productivity and formal zoning of the sector. However, some urban farming entities did not innovate even within the assumptions. This led to two key findings: first, even after the innovation networks and formalisation, some UA practices are still converted into real estate negating the whole formalisation process. Second, many of the informal farms that lay outside this 'virtuous circle' still significantly contribute to the city.

This study wanted to understand the variations in power relations between the international case studies of Almere, Dar es Salaam, Detroit, Havana and Portland, and empirical evidence from Johannesburg. However, the secondary data on these cities mentioned stakeholders without elaborating their roles, contribution or influence on the networks. Thus this study is unable to compare the influence of CoJ departments on farming entities with, for instance, the Havana Department of Urban Agriculture on their influence among the farmers to promote innovation. The differences of these datasets could also be attributed to primary data collection and specifically the extended case method employed in Johannesburg that observed participants over a long period.

7.3 Theoretical and practical implications of the study

As was suggested in the conceptual framework, the study found that networks are critical 'spaces' of convergence (Miraftab, 2004) but far beyond the essential ingredients for innovation as a means to simply acquire equipment and even knowledge. While the lack of resources is a major impediment to the development in

the UA sector in general, what the evaluation of the principles of innovation theory has brought to this study is that the scope of innovation and networking needs to be larger in scope to include not only individual sectors but mindsets, political will and actors across sectors.

Practices that can be identified as principles of innovation network theory across UA and land use planning have resulted in formalisation of UA in Almere, Dar es Salaam, Detroit, Havana, Portland and Johannesburg. The formalisation of UA took place in two forms that are: (i) formal zoning where land is zoned permanently for farming in all these cities; (ii) formal temporary land access agreements in all the above cities except Almere. However, it must be noted that in a formal land use zoning in Johannesburg, through the 2040 Spatial Development Framework (SDF), UA was assigned permanent land use zoning to peri-urban areas – effectively continued spatial marginalisation.

That said the CoJ has temporary land use agreements for UA well. In the inner city, the SDFs further allow temporary land access arrangements for open spaces, areas earmarked for future development and rooftops for gardening. While not formal land allocation, in practice this is what allows much of the more centrally located, so effectively short food chain, urban farming.

It must also be noted that with land allocation and resources the CoJ, NPO, and the private sector work with South African emerging farmers only. They do not give formal land rights to foreigners to farm, which limits potential expansion in UA. This is critical since some farming entities in this study had non-South Africans as members.

7.4 The study's contributions to existing knowledge around UA and its relationship with land use planning

It's worth remembering that this study was instigated by the tensions and ineffectual relations that exist between UA and land use planning in Johannesburg. Given this starting point, the central contribution of my study is the evidence substantiated in

my findings for the potential of innovation networks as a bridging mechanism between UA and land use planning to achieve a more supportive 'ecosystem' for urban farming that aligns with sustainability goals and urban resilience practices.

As I have shown, innovation network theory has been applied to other sectors such as online banking in South African (Moore, 1998), chemistry industry in Europe and US (Ahuja, 2000) and information technology in the development of computers in the USA (Pittaway et al., 2004). It became critical to understand the central principles of the theory, which are: innovation networks create a collaborative platform that allows learning through sharing information and sectoral requirements that are critical towards harmonisation; the actors together work towards common realisable processes and products; the actors work together to create viable organisational structures. I then searched for evidence of these principles in the UA and land use planning practices in the international case studies and locally in Johannesburg.

What I found was that there is evidence of innovation network principles in the cities where UA has been able to establish a stronghold, such as Almere, Detroit and Havana and to a lesser extent Portland. A key finding within this is that there was a common vision for the city amongst critical stakeholders and that this vision counterbalanced the power of the neoliberal market forces.

Held alone, this finding is in line with such previous studies as Steel's (2008) work in Europe and the Near East show that urban life and food systems were intertwined since the pre-historic times. There the author advocates for a symbiotic relationship between cities and cultivated farmlands (ibid.).

Building on this notion of symbiosis my study goes on to suggest innovation networks as a viable (and proven as pointed out above) methodology to bring urban development decision making and farming together towards formalisation. While certainly not suggesting a 'silver bullet', the study highlights that innovation networks do have the potential for the development of the UA sector by exploiting existing innovations in farming practices, urban planning and spatial policy to support social, community and environmental benefits as well as the value addition to the city.

Returning to the point of formalisation alluded to above; this study has also substantiated the 'soft' value of UA which is frequently found in informal and subsistence farming. It is this 'soft' value of social and environmental benefit which must be added to the accepted understanding of UA. Added to this, as was discussed earlier in the study, formalisation is a contested notion in Johannesburg (and in many other cities around the world). Therefore it's important to make clear that what I'm suggesting is not a formalisation of UA itself but rather the need to hold both formal and informal farming practices in the frame while formalising UA as a stable long-term land use within planning.

7.5 Recommendations for future research

The scope of this study was limited by both time and resources, and, therefore, did not address all the areas that relate to how innovation networks could influence the relationship between UA and land use planning. That said, it has established a critical baseline from which further specific lines of inquiry can be made. It is clear from this study that the principles of innovation networks make UA more acceptable or attractive for the city as it adopts better farming methods, produces better quality products, and improves marketing, and targets customers. It is also clear that UA, in the same way as informal transport, contributes to the parallel economy, and as such plays a key, even if an unquantifiable, role in food security for vulnerable urban residents.

A heavily weighted statistical follow up to this study focusing on whether innovating or non-innovating farming entities can generate enough revenue to cover their operating costs would be critical. This point remains a significant hurdle to UA's formalisation within land use, there is still the strong argument to exclude UA because (as was discussed in Chapter 1) it must be subsidised over the long term. Such research would be useful because the viability of a farming entity is widely

measured in financial terms. This is crucial for the future of UA because it speaks directly to the perception of its transitory nature.

This financial 'judgement' of UA combined with the study's surprising findings that it contributes towards social capital begs the question: Are there other, more appropriate, parameters with which to evaluate the significance of the UA sector? This question of parameters would entail a better understanding of the 'soft' side of UA and while there is some literature, as discussed in Chapter 2, there is more work to be done.

One of the areas of contention in this study is that UA land is converted into real estate. International, as well as local experiences, show that even formal UA zones, as well as both private and public land uses, are not spared this scourge. As was discussed in Chapter 4, a positive development in South Africa is the new draft Regulation of Agricultural Land Holdings Act of 2017, which, while contentious for other reasons as was previously discussed, seeks to protect public agriculture land in rural, and urban areas from conversion into other land uses. It would be worth exploring the extent to which this Act will protect UA on agricultural land in Johannesburg. As well as modelling what such existing policies as the IDPs and SPLUMA mean to the future spatial future of UA in Johannesburg.

7.6 Conclusion

UA has tangible benefits such as food security and city greening in the discourses of sustainable and resilient cities. This study has made a convincing argument that the complex relationships within UA networks are better explained by assemblages that further assess the histories of engagement and experiences among actors over and above the mere number of connections between actors and how these manifest in space. Implied in this is the city as a process of dwelling (McFarlane, 2011), which I would argue is more in line with the informal/formal hybrid character of UA in Johannesburg (and many other cities around the world. For this reason, the study has tried to face the contested issue of formalisation in a way that incorporates those

practices that take place outside the formal processes avoiding a mask of formalisation of UA as a façade. In other words, the study suggests the need to hold both formal and informal farming practices within the frame of UA as we look to the future.

In line with this formal/informal character of UA, while it has been shown that innovation leads to value addition and increased productivity, for other farming entities, the output-driven small business trajectory is not appropriate for the *de facto* needs of the farmer or the vulnerable populations relying on their short food chains. It is at this point that this study has uncovered a significant shortcoming: the fragmentation within such collaborations, in fact, undermines UA's stability and on some levels its success.

Building on this, the study has found that NPOs provide a unique coordinating role in these assemblages. They fill the roles that mentor farmers, vet members, and cushion them in the responsibility of managing network relations. Given their flexibility, NPOs provide a strong coordinating role that orchestrates inter-departmental coordination. As a non-state actor, they provide a strong platform for public, private, and grassroots collaboration that involves urban farmers. It is here that the study's argument for innovation networks gathers strength because it creates a 'space' with the capacity to support such multiple connections, as well as strong municipal institutional support, critical to UA's success in its many forms and trajectories.

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APPENDICES AND SUPPLEMENTARY INFORMATION

Appendix A: Research methodology matrix

Table A-0-1: Research methodology matrix

Research sub-questions	**Ethnographic observation guide/question schedule**	**UA farming entity interview guides**	**Key stakeholder interview guides** (e.g. city or government departments, NPOs)	**Key informant interview guides** (research & training organisations)	**Desktop publications**
1. What are the drivers underlying the marginalization of UA in municipal land-use planning?	1) Move around the UA entity observe (a) land access arraignments, (b) inputs, production, harvesting, marketing process	1) What type of land access do you have with land owners, is it formal or informal? 2) How involved are you in the planning of your city or neighbourhood? 3) How much do you produce on your land, does it cover your operating cost? 4) Do you sell or consume what you produce? 5) Where do you sell what you produce, is if formal or informal?	1) What land use and other policies and plans do you have on UA? 2) Do you have formal land use zoning and informal UA practices in your city, How are they regulated? 3) How do stakeholders collaborate to promote UA? 4) Do UA practices in your area produce enough to make profit, cover costs etc 5) Where do UA sell their produce and what assistance do you give them?	1) Can you comment on land use planning policies towards UA 2) How are city structures involved in planning for UA? 3) How productivity is UA in your city 4) How effective is UA in utilising land?	Review of land use planning policies, plans and strategies for their provision for UA

2. Within a context of market logic (productivity and competitiveness), how effective are innovation networks in overcoming the underlying drivers of marginalisation towards promoting formal assigning of land uses for UA?	1) Observe any existence of collaboration between farming entities and other partners 2) Check whether the city if one of the partner and check which department is involved in the collaboration 3) Check whether UA or city department innovates through (i) open knowledge and technology sources, (ii) Acquisition of knowledge and technology, (iii) innovation collaboration; 4) What the networks power relations (i) how has more connections, (ii) Do they translate to resources? 5) Do network influence formation is UA and how?	1) How do the innovations or changes in UA along the value chain come about? 2) What are the networks that are involved across the UA value-chain and how do such networks catalyse or inhibit innovation or change? 3) Who are your main customers and how do you communicate with them? 4) Innovations or changes implemented by your farm over the last 2-3 years a) How do you involve other stakeholders in your business e.g. client/customers/partners? 5) Measuring innovation network along the value chain over the last 2-3 years a) What Information, knowledge and technology through open sources (for instance from exhibitions, published articles and clients feedback)?	1) Do you collaborate with UA practices or land use planners on sharing information, knowledge and technology on innovation– (through e.g. exhibitions, published articles and clients feedback) (over the last 2-3 years) 3) Which are networks that you collaborate with in UA practices across the value-chain and how do such networks catalyse or inhibit innovation/change? 4) What are the innovations/changes implemented by the UA practices that you work with over the last 2-3 years 5) Which stakeholders/partners do you collaborate with to innovate and what are their roles? 6) Which stakeholders are most and least important in your innovation networks?	1) Do you collaborate with UA practices on sharing information, knowledge and technology on innovation– (through e.g. exhibitions, published articles and clients feedback) (over the last 2-3 years) 2) Do you collaborate with UA practices to acquire information, knowledge and technology on innovation - (through the procurement of machinery, equipment or software)? 3) Do you collaborate in joint research with UA practices to promote or sale information, knowledge and technology – active research for technology transfer? 4) Comment on the strengths and limitations in the innovation networks in UA in Johannesburg?	1) Check websites and Facebook pages for cities, and UA entities 2) Gather resources or tools needed for the observation exercise such as maps of the area, farm plans, progress reports from municipal councils, marketing agreements, exhibitions or customers care or stakeholder workshop reports or registers 2) Review International, regional and national best practices in urban land use planning innovation for UA

	6) Observe week-day basis (i.e. the daily routine of farming operations/activities) along the value chain & responsibilities (input, production, processing and marketing) 7) Take pictures of improvements/unique operations/activities at each UA practice	b) What Information, knowledge and technology are acquired through procurement of machinery, equipment? c) What Information, knowledge and technology are acquired through active joint collaborations (universities and government research laboratories); 7) Which stakeholders or partners do you collaborate with to innovate and what are their roles? 8) Which stakeholders are most and least important in your innovation networks?	7) What are your views or practices on current urban land use allocation for UA in Johannesburg, and how is this likely to change in future? 8) How do you rate innovation in UA or land use planning in Johannesburg vs other international experiences?	5) What are your views or practices on current urban land use allocation for UA in Johannesburg, and how is this likely to change in future? 6) How do you rate innovation network in UA and land use planning towards formalisation of UA in your city?	
3. How could insights from the effectiveness of innovation networks in overcoming the marginalization of UA in municipal land-use planning guide our understanding of the current and future experience in formalization of land uses for UA?	1) Check effectiveness of innovation networks toward the current and future role of UA; (i) trends towards collaboration and formalisation of UA – are they getting more or less successful.	1) How effective are collaborative platform on UA in the city 2) What role to these collaborative platform have of formalisation of UA 3) Do you think UA has a better role in the city in future?	1) Comment on the innovation collaborative platforms and how they promote UA? 2) How strong are collaborative platform of UA and land use planning within municipal councils? 3) What is the current and future role of UA in your city?	1) comment on the effectiveness on the collaborative platforms on promoting formalisation UA 2) How enabling and prohibitive is land use planning towards UA l?	Assess response to sub-question 1 and sub-question 2; Are there city best practices? What are innovation network principles do they manifest

Appendix B-1: Data Presentation Schedule: Summary of key data on UA marginalization and related drivers for formalisation for international city case studies

Sub-questions 1: What are the drivers underlying the marginalization of UA in municipal land-use planning?

Sub question 2: Within a context of market logic (productivity and competitiveness), how effective are innovation networks in overcoming the underlying drivers of the marginalisation towards promoting formal assigning of land uses for UA?

Data Instrument	**Key data parameters**	**Key data capture**	**Data analysis approach and key sections where data are analysed**
Secondary data sources: Literature review and documentary analysis on innovation networks towards formalization of urban agriculture: Six international city case studies. The relevant questions that guided case study analysis are: • Question 1: What marginalization exist between UA and land use planning • Question 2: What planning innovation networks do the municipal councils extend to UA stakeholders towards formalization UA? • Question 3: What type of land access do cities have towards urban agriculture?	Question 1: Aimed at responses on assessing: (a) Land use planning hindrances towards UA	Summary responses from respondent 1: Almere • Developed innovation networks with farmers' association, nearby city, provincial government, central government, business association towards formalizing UA • Innovation ecosystem reached consensus that UA should be incorporated into the city • Developed plan 'Aglomere' that zoned peri-urban farmers into the city • Urban farmers connected to supply the city supermarkets, provide education and ecotourism	See analysis in Chapter 4; Section 4.1. The main data analysis approach is guided by the assessment of the city marginalisation of UA by conventional planning. It also assessed the effectiveness of innovation networks in overcoming the marginalization of UA. The derivation of sub-findings on the sub-question 1 is achieved by assessing how planning policy and practice inhibitive urban farming.
	Question 2: Aimed at responses on: Networks developed by city and its stakeholders that are extended towards formalization of UA	Summary responses from respondent 2: Detroit • Development innovation networks with farmers association, central government, universities towards formalization of UA • The collaborative platform agreed that UA is a sustainability strategy towards margining shrinking economy vacant plots • Developed Urban Agriculture Ordinance for formally zoning UA • Urban farmers supply food to household, community and also high end supermarkets	

	Question 3: UA land access arrangements	Summary responses from respondent 3: Havana • Developed innovation networks comprising city department, central government, research and training institutions and provincial departments towards formalizing UA • The platform agreed that UA would offer solutions to Havana's food insecurity • Developed different systems of access to land tenure • UA supplies food to household, community, factory workers and even for sale	The derivation of sub-findings on the sub-questions 2 is achieved by assessing the collaboration between stakeholders towards promotion innovation across the two sectors and formalization of UA.
	Interview question 4: Aimed at responses on: policies towards UA	Summary responses from respondent 3: Dar es Salaam • Developed innovation network platform between city departments, central government, development partners, NPO, farmers; representatives. • The platform acknowledged UA as one livelihood activity offered by the city • City identified areas that were zoned for urban agriculture through UA remained traditional	
Direct observations • No observations	Observation context 1: Aimed at observations relating to: Innovation networks • No observations	• Summary observations for Observation context 1 (Growing Health Farms) (most of the content here could be visual/images and maps), but also other sensorial content:	See analysis in Section 5.1. The main data analysis approach is guided by parameter that measure marginalization. These are: (i) land use planning rigidity, (ii) land use planning disregarding interest groups, (iii) UA low productivity, and (iv) UA inefficient land utilization
	• Observation context 2: Aimed at observations relating to: • No observations	Summary observations for Observation context 2 (most of the content here could be visual/images and maps), but also other sensorial content • No observations	

			The parameters for measuring the effectiveness of innovation networks are: (i) existence of innovation networks as a supportive 'ecosystem' for stakeholders, (ii) type of innovation networks employed (iii) innovation power relations, (iv) formal land access arrangements such as zoning
Secondary data sources with relevant case studies were identified through journal publications: (i) Jansma and Visser (2011)	Secondary data source 1 (Jasma and Visser, 2011)	Marginalisation/drivers relevant data (research and planning innovation led to coordination of urban development and UA)	See analysis in Section 5.1 as above
	Secondary data source 2 (Paddeu, 2017)	Marginalisation/drivers relevant data (Consensus on UA as solution to shrinking city and food insecurity)	
OVERALL FINDING ON SUB-QUESTIONS 1 AND 2	Consolidation of sub-findings on the last column above (across all the data instruments and related analysis) – Provide brief overview here on how this is done, and the Chapter-section which carries this content. i) Cities develop innovation networks as platform for information exchanges towards overcoming the marginalization of UA ii) The platform share experiences and dialogue towards improving coexistence of the two sectors and the development of policies for land use zoning iii) While forma zoning is often preferred, temporary land uses are accepted by investors towards to secure funding iv) However, in neoliberal development paradigm, land is often converted into real estate reversing the gains of the formalization process		

Appendix B-2: Data Presentation Schedule Appendix: Data schedule and summary of key data on UA marginalization and related drivers for formalisation for urban farming entities in Johannesburg

Sub-questions 1: What are the drivers underlying the marginalization of UA in municipal land-use planning?

Sub question 2: Within a context of market logic (productivity and competitiveness), how effective are innovation networks in overcoming the underlying drivers of the marginalisation towards promoting formal assigning of land uses for UA?

Data Instrument	**Key data parameters**	**Key data capture**	**Data analysis approach and key sections where data are analysed**
Semi-structured Interviews: 11 participants were interviewed. The relevant interview questions for this secondary objective (or sub-question) are: • Interview question 1: What type of land access do you have with land owners, is it formal or informal? • Interview question 2: How involved or how often are you consulted in the planning of your city or neighborhood, does the planning include issues on UA? • Interview question 3: What do you produce on your land; does it cover your operating cost? • Interview question 4: How often do you produce, where do you sell?	Interview question 1: Aimed at responses on assessing: (b) Land use planning rigidity against zoning	Summary responses from respondent 1: Growing Healthy Farm • Has formal land access (zoned in Kyalami) • Collaborates with CoJ Food Resilience Unit • Produce vegetables, fruits, chickens and ducks all year round, does not cover operating costs • Produce all year round, local and to city restaurants	See analysis in Chapter 5; Section 5.1. The main data analysis approach is guided by the assessment of the marginalisation of UA by conventional planning. It also assessed the effectiveness of innovation networks in overcoming the marginalization of UA. The derivation of sub-findings on the sub-question 1 is achieved by assessing how planning policy and practice inhibitive urban farming through disregarding UA.
	Interview question 2: Aimed at responses on: Land use planning disregarding interest groups (stakeholder collaboration	Summary responses from respondent 2: Planner Bee Plant Care • Has formal land access (zoned in Kyalami) • Collaborates with CoJ Department of Economic Development • Makes organic fertilizer and vermiculture equipment • Produce all year round, covers cost through diversification, sell locally, citywide and countrywide	The derivation of sub-findings on the sub-questions 2 is achieved by assessing the collaboration between stakeholders towards promotion innovation across the two sectors and formalization of UA.

	Interview question 3: Aimed at responses on: UA productivity	Summary responses from respondent 3: Eikenhof Farms • Formal temporary agreement (within zoned Eikenhof City Farm) • Collaborates with Food Resilience Unit • Farms vegetables, chickens, goats and pigs • All year round, does not fully utilize land, cannot cover costs, sell locally, intermittently to supermarkets and Johannesburg Fresh Produce Market	
	Interview question 4: Aimed at responses on: UA efficient land utilization	Summary responses from respondent 3: Bambanani Food and Herb Cooperative • Temporary formal agreement with Johannesburg Property Company • Collaborates with the Food Resilience Unit • Farms vegetables • All year round, does not fully utilize land, sell to local community, and intermittently to local supermarket	
Direct observations • Observation context 1: Existence of collaboration between farming entities and stakeholders • Observation context 2: Whether the city if one of stakeholders and check city department involved in the collaboration • Observation context 3: Check innovation network types • Observation context 4: Check innovation power relations	Observation context 1: Aimed at observations relating to: Innovation networks • Existence of innovation networks • Influence of network towards formalisation • Whether innovation network are (i) open knowledge and technology sources, (ii) Acquisition of knowledge and technology, (iii) innovation collaboration; •	• Summary observations for Observation context 1 (Growing Health Farms) (most of the content here could be visual/images and maps), but also other sensorial content: • Is party of a collaborative platform • City is part of the network (but not the department responsible for planning) •	See analysis in Section 5.1. The main data analysis approach is guided by parameter that measure marginalization. These are: (i) land use planning rigidity, (ii) land use planning disregarding interest groups, (iii) UA low productivity, and (iv) UA inefficient land utilization

	• Number of connections and influence in the network	• Mainly innovates through collaboration and acquisition of equipment • Has few strategic connections which are relevant towards innovation and marketing products	The parameters for measuring the effectiveness of innovation networks are: (i) existence of innovation networks as a supportive 'ecosystem' for stakeholders, (ii) type of innovation networks employed (iii) innovation power relations, (iv) formal land access arrangements such as zoning
	• Observation context 2: Aimed at observations relating to: Food value chain • Has short, intermediate and long value chain • Short is informal; intermediate and long are formal • Funders prefer formal and documented value chain • Packaging is critical to increasing value for UA	Summary observations for Observation context 2 (most of the content here could be visual/images and maps), but also other sensorial content • Short value chain is critical as farming entities develop relationship with residents Value addition is critical since UA has small plots	
Secondary data sources with relevant case studies were identified through: (i) farming entity reports, (ii) City of Johannesburg reports, (iii) farmers' website and Face book Pages	Secondary data source 1 (www.growinghealthyfoods.co.za (accessed 6 April 2017) Overview on the source and the case (Activities of the farming entity and some of its partners)	Marginalisation/drivers relevant data (conducted market research and packages its product. It has a market for its products. This promoted investment and innovation	See analysis in Section 5.1 as above
	Secondary data source 2 (http://www.fertilis.co.za (accessed 21 March 2017) Overview on the source and the case(Activities of farming entity and some of its partners)	Marginalisation/drivers relevant data (the farming entity produce organic fertilizer that is certified and marketed through the formal economy)	

OVERALL FINDING ON SUB-QUESTIONS 1 AND 2	Consolidation of sub-findings on the last column above (across all the data instruments and related analysis) – Provide brief overview here on how this is done, and the Chapter-section which carries this content. v) Innovating farming entities developed innovation networks with few strategic partners that were critical to mobilizing investment and securing formal land access arrangement. Their value chain is short, intermediate and long. The farming entities have the capacity to meeting requirements and thus supply the formal economy vi) Non-innovating farming entities developed networks, that often have large number of connections that are used for social capital. They have temporary or verbal land access agreements. Their value chain is short targeting households and local community. Farming entities cannot meet requirements of the formal economy

Appendix B: Innovating urban farming entities

This section presents the urban farming entities in this study, which are:

B.2: Case study 2: 3 Kotze Street Rooftop Garden – vegetable production

3 Kotze Street Rooftop Garden operates as a cooperative, which started in October 2016 after farmer training organised by the CoJ. The garden uses the CoJ Food Resilience Unit rooftop at 3 Kotze Street (Case study site 5, Figure B-1). The CoJ contracted Wits Siyakhana, and Ubuntu to train 22 emerging farmers from April to July 2016. Ten farmers successfully graduated from the training, and the five best farmers were selected to start the project as a cooperative in October 2016. The project receives no stipends from the city, and members sell their products to cover their operations. However, like any new investment, the project took longer than expected to generate income, and as a result, some members left the cooperative. During fieldwork in December 2016, the cooperative had only two members. The two members cannot provide all the labour requirements for the project and are recruiting new members.

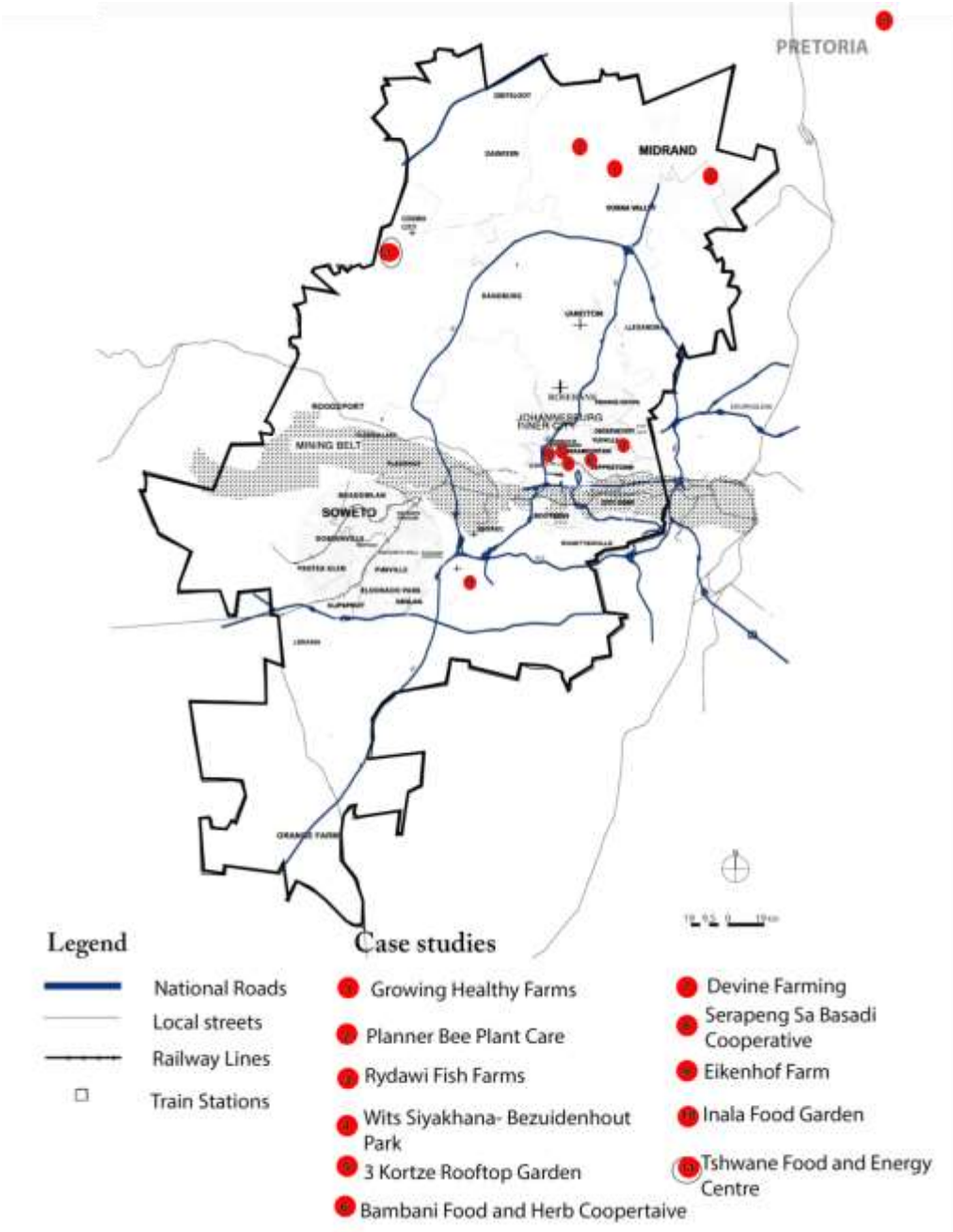

Figure B-0-1: Farming entities (circled – Wits Siyakhana and 3 Kotze Rooftop Garden) and their value-chains (source, adapted from City of Johannesburg, 2018)

➢ The 3 Kotze Rooftop Garden Value Chain

3 Kotze Street Rooftop Garden has a short value chain (Figure B-1). It sells vegetables to surrounding communities, and to vegetable markets around the Hillbrow area. The farming activities along the value chain are as follows:

- **Inputs** – The CoJ provide seed packs, tools and funded the hydroponics system for the cooperative. The garden has two incubators for producing seedlings (Figure B-2). After germination, the seedlings are transplanted in the tunnels.



Figure B-0-2: 3 Kotze Rooftop Garden incubators and tunnels (source, CoJ, 2016b)

- **Production** – 3 Kotze Rooftop Garden runs a hydroponics gardening system. The cooperative has 26 tunnels that cultivate lettuce, and kale among other vegetables (Figure B-3). The project has huge potential. However, the garden had stopped operation during the fieldwork because of weak electricity supply, power-cuts, a malfunctioning hydroponics system, and a shortage of labour since the project has only two active members. The hydroponic system currently has two major problems:
  - ✓ Power supply – The current power supply is too weak to supply both the garden and the Food Resilience Unit. The original energy design did not anticipate a large power demand on the rooftop. Secondly, the hydroponic system requires continuous electricity supply, and currently experiences frequent power cuts. The City attempted to circumvent the problem of power cuts by installing an automatic generator; however, the

generator itself has too low a capacity to supply both the Food Resilience Unit and the rooftop garden. The CoJ is exploring how the problem can be rectified.

- ✓ Hydroponics system - The system requires a constant flow of water and a flat surface. The system at 3 Kotze Rooftop Garden sits on raised wooden benches. The benches started sagging, and falling apart after heavy rains, disturbing the circulation of water. The problem gets worse when vegetables get bigger and heavier. The CoJ, together with Ubuntu and Wits Siyakhana, inspected the system and will rectify the problem.

- ○ **Marketing and consumption** – The project was designed to generate income for members. The garden has 26 tunnels, each supporting 75 plants. Lettuces are sold for R20 each, which would give a gross estimated income of R1 500 per tunnel. The current demand for vegetables outweighs the supply. However, production is at a standstill because of the operational problems. The CoJ organises monthly vegetable markets where farmers sell their products. In addition, the cooperative sells vegetables to the surrounding Hillbrow community. The activities of 3 Kotze Rooftop Garden along the value chain are set out in detail in Figure B-3.

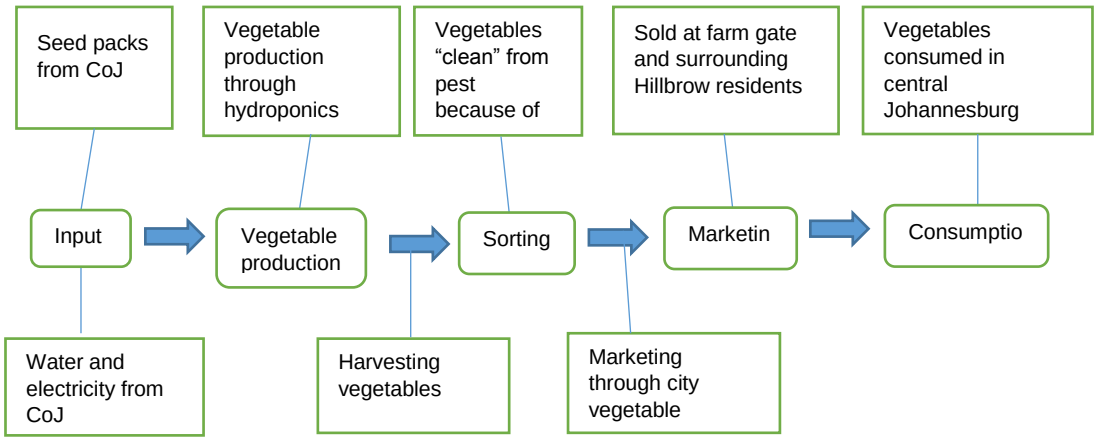

Figure B-0-3: 3 Kotze Street value chain (source, author)

- **Diversifying farm activities**

3 Kotze Rooftop Garden has no additional activities with which to augment income. However, the chairperson plans to train emerging farmers in gardening, and hydroponics. Similar to other farming cooperatives in Johannesburg, 3 Kotze Rooftop Garden is failing to generate sufficient revenue, hence the exodus of members from the project. These findings support UWSA's (2016b) evaluation of 22 farming cooperatives in Johannesburg in June 2016 that questioned the appropriateness of the cooperative model as a vehicle for managing urban farming initiatives in the city. Group cohesion and the commitment of members are stumbling blocks to the success of farming cooperatives.

- **Innovation and Innovation networks**

3 Kotze Rooftop Garden runs a highly novel hydroponics system. The system grows plants using a mineral-rich nutrient solution without soil. The system provides a higher yield, shorter growing cycle, and better quality output. Crops are protected from pests, while nutrients and the volume of water are regulated. This innovation was promoted by the CoJ, with expertise from Wits Siyakhana. Time will judge if the cooperative can manage the technology effectively.

- **Networking partners and power relations**

The project is virtually dependent on the CoJ. It funded training, hired a consultancy, provided the rooftop, gardening tools, seedlings, and the hydroponics equipment. The city additionally provides water, electricity, and overall monitoring, and project coordination. Wits Siyakhana and Ubuntu offered training and a backup service for the hydroponics system. The cooperative enjoys power through assemblages; that is, the long-term engagement, and capacity building by the city that transformed the cooperative into a critical stakeholder in food security. However, the experience is that the farming cooperatives in Johannesburg, in general, have dependency tendencies. They often transform this partner relationship with CoJ into an employee relationship,

in which they want everything to be provided by the city. The power relationships are shown in the sociogram in Figure B-4.

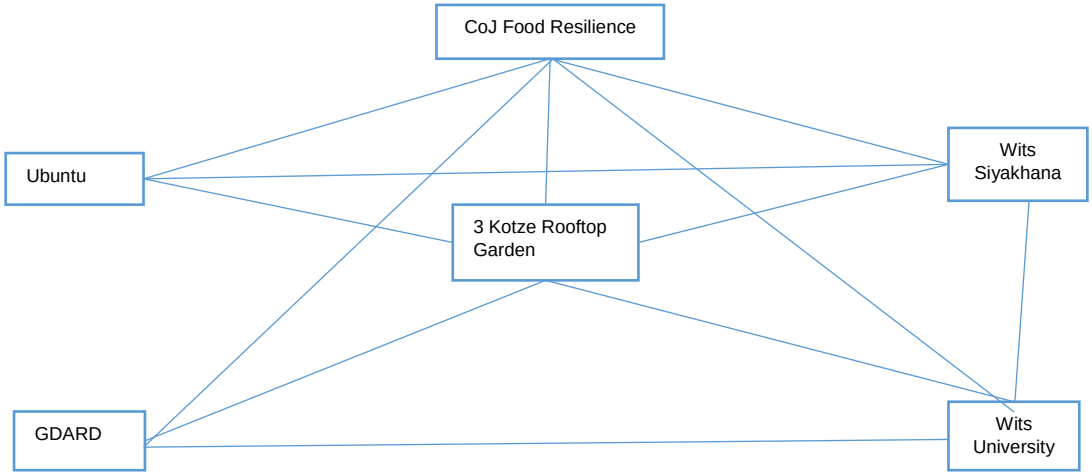

Figure B-0-4: 3 Kotze Rooftop Garden sociogram (source, author)

C.1: Case study 1: Wits Siyakhana Initiative – vegetable production

(WSI) is a Non-Profit Organisation (NPO) established in 2005 by a professor from the University of Witwatersrand. It is a unique farming intervention that uses the garden as a multi-functional centre to promote healthy and resilient environments for research, training, advocacy, and internship for students (Wits Siyakhana Initiative, 2017). The one-hectare food garden in Bezuidenhout Park (see case study site 4, Figure B-1) has a five-year renewable lease agreement with the Johannesburg Property Company (JPC). The garden produces vegetables for consumption by workers, and also for selling to the local community.

➢ Wits Siyakhana Initiative Value Chain

Wits Siyakhana has a short and intermediate value chain for its vegetable production but has a long value chain for its research collaboration (Figure B-1). However, the NPO collaborates with national and international universities on research. The farming activities are:

- **Inputs** – WSI buys seed from agro-dealers in the city. The NPO is organic oriented, produces compost, and runs vermiculture initiatives that produce manure for the garden.
- **Production** - The garden is managed by seven permanent, and three part-time staff members. They cultivate a variety of vegetables such as maize, herbs, kale, spinach, tomatoes, and onions. The vegetables are consumed, or sold by the staff.
- **Processing** - The vegetables are harvested, cleaned, sorted, and packaged into boxes, or plastic containers called ‘combos’. Each combo contains different types of vegetables, such as kale, or spinach, cucumber, tomato, onion, carrots, and may include seasonal fruit such as avocado, or peaches (Figure C-2).



Figure C.0-2: WSI produce ready for sale, (source, adapted from WSI Facebook, 2017)

- **Marketing and consumption** – WSI sells fresh vegetables to customers at farm-gate, or in boxes or plastic combos delivered to customers. The NPO also sells vegetables to the Yeoville Vegetable Market. In a good season, WSI sells an average of 10 boxes per week; however, this is insufficient to cover all WSI's operating costs. The activities of the value chain are detailed in Figure C-3.

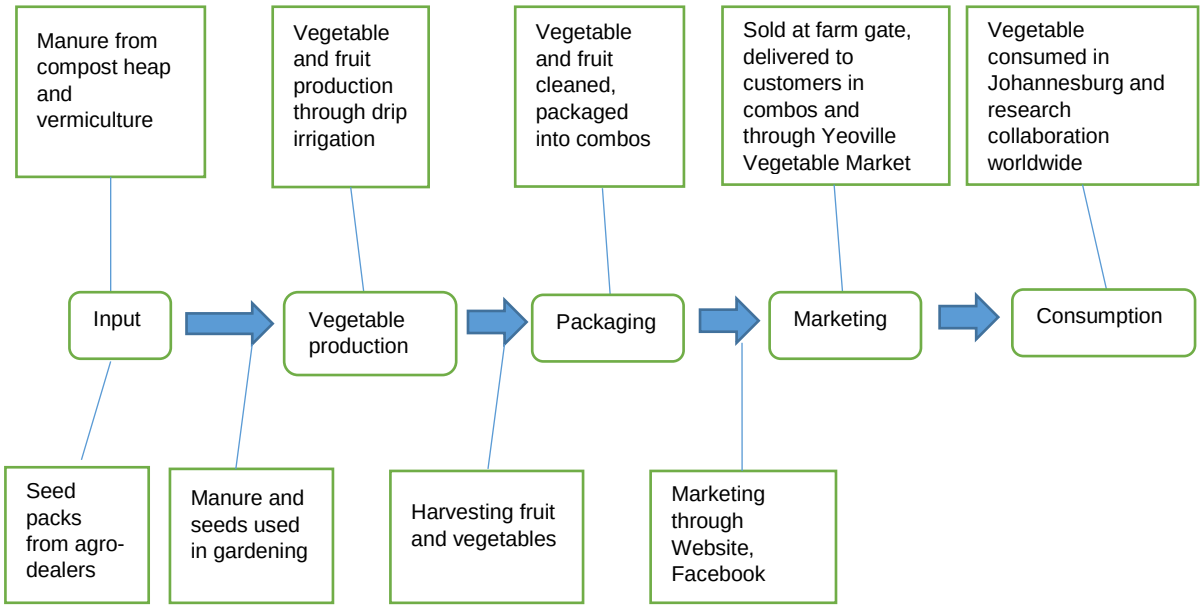

Figure C.0-3: Wits Siyakhana value chain (source, author)

➢ Diversifying farm activities

The sales of fruit and vegetables are insufficient to keep the NPO afloat. The WSI runs training, and practical demonstrations on food gardening, and ecotourism programmes to communities, schools, and corporates. The NPO runs various other programmes that include:

- Research and consultancy - The academic unit of WSI uses the garden to promote research into food, nutrition, and UA; and collaborates with six universities in South Africa. The WSI offers consulting services in areas such as food security, health, and nutrition.
- Advocacy – The experiences from the garden are used to influence policy and strategies on UA. The WSI engages government, and civil society to create awareness about UA, and share research findings to promote food security, and health.
- Training – WSI trains, and offers courses in nutrition, permaculture gardening, sustainable UA, nutrition, herbalism, and health promotion.

WSI raises funding through donors, training, and consultancy; however, this is still insufficient to cover its running costs. Similar to other NPOs, such as Growing Healthy Farms in Kyalami, and Growing Power Aquaponics in the USA, WSI requires subsidies. The NPO secured funding from the European Union for research, and training in food security, and social development in collaboration with two European, and two African Universities (Wits Siyakhana Initiative, 2017), and will continue to fundraise for its activities.

➢ Innovation and innovation networks

The WSI's vast networks promote innovation at different levels. For instance, the garden has an eco-toilet that uses wood shavings and an eco-office building for meetings (Figure C-4). The WSI garden has contours across the slope, and wood shavings along the walkways that facilitate the infiltration of run-off. The design saved the garden from a hailstorm in November 2016 that destroyed many gardens in Johannesburg.



Figure C.0-4: The eco-office and toilet (source, author)

The Wits Siyakhana Initiative innovates through the following networks:

- Open knowledge and technology sources – WSI maintains an interactive website, blog, and Facebook page that share information, and secure comments, and suggestions from stakeholders. In September 2014, WSI organised a Garden Spring Festival, and also exhibited at the Arbour Day Celebration in 2016 to showcase and drum up support for its farming activities.
- Acquisition of knowledge and technology – WSI acquired, and uses technologies such as drip irrigation, vermiculture for producing manure, and tunnels for producing seedlings.
- Innovation cooperation – WSI is a platform of 'inter-sectoral collaboration' in research with six South African Universities. They are the University of the Witwatersrand, Tshwane University of Technology, University of Johannesburg, University of South Africa, Stellenbosch University, and University of Cape Town (Wits Siyakhana Initiative, 2017). This cooperation shares experiences and offers student practical internship in UA. The WSI also collaborates with the University College, London, and Queens University.

➢ Networking partners and power relations

The WSI collaborates with six South African universities, and two foreign universities on research. The NPO is part of the African Food Security Urban Network (AFSUN), which works to improve the knowledge base, and advocates for policies to enhance food, and nutrition security. WSI coordinates, or hosts

collaborative research in UA, and public health. WSI collaborates with the CoJ Department of Social Development. The NPO supported the development of the Food Resilience Policy, evaluated the Food Security Programme, and trained 3 Kotze Rooftop Garden's cooperative. These networks are represented in Figure C-5.

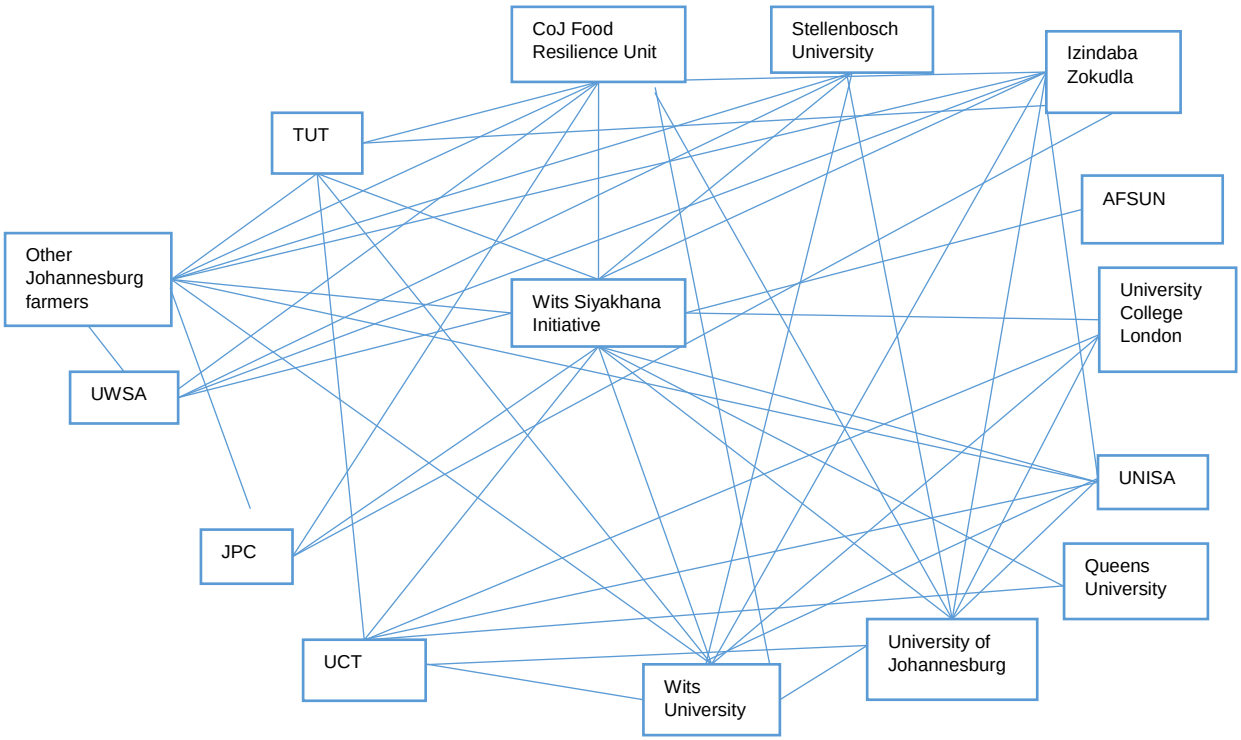

Figure C.0-5: Wits Siyakhana Initiative sociogram (source, author)

Appendix D: Non-innovating farming entities

D.1: Case study 3: Devine Farming – poultry and vegetable production

Devine Farming is located in Ivory Park, to the north of Johannesburg (case study 7, Figure D.1) The entity uses church premises by verbal agreement, and pays electricity charges for pumping water for the project. The garden is divided into two sections. The vegetable section grows spinach, kale, tomatoes, and onions. The farm employs two workers for planting, weeding, and selling vegetables. It uses the chicken droppings as manure for the garden. The poultry section is further divided into two compartments to allow for more than one batch of chickens at any given time.

The farm employs two workers on poultry production whose primary daily activities includes cleaning, refilling the water and feed troughs, monitoring the condition of chickens, and the temperatures of the fowl-run. Given that one of the critical challenges in poultry production is disease outbreaks, the farm owner vaccinates day old chicks immediately after purchase, and again 14 days later. He also restricts entry into the fowl run to his staff in order to reduce the risk of transmission of common diseases such as New Castle, and *coccidiosis*.

➢ Devine Farming value chain

Devine Farming has a short value chain (Figure D-1). The farm sells vegetables, and chickens to surrounding communities at farm-gate, vegetable markets organised by the CoJ, and surrounding food stores.

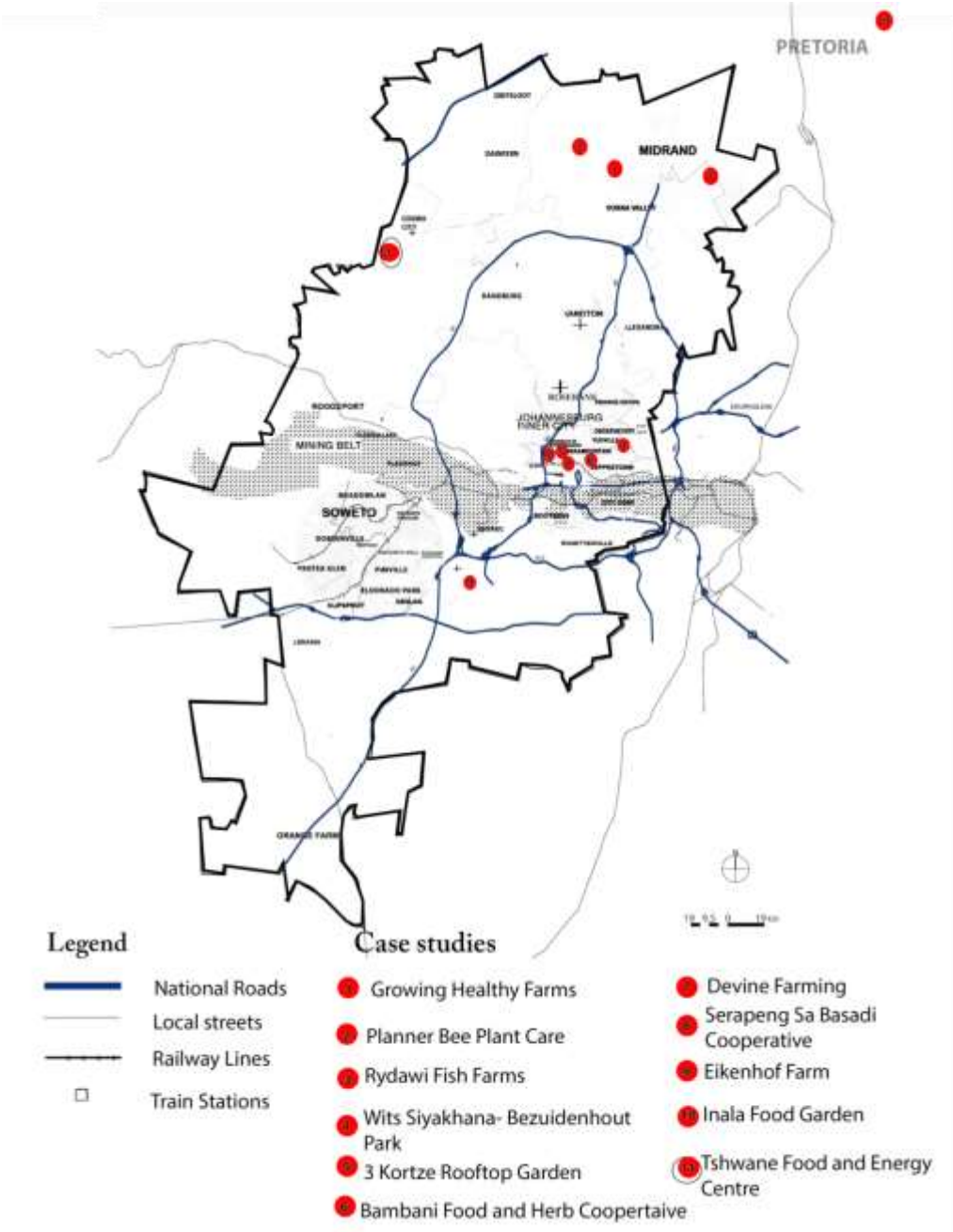

Figure D-1: Farming entities (circled – Devine Farming and Serapang) and their value-chains (source, adapted from City of Johannesburg, 2018)

The farming activities along the value chain are:

- **Inputs** – The major inputs into the poultry project are the day-old chicks, stock feeds, and wood shavings to keep the fowl run dry (Figure C.2). The farm owner also practices organic gardening and established a compost heap for the benefit of the whole garden. Chicken droppings mixed with

wood shavings are transferred to the compost heap to decompose before it is added to the garden as fertiliser.

- **Production** – Devine Farming keeps batches of chickens of different ages. During the fieldwork in December 2016, the farmer had 78 eight-week-old birds from a previous batch of 2 000 broilers. The second batch of 1 000 four-week old broilers would be ready for the market at the end of the fifth week. The third batch of 1 000 birds was two weeks old. The survival rate for day-old chickens for the farmer is 80 per cent, and this can be improved with better management practices. The current fowl-run is too small, and the farmer requires three similar structures to properly manage three batches of 1 000 birds at any given time. The current crowded space allows for two batches of chickens plus a makeshift corner for day-old chickens.



Figure D-2: Devine Farming fowl-run and garden (source, author)

- **Processing** – Devine Farming sells vegetables without processing or packaging. However, chickens are sold differently. Chickens are sold at farm-gate without processing, or slaughtered, and dressed before delivery to individual customers, and nearby grocery stores. Slaughtering and

dressing chickens create additional income for the farmer and jobs for hired labourers.

- **Marketing and consumption** – The farming entity sells mature birds at R55 each after five weeks, each weighing about 1.6kgs. The farmer normally sells the whole batch of 800 birds to the local community and food stores in the space of two to three days. However, during the field visit, the farmer encountered competition from commercial poultry producers who supplied chickens to his neighbourhood on credit to take advantage of the festive season. The farmer sells vegetables, and chickens for cash, but his customers were diverted by the credit facilities offered by commercial producers. The farmer attends CoJ market days that are organised for farmers where they meet potential customers, advertise, and sell their produce. The city exhibitions are free but have logistical problems, such as starting late, and failure to attract customers. On the other hand, commercial poultry farmers in Johannesburg organise shows where exhibitors pay R200. The commercial exhibitions are better organised, draw many customers, and stakeholders, and offer a good platform for marketing. The farmer attends and learns from both the city and commercial poultry producer exhibitions. The detailed activities along the value chain are elaborated in Figure D-3.

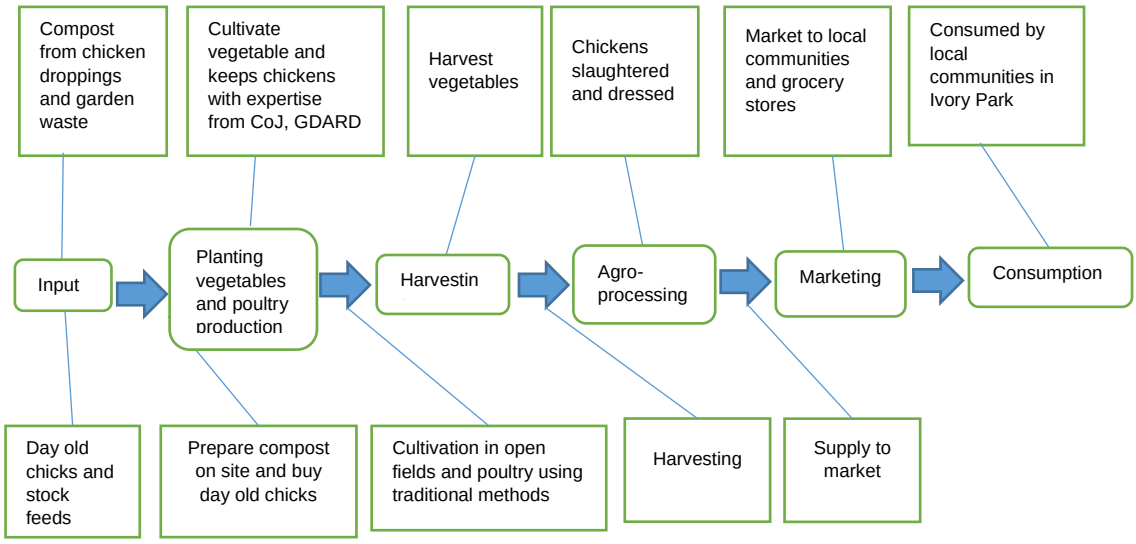

Figure D-3: Devine Farming value chain (source, author)

- **Diversifying farming activities**

Devine Farming keeps chickens and grows vegetables. Chicken droppings are used as manure for vegetables, thereby lowering inputs costs. The income from both vegetables and poultry diversifies Devine Farm's investment and generates additional revenue.

- **Innovation and innovation networks**

Devine Farming constructed simple fowl-runs and uses basic equipment for keeping chickens, and conventional practices for vegetable production. The farmer established networks with different actors to tap expertise, and knowledge necessary for future innovation. These networks are:

- Open knowledge and technology sources – Devine Farming attended a CoJ, and commercial poultry farmer exhibitions to market his business, and learn from peers. CoJ exhibitions are sometimes hurriedly organised to coincide with the visit of a prominent politician. This often results in poor preparation, poor attendance, and losses as farmers display fresh vegetables and fail to sell them.
- Acquisition of knowledge and technology – Devine Farming acquired equipment for poultry production such as infra-red lamps, feeding and water troughs. These are basic equipment, and technology for poultry production.
- Innovation collaboration - Mleya collaborates closely with GDARD on extension services and technical support for poultry, and vegetable production.

- **Networking partners and power relations**

Devine Farming networks with GDARD to secure expertise, and extension services on poultry production, and disease control. GDARD subsidises farmers with start-up capital, farming tools, and training. The farmer participated in many training workshops, and seminars, including financial management training organised by the CoJ, and UWSA in 2016. The entity networks with commercial

poultry producers in Kempton Park who share experiences, and expertise on poultry production, and disease control. The CoJ and GDARD wield a lot of power in this network because they provide tools, equipment, seed packs, and organise market days, and exhibitions for farmers. The network relationships are shown in Figure D-4.

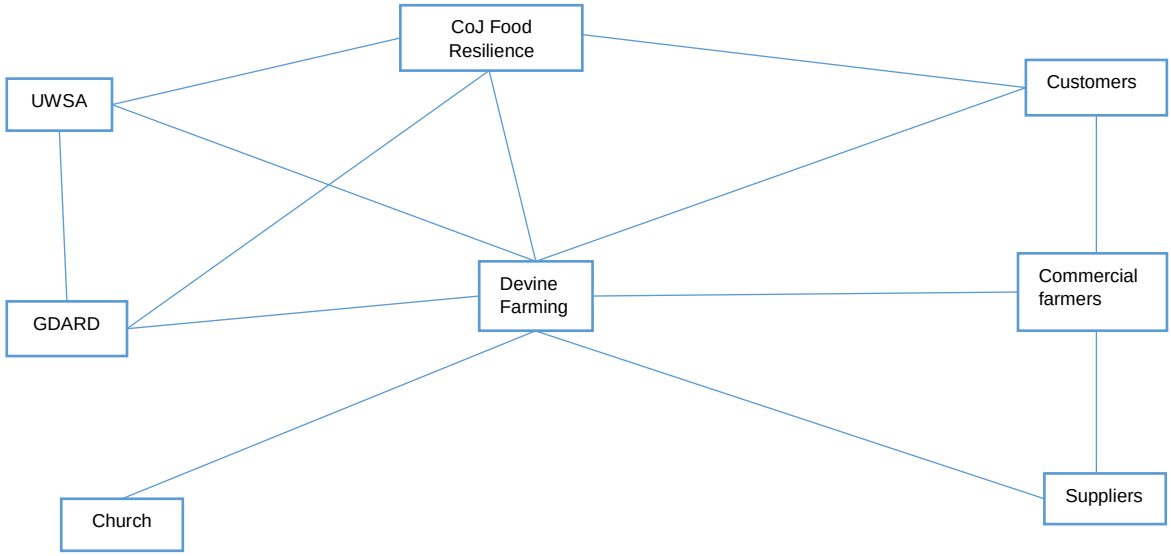

Figure D-4: Devine farming sociogram (source, author)

D.2: Case study 4: Serapeng Sa Basadi Cooperative – vegetable and herb production

Serapeng Sa Basadi Cooperative, (here referred to as Serapeng), was started in 2005 by four women. The cooperative owns a farm in Vereeniging, south of Johannesburg. Similar to many cooperatives, the group originally was large, with about 30 members. However, the majority left after realising that farming does not deliver immediate revenue. After experiencing problems in marketing farm products in Vereeniging (which is a small urban centre) they opted for the larger market in Johannesburg where they run a garden that previously belonged to the Green House Project in Joubert Park (case study site 8, Figure D.1). The parties entered into an agreement whereby the cooperative cultivates the garden and keeps the premises clean, and the Green House Project concentrates on broader environmental, and climate change awareness, and advocacy issues while showcasing the garden as one of its initiatives. Serapang cultivates vegetables

and herbs, runs eco-tourism visits for students, and also trains other emerging farmers.

➢ Serapeng Value Chain

Serapang has a short value chain, where the cooperative grows vegetables, and herbs, and sells it in central Johannesburg (Figure D.1). Additionally, Serapang offers training programmes to emerging farmers in collaboration with the Green House Project, and Gender and Climate Change country-wide. The cooperative's farming activities along the value chain are:

- **Inputs** – the cooperative gets seed packs and tools from the CoJ and supporting NGOs such as the Green House Project, and Gender and Climate Change. The cooperative practices organic farming and prepares compost by recycling garden waste on-site.
- **Production** – Serapang produces vegetables and herbs in a greenhouse that controls temperatures and keeps out pests and, therefore, produces good quality vegetables (Figure D.5). The cooperative combines modern and conventional farming methods; some vegetables and herbs are also grown in open spaces outside the greenhouse.



Figure D-5: Serapang farms vegetables and herbs inside and outside the greenhouse in Joubert Park (source, author)

- **Processing** – The vegetables are sold to traders without processing or packaging. Herbs, again, are processed into an ointment, herbal mixes, and cough syrups.
- **Marketing and consumption** –Joubert Park in central Johannesburg offers the cooperative improved access to the market. The cooperative had a limited market at Vereening but within the city centre, the market is huge. The vegetables and ointment are sold at farm-gate to customers or vendors within the city. The sale of vegetables and herbs also covers transport cost for members who commute daily from Vereeniging to Johannesburg. The activities of Serapang along the value chain are depicted in detail in Figure D-6.

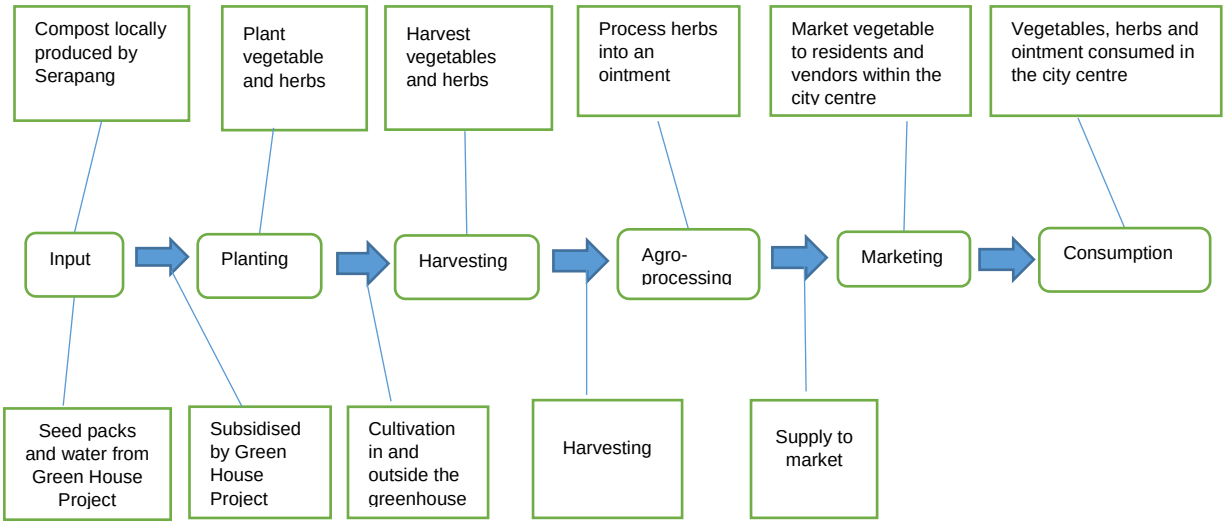

Figure D-6: Serapeng Sa Basadi Cooperative value chain (source, author)

➢ Diversifying farm activities

In addition to growing vegetables, herbs, and processing ointment, Serapeng runs eco-tourism tours for university, college and school students on gardening, and the environment. The cooperative teaches practical experiences in UA, the environment, and food preservation methods such as hot bakes (that keep food warm, or cold, for longer periods). Serapeng members attended a training of trainer's course on gardening and herbs, and are contracted by Gender and Climate Change to train other women, and youths.

➢ Innovation and Innovation networks

The cooperative combines innovation, and conventional farming practices. For instance, gardening in the greenhouse, and processing herbal ointment follows novel farming practices. However, the cooperative also practices open space farming outside tunnels using traditional methods. The cooperative developed networks for social capital though they are potentially used as springboards for innovation. The innovation networks for the cooperative are:

- Open knowledge and technology sources – Serapang undertakes exhibitions of food processing in collaboration with Gender and Climate

Change, and the Green House Project. The exhibitions showcase Serapang's best practices to emerging farmers in the city.

- Acquisition of knowledge and technology – The cooperative rents the greenhouse from the Green House Project for its gardening. In addition, the cooperative also employs traditional farming methods outside the greenhouse.
- Innovation cooperation – Serapang received training on the environment, climate change, food production, and self-reliance. The training workshops were organised by Earth Life Africa, Gender and Climate Change, and the Green House Project. Gender and Climate Change also trained Serapang in self-reliance issues, such as food processing, hotbeds, and the production of cough syrups.

➢ Networking partners and power relations

Serapang shares the same premises with the Green House Project, and Gender and Climate Change, and through these linkages the cooperative gets exposure to like-minded organisations that offer inputs, and training. Serapeng and the Green House Project collaborate with UJ, which brings Environmental Science students to learn practical gardening, and conservation. The cooperative collaborates with GDARD, which provides tools, and seedlings. The CoJ Department of Social Development, through the Public Works Programme, places labourers with community projects such as Serapang. Serapang also collaborates with Earth Life Africa in promoting awareness, education, and advocacy on climate change, and sustainable energy. Gender and Climate Change collaborates with Serapang to empower women in climate change justice. The Green House Project, Gender and Climate Change, and Earth Life Africa are crucial to the success of, and have a great deal of influence on, Serapang. The three NPOs hold periodic meetings on environmental and women's issues with regard to climate change. This network enables Serapang to meet urban farmers, and learn from their experiences. These networks are illustrated in the sociogram in Figure D-7.

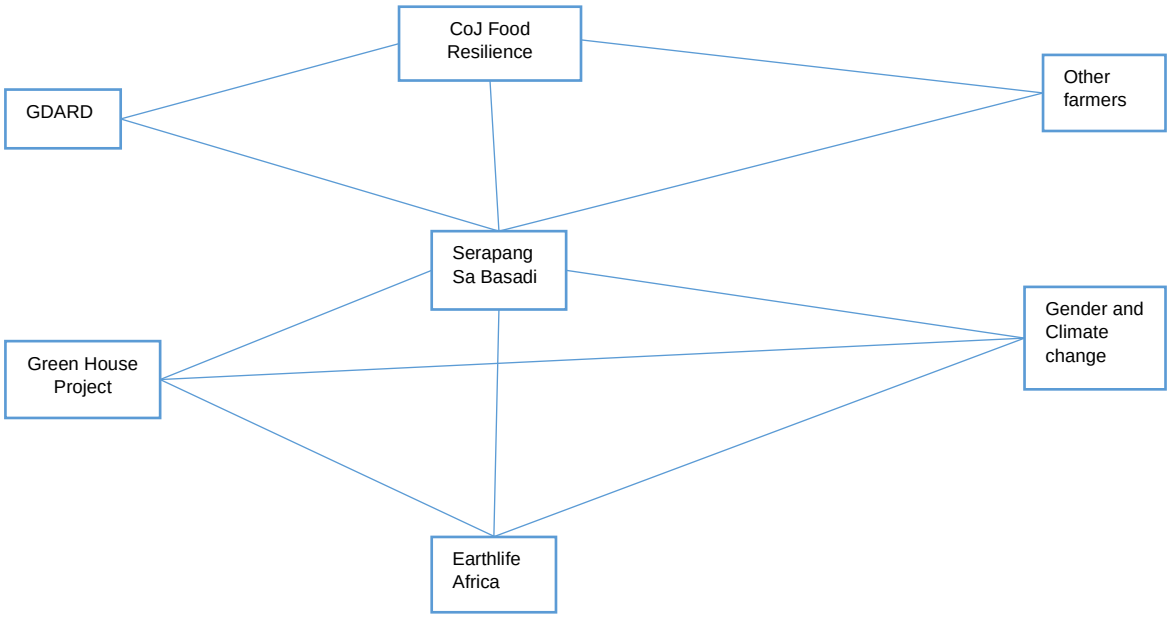

Figure D-0-6: Serapeng Sa Basadi Sociogram (source, author)

Appendix E: Data analysis template

PART IV FINDINGS: INNOVATION NETWORKS IN UA AND PLANNING IN JOHANNESBURG
4.0 EFFECTIVENESS OF INTERNATIONAL EXPERIENCES OF INNOVATION NETWORKS TOWARDS FORMALISATION OF URBAN AGRICULTURE ON LAND USE PLANNING: PERSPECTIVES FOR JOHANNESBURG

Question 2: Within a context of market logic (productivity and competitiveness), how effective are innovation networks in overcoming the underlying drivers of marginalisation towards promoting formal assigning of land uses for UA?

Table E-1: Data analysis template – UA international practices parameters

Key theoretical issue to guide data capture and analyses	**Data Parameters or criteria**	**Primary Data Source**	**Secondary Data Source**	**Approach to Data Analysis**
Issue 1: Planning innovation networks	Land use options	Interview CoJ; UJ, South Africa Council of Planners; South Africa Cities Network	Review thesis Chapters 4 and 5; Review Almere, Berlin, Cape Town, Dar es Salaam, Detroit, Havana and Portland publications and Maps;	Transcriptions of recordings, thematic content analysis, Comparative analysis – land use zoning for UA
	Pro UA policies	Interview CoJ; UJ, South Africa Council of Planners; South Africa Cities Network	Review thesis Chapters 4 and 5; R Review Almere, Berlin, Cape Town, Dar es Salaam, Detroit, Havana and Portland publications and Maps	Transcriptions of recordings, thematic content analysis, Comparative analysis – land use zoning for UA
Issue 2: Farming practices	Diversity	Interview CoJ; UJ, South Africa Council of Planners; South Africa Cities Network	Review thesis Chapters 4 and 5; Review Almere, Berlin, Cape Town, Dar es Salaam, Detroit, Havana and Portland publications and Maps and photos;	Transcriptions of recordings, thematic content analysis, Comparative analysis – farming practice diversity
Issue 3: Innovation networks	Innovation network types	Interview CoJ; UJ, South Africa Council of Planners; South Africa Cities Network	Review thesis Chapters 4 and 5; Review Almere, Berlin, Cape Town, Dar es Salaam, Detroit, Havana and Portland publications and Maps	Transcriptions of recordings, thematic content analysis, Comparative analysis – innovation networks types
Issue 4: City support mechanism	Inputs schemes, marketing and training	Interview CoJ; UJ, South Africa Council of Planners; South Africa Cities Network	Review thesis Chapters 4 and 5 Review Almere, Berlin, Cape Town, Dar es Salaam, Detroit, Havana and Portland publications and Maps and photos	Transcriptions of recordings, thematic content analysis, Comparative analysis – city input schemes, marketing, training

Table E-0-3: Data analysis template – CoJ land use planning innovation parameters

Key theoretical issue to guide data capture and analyses	Data Parameters or criteria	Primary Data Source	Secondary Data Source	Approach to Data Analysis
Issue 1: Planning innovation networks	Formal zoning	Interviews of CoJ. Voice recorder, field notes, Extended case method - attend plan presentation meetings	Review of CoJ IDP and SDF and websites, stakeholder reports, Maps	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses
	Temporary land use	Interviews of CoJ. Voice recorder, field notes, Extended case method - attend plan presentation meetings	Review of CoJ IDP and SDF and websites, stakeholder reports, Maps	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses

Table E-0-4: Data analysis template – CoJ and key stakeholder (NPO and private sector) innovation networks parameters

Key theoretical issue to guide data capture and analyses	Data Parameters or criteria	Primary Data Source	Secondary Data Source	Approach to Data Analysis
Issue 3: Innovation networks	Open knowledge + technology	Interviews of CoJ Food Resilience Unit; Department of Development Planning	Review of CoJ IDP and SDF and websites, stakeholder reports	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses
	Acquisition of knowledge and technology	Interviews of CoJ Food Resilience Unit; Department of Development Planning	Review of CoJ IDP and SDF and websites, stakeholder reports	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses
	Innovation collaboration	Interviews of CoJ Food Resilience Unit; Department of Development Planning	Review of CoJ IDP and SDF and websites, stakeholder reports,	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses

Table E-0-5: Data analysis template – CoJ and key stakeholder (NPOs and private sector) network power relations parameters

Key theoretical issue to guide data capture and analyses	**Data Parameters or criteria**	**Primary Data Source**	**Secondary Data Source**	**Approach to Data Analysis**
Issue 4: Network power relations	Degree centrality	Counting number of actors, the interrelationships between the CoJ and other key stakeholders such as NPO and the private sector. Extended case method - attending training and stakeholder meetings	Review CoJ Food Resilience Unit reports, stakeholder reports, websites and newsletters	Transcriptions of audio recordings, Primary and secondary data thematic content analysis, clustering similar responses, figures and analysis tables, Social Network Analysis software (UCINET 6 for windows)
	Brokerage centrality	Observation of the actors that coordinate the relationship between the CoJ and other key stakeholders such as NPO and the private sector and the farming entities. Extended case method - attending training and stakeholder meetings	Review CoJ Food Resilience Unit reports, stakeholder reports, websites and newsletters	Transcriptions of audio recordings, Primary and secondary data thematic content analysis, clustering similar responses.

Table E-0-6: Data analysis template – The CoJ and key stakeholder (NPOs and private sector) support mechanism parameters

Key theoretical issue to guide data capture and analyses	**Data Parameters/criteria**	**Primary Data Source**	**Secondary Data Source**	**Approach to Data Analysis**
Issue 4: City support mechanism	Inputs schemes	Interview of 12 farming practices, CoJ Food Resilience Unit, GDARD, Participant observations. Photos, voice recorders, field notes,	Review CoJ Food Resilience Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis
	Marketing farm produce	Interview of 12 farming practices, CoJ Food Resilience Unit, GDARD, Participant observations. Photos, voice recorders, field notes,	Review CoJ Food Resilience Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis
	Farmer training	Interview of 12 farming practices, CoJ Food Resilience Unit, GDARD, Participant observations. Photos, voice recorders, field notes	Review CoJ Food Resilience Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis

5.0 JOHANNESBURG'S FARMING CASE STUDY FINDINGS: THE EFFECTIVENESS OF INNOVATION NETWORKS TOWARDS FORMALISATION OF URBAN AGRICULTURE

Question 1: What are the drivers underlying the marginalization of UA in municipal land-use planning?

Table E-0-7: Data analysis template – farming entity value chain parameters

Key theoretical issue to guide data capture and analyses	**Data Parameters/criteria**	**Primary Data Source**	**Secondary Data Source**	**Approach to Data Analysis**
Issue 1: Value chain	Inputs	Interview of 12 farming entities, CoJ Food Resilience, Participant observations. Photos, voice recorders, field notes	Review CoJ Food Resilience Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses,
	Production	Interview of 12 farming entities, CoJ Food Resilience, Participant observations. Photos, voice recorders, field notes	Review CoJ Food Resilience Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses
	Processing	Interview of 12 farming entities, CoJ Food Resilience, Participant observations. Photos, voice recorders, field notes	Review CoJ Food Resilience Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses,
	Marketing	Interview of 12 farming entities, CoJ Food Resilience, Participant observations. Photos, voice recorders, field notes	Review CoJ Food Resilience Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses,
	Consumption	Interview of 12 farming entities, CoJ Food Resilience, Participant observations. Photos, voice recorders, field notes	Review CoJ Food Resilience Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses,

Table E-0-8: Data analysis template – farming entity land access arrangements parameters

Key theoretical issue to guide data capture and analyses	**Data Parameters/criteria**	**Primary Data Source**	**Secondary Data Source**	**Approach to Data Analysis**
Issue 1: UA land access arrangements	Formal land access	Interview of 12 farming entities, CoJ Food Resilience, Participant observations. Photos, voice recorders, field notes.	Review of CoJ IDP and SDF and websites, stakeholder reports, Maps	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses
	Temporary land access	Interview of 12 farming entities, CoJ Food Resilience, Participant observations. Photos, voice recorders, field notes	Review of CoJ IDP and SDF and websites, stakeholder reports, Maps	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses
	Informal land access	Interview of 12 farming entities, CoJ Food Resilience, Participant observations. Photos, voice recorders, field notes	Stakeholder reports, Maps	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses

Table E-0-9: Data analysis template – farming entity innovation networks parameters

Key theoretical issue to guide data capture and analyses	**Data Parameters/criteria**	**Primary Data Source**	**Secondary Data Source**	**Approach to Data Analysis**
Issue 3: Innovation networks	Open knowledge + technology	Interview of 12 farming entities, CoJ Food Resilience Unit, GDARD, Participant observation, Photos, voice recorders, field notes, Extended case method - attending exhibitions	Review CoJ Food Resilience Unit Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses,
	Acquisition of knowledge and technology	Interview of 12 farming entities, CoJ Food Resilience Unit, GDARD, Participant observation, Photos, voice recorders, field notes, Extended case method - attending exhibitions	Review CoJ Food Resilience Unit Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses,
	innovation collaboration	Interview of 12 farming entities, CoJ Food Resilience Unit, GDARD, Participant observation, Photos, voice recorders, field notes, Extended case method - attending exhibitions	Review CoJ Food Resilience Unit Reports, stakeholder reports, farming practice websites, farmers reports/newsletters	Transcriptions of recordings, Primary and secondary data thematic content analysis, clustering similar responses,

Table E-0-10: Data analysis template – farming entity network power relations parameters

Key theoretical issue to guide data capture and analyses	Data Parameters/criteria	Primary Data Source	Secondary Data Source	Approach to Data Analysis
Issue 4: Network power relations	Degree centrality	Participant observation of collaborating actors, their number, type of interrelationships between farming entities, CoJ and other stakeholders. Extended case method - attending training and stakeholder meetings	Review CoJ Food Resilience Unit reports, stakeholder reports, farming entity reports, websites and newsletters	Transcriptions of audio recordings, Primary and secondary data thematic content analysis, clustering similar responses, Figures and analysis tables, Social Network Analysis software (UCINET 6 for windows)
	Brokerage centrality	Participant observation of collaborating actors, their number, type of interrelationships between farming entities, CoJ and other stakeholders. Extended case method - attending training and stakeholder meetings	Review CoJ Food Resilience Unit reports, stakeholder reports, farming entity reports, websites and newsletters	Transcriptions of audio recordings, Primary and secondary data thematic content analysis, clustering similar responses.
	Assemblages	Participant observation of the power that farming entities exercise as a result of histories of engagement, experiences and training. Extended case method - attending training and stakeholder meetings	Review CoJ Food Resilience Unit reports, stakeholder reports, farming entity reports, websites and newsletters	Transcriptions of audio recordings, Primary and secondary data thematic content analysis, clustering similar responses.

6.0 EFFECTIVENESS OF INNOVATION NETWORKS AS A MECHANISM TO OVERCOME THE MARGINALISATION AND ENHANCE FORMALISATION OF URBAN AGRICULTURE: Question 3: How could insights from the effectiveness of innovation networks in overcoming the marginalization of UA in municipal land-use planning guide our understanding of the current and future experience in formalization of land uses for UA?

Table E-0-11: Data analysis template – UA international success story parameters

Key theoretical issue to guide data capture and analyses	**Data Parameters/criteria**	**Primary Data Source**	**Secondary Data Source**	**Approach to Data Analysis**
Issue 1: Planning innovation	Land use options	Interview CoJ; UJ Department of Anthropology, SACPLAN; SACN	Review thesis Chapters 4, 5 and 6	Comparative analysis – land use option and role of UA
	UA policies	Interview CoJ; UJ Department of Anthropology, SACPLAN; SACN	Review thesis Chapters 4, 5 and 6	Comparative analysis – role of UA
Issue 2: Farming organisational structures	Organisational structures	Interview CoJ; UJ Department of Anthropology, SACPLAN; SACN	Review thesis Chapters 4, 5 and 6	Comparative analysis – role of UA
	Functional roles of UA	Interview CoJ; UJ Department of Anthropology, SACPLAN; SACN	Review thesis Chapters 4, 5 and 6	Comparative analysis – role of UA
Issue 3: Municipal structure for UA	Departmental structure for UA	Interview CoJ; UJ Department of Anthropology, SACPLAN; SACN	Review thesis Chapters 4, 5 and 6	Comparative analysis – role of UA
Issue 4: Innovation network	Power relations	Interview CoJ; UJ Department of Anthropology, SACPLAN; SACN	Review thesis Chapters 4, 5 and 6	Comparative analysis – role of UA
	Network Strengths	Interview CoJ; UJ Department of Anthropology, SACPLAN; SACN	Review thesis Chapters 4, 5 and 6	Comparative analysis – role of UA

Appendix F: Human Research Ethics Committee clearance

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Zivhave

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H16/07/40**
PROJECT TITLE	Networks of innovation in the urban agriculture value chain: Municipal practices in the formalisation of urban agriculture as an urban land-use in the city of Johannesburg
INVESTIGATOR(S)	Mr M Zivhave
SCHOOL/DEPARTMENT	Architecture and Planning/
DATE CONSIDERED	22 July 2016
DECISION OF THE COMMITTEE	Approved
EXPIRY DATE	26 October 2019

DATE 27 October 2016 **CHAIRPERSON** (Professor J Knight)

cc: Supervisor : Professor D Irurah

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature

02 / 11 / 2016
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES