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Land Tenure and its Implications for Productivity of Urban Agriculture in Soweto, South Africa

Ph.D. dissertation

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Statement of originality

This is to certify that the intellectual content of this dissertation is the product of my own work and that all the assistance received in preparing this dissertation and sources have been acknowledged.

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Abstract

Land tenure and land tenure security are often acknowledged as the most substantial assets determining the viability of urban agriculture, especially in terms of its productivity and of potential investments. Numerous researchers have built their ideas on traditional agricultural theory, which states that only legally based land tenure and land ownership can result in land tenure security and thus enhance the productivity of urban agriculture. Consequently, they have emphasized the need for legalized and secure land tenure for more prosperous urban agriculture. Nevertheless, such statements often origin from weak or non-existent evidence. In order to address this research gap, the dissertation aims to enrich the discussion on land tenure for urban agriculture by empirical examination of the above-mentioned theory by applying mixed-method research. Furthermore, the presented case study introduces an investment index for the measurement of investments among small-scale urban farmers. The index utilizes nonmonetary and easy-to-recall information from the farmers. The findings of the dissertation show that the concept of land tenure and land tenure security for urban farmers used in the literature is too narrow and need to be extended by other dimensions than the legal one. Finally, the dissertation concludes that it is vital to consider the importance of social relations and contextual information in order to fully understand the dynamics of land tenure and productivity of urban agriculture.

Key words: land tenure, tenure security, productivity, investments, investment index, urban agriculture, Soweto

Abstrakt

Držba půdy a její bezpečnost jsou často považovány za nejvýznamnější determinanty určující životaschopnost městského zemědělství, zejména pokud jde o jeho produktivitu a potenciální investice ze strany farmářů. Řada autorů však staví své myšlenky na tradiční zemědělské teorii, že pouze legální držba nebo vlastnictví půdy mohou vyústit v bezpečnost jejího využívání a tím zvýšit produktivitu městského zemědělství jako takového. Na základě této argumentace pak autoři zdůrazňují potřebu formalizace vlastnických práv jako základ pro prosperující městské zemědělství. Tato tvrzení však často pochází z nedostatečných anebo neexistujících empirických důkazů. Proto je hlavním cílem této práce obohatit stávající literaturu o případovou studii, která na základě empirického zkoumání přináší tolik potřebné důkazy pro diskusi o formalizaci vlastnických práv pro městské zemědělce. Dizertační práce také přispívá k současné literatuře o produktivitě městského zemědělství prostřednictvím indexu měřícího úroveň investic mezi městskými zemědělci, který je sestrojen na základě nemonetárních a snadno dostupných informací od farmářů. Výsledky této dizertační práce ukazují, že tradiční pojetí držby půdy pro městské zemědělce je příliš úzce zaměřeno na její legální aspekty a je potřeba ho obohatit o další aspekty, zejména o zohlednění sociálních vazeb a kontextuálních informací, které zcela zásadním způsobem ovlivňují jak vnímání bezpečnosti držby půdy, tak produktivitu městského zemědělství jako takového.

Klíčová slova: držba půdy, bezpečnost držby půdy, produktivita, investice, investiční index, městské zemědělství, Soweto

List of abbreviations

CoJ – City of Johannesburg

DME – Departmental and Municipal Entity of the City of Johannesburg

DSD – Department of Social Development of the City of Johannesburg

FAO – Food and Agriculture Organization

II – Investment Index

JPC – Joburg Property Company

MCR – Mayoral and Council Reporting of the City of Johannesburg

MUFPP – Milan Urban Food Policy Pact

PFP – Partial factor productivity

TFP – Total factor productivity

UA – Urban agriculture

UJ – University of Johannesburg

UN-Habitat – United Nations Human Settlement Programme

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Content

Introduction

During the last three decades, urban agriculture in developing countries[1] attracted the attention of various scholars, international organizations, and NGOs as well as national and local governments. The rising interest in urban agriculture is determined by the potentials and benefits of the activity especially at the household level. With no doubts, urban agriculture can help to improve food security (e.g. Armar-Klemesu, 2000; Maxwell, 1995; Mwangi, 1995; Tinker, 1994) and enhance the economic situation of the urban poor (e.g. Van Veenhuizen & Danso, 2007; Moustier & Danso, 2006; Nugent, 2000). Concerning the benefits, it is not surprising that urban agriculture is one of the possible livelihood strategies of the poor in the cities. Furthermore, urban agriculture could be also considered as a significant employer in the cities across the world. For instance, Van Veenhuizen & Danso (2007) refer that more than 200 million people are involved in market-oriented urban agriculture, thereby providing 15 – 20% of global food. Additionally, Mougeot (2000) suggests that nearly 800 million urban dwellers are involved in agriculture. It is estimated that more than 40% of all African urban households are engaged in farming (FAO, 2012). On top of that, urban agriculture has certain benefits also at the city level, as it can improve the local environment (e.g. Cofie et al., 2006; Deelstra & Girardet, 2000). Despite the arguments given above, urban agriculture cannot be perceived as a panacea for problems of urban poor as the real impact, especially on improvement of food security, is questionable (see e.g. Crush et al., 2011; Frayne et al., 2014; Zezza & Tasciotti, 2010). Furthermore, Zezza & Tasciotti (2010) point out the unreliability of available data on urban agriculture. Most of them are cited repeatedly even though they are based on expert judgment and the evidence is more qualitative than quantitative (ibid.).

The success of urban agriculture as a livelihood strategy, as well as its contribution to food security, greatly depends on the availability of household capital.[2] Farmers usually lack the most important capital – land.[3] Only 20% of all urban agriculture activities are carried out on the privately-owned land. Furthermore, both title deeds and tenancy agreements are rare. Contracts are mostly unsecured and overpriced as a legal framework is very often missing

[1] Urban agriculture is practiced and researched across the globe. However, urban farming in developed countries is of substantially different character, especially if the scope and organization of agricultural practice together with farmers' motivation are considered. Therefore, this dissertation focuses exclusively on urban agriculture in developing world.

[2] We can distinguish five types of capital (assets) which are crucial for the development of urban agriculture: natural capital, physical capital, human capital, financial capital, and social capital (Prain & Lee-Smith, 2010).

[3] According to Prain & Lee-Smith's (2010) land stands for natural capital.

(Bryld, 2003). Thus, the productivity of urban agriculture is highly affected by the form of land tenure (Lynch et al., 2001). Consequently, the formality of the land tenure defines the legal status of urban agriculture as well as its character (i.e. urban agriculture as a part of the formal or informal economy) (Van Veenhuizen & Danso, 2007). Land rights also play key role in accessing external financing for urban agriculture as land often serves as a collateral for institutions providing credit services (Cabannes, 2015). Ruel et al. (1999) adds that the security of land tenure highly affects the farmers' market behavior and further investment to the land in terms of environmentally friendly treatment. Bryld (2003) concludes that many farmers whose land tenure is insecure implement low-risk strategies, therefore growing vegetables with lower yield and short-duration seasonal crops. Finally, FAO (2002) states that land tenure influences the environmental sustainability, social conflicts, and food security of vulnerable groups and vice versa.

As suggested above, the question of land tenure is appealing throughout the literature on urban agriculture. However, most of the authors build on traditional agricultural theory of Feder et al. (1988) which emphasizes the need of secure land tenure in terms of productivity enhancement. Nevertheless, the empirical evidence validating this relation within the literature on urban agriculture is scarce, often lacks solid data background and it is rather inspired by the studies from rural areas. Therefore, the applicability of Feder's et al. (1988) hypothesis is questionable, especially because of different character of urban and rural agriculture. While rural agriculture represents stability, urban agriculture has more dynamic and changeable character. Moreover, land utilization in cities is more diverse than in rural areas. Finally, as suggested by Place (2009), the links between land tenure and productivity are disputable. While some studies clearly show a positive effect of secure land tenure on agricultural productivity, others found only little or no evidence that tenure affects agricultural intensification and/or productivity.

Land tenure systems are often very complicated, especially in developing countries and particularly in sub-Saharan Africa. There is wide range of literature discussing the issues of scattered land tenure systems, considering the clashes between legal and customary land tenure systems (e.g. Boamah et al., 2020, Lawry et al., 2014, etc.). This situation is even more complicated in urban areas where the land competition is extremely high and the means of access to land are subject of semi-legal transactions (Payne, 1997).

The aim of this study is to explore to what extent land tenure arrangements influence the productivity of urban agriculture in Soweto, one of the Johannesburg's townships, South Africa.

The study aims to enrich the existing literature on urban agriculture in order to respond to the call of Zezza & Tasciotti (2010) who emphasize the need for more quantitative studies to ensure higher reliability of the data. The study will employ a mixed method research design as the author believes that the combination of both, quantitative and qualitative approach, may help to better understand the researched phenomena and to reach reliability of the data analysis.

The dissertation thesis is organized as follows. First chapter identifies the research gap in urban agriculture research and consequently frames the scope, aims and objectives of the study. Second chapter brings the overview of the methodological approach applied in the dissertation as well as the discussion of research limitations. In third chapter, the literature review is done in order to set up the theoretical framework for the empirical part of this thesis. The literature review firstly introduces the concept of urban agriculture with a special emphasis on productivity and investments into urban farming and on approaches to their measurement. Secondly, land tenure and land tenure security are discussed from a theoretical point of view where three major paradigms are critically discussed in order to create a solid base for the data analysis. Finally, literature review is focused on land tenure, land tenure security and its relation to productivity of urban agriculture. An attention is also paid to policy considerations which are essential for framing the results of the empirical part. Fourth chapter represents a case study of urban farmers in Soweto, South Africa. The case study consists of three major parts. At first, the context of Johannesburg and Soweto is introduced in respect to urban agriculture, policy making and land tenure development. In the second part, the research methodology (including research framework, methods of data collection and data analysis, and methodological and ethical considerations) is presented. The last part of the fourth chapter brings the results section, which is organized according to research objectives stated in the first chapter. Therefore, the results section firstly introduces the farmers of Soweto. Afterwards, land tenure arrangements, land tenure security and investments to urban agriculture among Sowetan farmers are explored. Finally, the relationship of land tenure security to investments is examined. Last two chapters of the dissertation consist of discussion and conclusion.

1 Scope of the Study

This dissertation thesis responds to the call of Zezza & Tasciotti (2010) who stressed out the importance of empirical research on urban agriculture. Their appeal for deeper examination of urban agriculture is even more urgent as food production in cities became the subject of number of policies[4] emerging (not only) in developing countries. Majority of these policies have two things in common: securing land tenure for urban agriculture and enhancing its productivity[5]. However, these documents often build on insufficient evidence[6] (Webb, 2011; Zezza & Tasciotti, 2010) and, especially in terms of land tenure formalization, often draws on examples and policy actions from rural areas. Nevertheless, as suggested by Van Veenhuizen & Danso (2007), there is a lot of differences between rural and urban agriculture, thus the transferability of rural agriculture policy practices is limited[7] and might result into ineffectiveness of proposed policies. Therefore, the ambition of this thesis is to extend the knowledge of urban agriculture by provision of empirical evidence on land tenure and productivity of urban agriculture. The scope of this thesis is threefold: firstly, it examines productivity of urban agriculture through investments into urban farming; secondly, it explores land tenure and land tenure security for urban agriculture. Finally, the thesis also enriches current research practice on urban agriculture and land tenure in terms of methodological innovation by thorough description of the data collection and analysis which can further help to other researchers focused on the phenomena under investigation or similar topics.

At first, the dissertation thesis brings insight into productivity of urban agriculture. The knowledge about the productivity of urban agriculture is mostly provided through cases studies or through generalized information. Furthermore, instead of producing knowledge on the productivity of urban agriculture, authors rather examine related issues such as income generation or contribution to food security (e.g. Adeoti et al., 2012, Crush et al. 2011; Frayne et al. 2014; Rezai et al., 2016). Moreover, because of the small-scale and mostly informal character of urban agriculture, capturing data related to urban agriculture yields in developing countries is relatively difficult as farmers mostly do not keep any records necessary for productivity measurement. In order to contribute to the existing literature, this study addresses

[4] Urban agriculture is often embodied in food security policies.
[5] The policy considerations, together with examples of strategic documents, are further elaborated in subchapter 3.3.1 Policy Considerations for Land Tenure Security for Urban Farmers.
[6] As the evidence for urban agriculture is generally lacking.
[7] This problem is further discussed in chapters 2.1 Research Limitations and 3.3 Land Tenure, Land Tenure Security and Productivity of Urban Agriculture.

productivity through measurement of investments by Investment Index constructed by the author. This index is based on the easily accessible data and presents a simple tool for other researchers who are interested in small-scale, informal (urban) agriculture.

Secondly, the research aims to enrich ongoing debate on land tenure formalization for urban agriculture by provision of empirical evidence from Soweto, South Africa. Despite the number of research papers analysing land tenure and its security in developing context, majority of them focus either on housing or on agriculture in rural areas. Nevertheless, applying these frameworks to urban agriculture might be tricky as the land tenure for urban farmers have different dynamics than land tenure for rural agriculture and housing. In order to address the above-mentioned issues, the thesis brings two innovations into the urban agriculture research. Firstly, while majority of authors builds on the paradigm of land tenure formalization, i.e. highlights the importance of legality, the dissertation builds on Van Gelder's (2010) *tripartite view* of land tenure security and particularly focuses on perceived tenure security. Detailed exploration of diverse dimensions of land tenure security contributes to possible paradigm shift which is essential to effective policy-making. Secondly, the presented research also enables a deeper understanding of land tenure processes on the ground by employment of mixed-method research combined with participatory approaches to knowledge building.

The results of this study enable improvement of policy planning and can also support policymakers when re-thinking existing approach to land tenure formalization and productivity enhancement of urban agriculture. Therefore, the last part of the dissertation will provide set of policy recommendations based on the results of the study.

1.1 Aims and Objectives

As described above, the main aim of the study is to analyze how land tenure influences the productivity of urban agriculture with special emphasis on investments to urban agriculture. In order to fully understand the researched phenomena, it is important to define urban agriculture, its benefits and constraints and the scope of its productivity and different approaches to its measurement. Secondly, the thesis will focus on the access to the land, land tenure and land tenure security for urban agriculture. The special attention will be paid to the discussion of various understandings of land tenure question. Furthermore, this part will also examine the assumption of many authors that land tenure and its security highly affect agricultural productivity as well as will introduce policy considerations regarding land tenure for urban agriculture. Thirdly, the field-based case study will aim to analyze how land tenure influences

urban farmers' productivity. The core of the case study is to explore three dimensions of land tenure security and the interactions among them. Consequently, the influence of land tenure security on investments will be analysed. The aims and objectives are summarized in table 1.

Table 1 *Aims and objectives of the thesis*

Aims	Objectives
1. to analyze the phenomenon of urban agriculture	**1.** to characterize the phenomenon of urban agriculture
	2. to examine the productivity of and investments to urban agriculture and the approaches to its measurement
2. to describe and analyze land tenure and its security and its role in urban agriculture	**1.** to explore land tenure and land tenure security from different theoretical perspectives
	2. to analyze the impact of land tenure and its security on (urban) agriculture (based on existing literature)
	3. to discuss land tenure for urban agriculture from the policy perspective
3. to analyze how land tenure influences urban farmers' investments to urban agriculture in Soweto, South Africa	**1.** to characterize farmers of Soweto
	2. to analyse access to the land of urban farmers in Soweto
	3. to analyse the forms of land tenure among urban farmers in Soweto
	4. to analyse three dimensions of land tenure security among farmers in Soweto
	5. to analyse the level investments to urban agriculture in Soweto
	6. to analyse the implications of different types of land tenure security for investments of urban agriculture

Source: Author

2 Methodology

The thesis is based on the mixed methods research, i.e. on the combination of qualitative and quantitative research methods. While quantitative components enable to acquire statistically significant view on the researched phenomena, qualitative elements allow for deeper understanding of the research context and for explanation of the statistical results. In this research, mixed methods research includes wide range of methods, such as literature review, interviews and questionnaire survey, which are subjected to quantitative and qualitative data analysis. The particular methods are described in detail below. This chapter is structured according to the thesis aims in order to fully understand the research logic. Furthermore, it will also bring an overview of consecutive phases of the research. Finally, limitations to the research are also discussed.

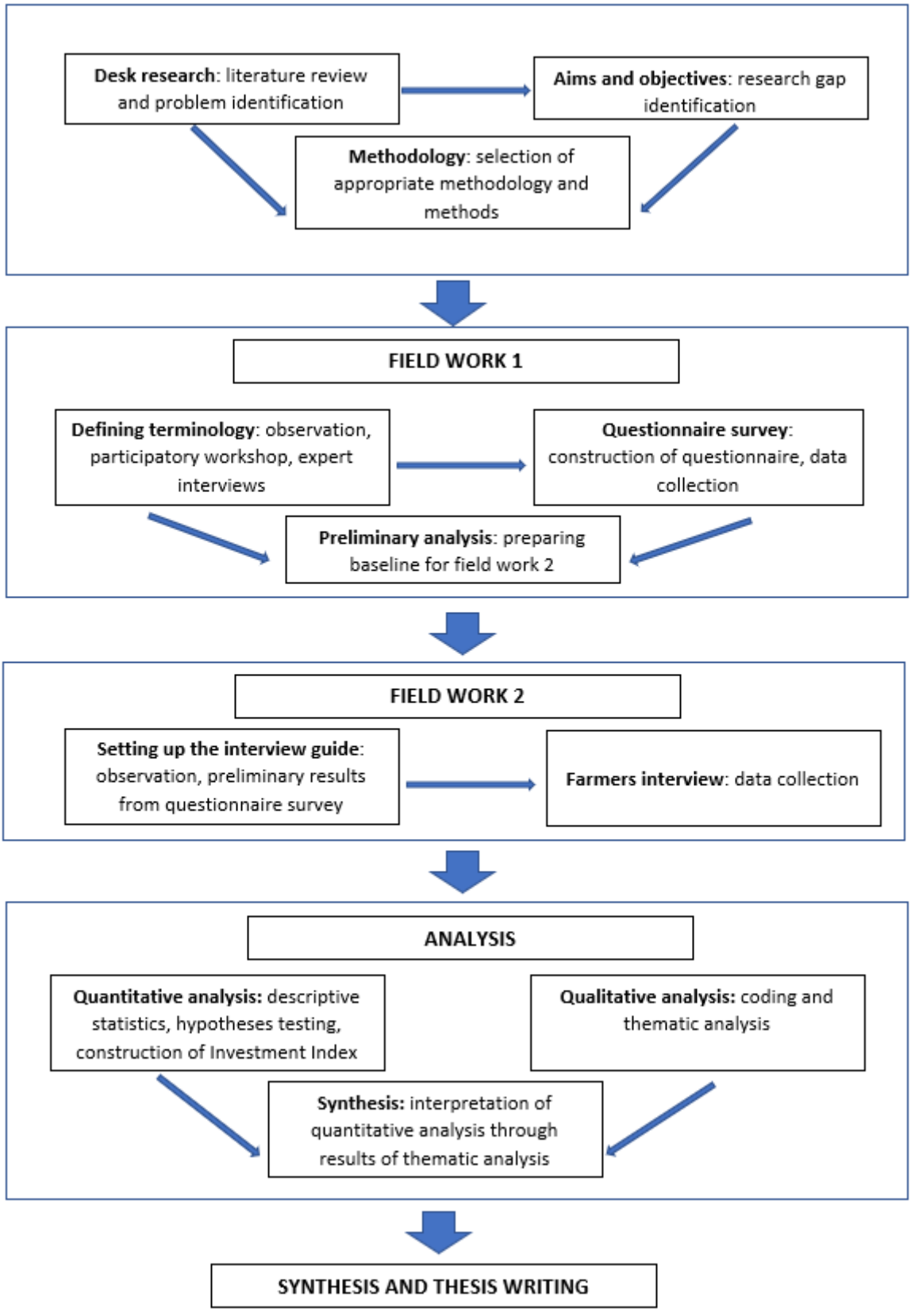
Aim 1: *To analyze the phenomenon of urban agriculture* and Aim 2: *To describe and analyze land tenure and its security and its role in urban agriculture* are based on the desk research, i.e. on the literature review examining existing works. Academic journals and books as well as grey literature were used and reviewed. Grey literature mainly included reports from FAO and RUAF Foundation but also from other agencies active in the field related to the subject of the thesis. Due to lacking literature on productivity of urban agriculture, investments to urban agriculture and land tenure and its security for urban agriculture, the literature review also utilizes studies researching the above-mentioned phenomena in terms of rural agriculture. Furthermore, literature discussing land tenure and related issues under different paradigms as defined by Simbizi et al. (2014), namely the economic oriented school, legal based school and adaptation school, is included in order to set up an appropriate framework for the analytical part of the thesis.

The findings responding to the Aims 1 and 2 are presented in chapter 3 Literature Review. Both aims were approached in the same way. Firstly, the author defines the phenomenon under the investigation in order to avoid misinterpretations in later phases of research. Secondly, the existing literature is actively discussed in order to critically assess the approaches and paradigms used by other authors. For instance, the chapters 3.1.1 and 3.1.2 do not only bring the overview of different approaches to measurement of productivity and investments to agriculture, it also discusses their suitability for urban agriculture in the context of developing countries.

Aim 3: *To analyze how land tenure influences urban farmers' investments to urban agriculture in Soweto, South Africa* is based on the field research conducted in Soweto during the periods of February to May 2017 and February to March 2018. The field study employs mixed methods of data collection, i.e. a combination of quantitative and qualitative research methods. This approach benefits from the strengths of both, and helps to better understand the researched reality in terms of collection of statistical data by questionnaire survey and its complementation by data gained through in-depth interviews (Punch, 2009). The following methods of data collection are used in this study: *observation, participatory workshop, questionnaire* and *in-depth interviews* with key informants and farmers. The methods used during the field research as well as during the data analysis are described in detail in chapters 4.2.3 and 4.2.4. The results of the qualitative and quantitative analysis are presented in chapter 4.3.

Figure 1 visualizes five stages of the presented research. At the preparatory phase, desk research including literature review and problem identification was conducted in order to define the research gap and set up the aims and objectives of the study. Based on the literature review and overall aims, the research methodology and particular methods were selected. At the second stage, first round of fieldwork was carried out. Firstly, the terminology used within the questionnaire was established during observation, participatory workshop with farmers and during key informant interviews. The questionnaires were then collected with the help of trained fieldworkers. Afterwards, the preliminary analysis of quantitative data was done. These results were then used for shaping the interviews which were focused on the collection of complementary information to the results of questionnaire survey carried out in the second phase of fieldwork. Finally, the analysis of both, quantitative and qualitative data was performed.

Figure 1 *Stages of the presented research, source: author*



Source: Author

2.1 Research Limitations

This research faces several limitations and challenges. While the ones related to the fieldwork and data collection are closely discussed in subchapter 4.2.5, this subchapter reviews limitations of more general character. First limitation concerns the accessible literature on the subject under the investigation. As long as the theoretical part of this paper does not exclusively build on the cases from urban agriculture literature, one must consider the limits of applicability of the frameworks from rural agriculture to urban agriculture because, as suggested in the introduction, urban farming has different dynamics than rural agriculture. Therefore, rather than drawing conclusions related to urban farming based on rural agriculture research, this sort of evidence serves more likely as a source of inspiration while bearing in mind the limitations arising from diverse natures of the two agricultural systems. The similar issue arises from the employment of literature examining urban land tenure and land tenure security for other than farming uses, such as housing or small-scale family businesses which are of more legitimate character[8]. At the same time, tenure for "legitimate" land uses is significantly influenced by high population pressure and satisfaction of basic needs (especially in terms of housing). Nevertheless, these dynamics necessarily do not have to be related to urban farming as long as the land used by urban farmers is often underutilized for a long time. In conclusion, although the suitability of theories examining urban and rural land tenure for urban agriculture might be questionable, it is substantial to critically assess the insights from the concepts discussed in chapters 3.2 and 3.3 in order to shape functional theory for urban agriculture.

Second limitation concerns the transferability of the research findings. As the fieldwork has been taking place only in Soweto, South Africa, the context is too specific in order to transplant the findings to another environment, even within another location in South Africa. Although the suggested approach to land tenure security does not have to necessarily reflect the situation elsewhere (for instance, the suggested categories of land tenure might be different in other context), the research methodology and the questionnaire survey were designed carefully and could be used in different study sites with little or no modification.

Last limitation is connected to measurement of productivity. The original focus of this study was on the measurement of productivity. Although some of the tools (such as record keeping

[8] While housing needs are legitimate in terms of sustaining basic human needs, small-scale family business represents a widely recognized form of urban livelihood strategy. As long as urban agriculture is, at some cities, missing this recognition, it can be perceived as less legitimate by the municipal government as well as by local residents.

diaries) described in chapter 3.1.1 would be suitable for the farmers of Soweto, these methods would require longer stay of the author at the study site which was not possible due to financial demands. Furthermore, due to inaccurate data regarding the productivity coming out of the questionnaires, it was not possible to employ any approach to the measurement of productivity indicated in chapter 3.1.1. In fact, employment of distorted and inaccurate data would skew the analysis thus jeopardizing the overall results of this research. Therefore, the author decided to proxy productivity through investment measurement by the construction of composite Investment Index (the methodology is further described in chapter 4.2.4).

3 Literature Review

In order to fully understand the phenomena under investigation, it is essential to define the researched concepts as well as to explore and discuss wide range of underlying theories. The literature review aims to introduce the concept of urban agriculture in developing countries[9] with a special emphasis on its benefits and constraints. Furthermore, the approaches to productivity and investments to urban agriculture will be discussed. Secondly, different approaches to land tenure and land tenure security will be examined. Thirdly, this chapter will focus on the existing literature on the relationship between land tenure and investments into agriculture including policy considerations.

3.1 Urban Agriculture

Despite many efforts, there is no single definition of *urban agriculture*. According to Van Veenhuizen & Danso (2007:1), urban agriculture is defined as "the growing of plants and the raising of animals for food and other uses within and around the cities and towns, and related activities such as the production and delivery of inputs, processing, and marketing of products." Other existing definitions are more or less complementary to the one of Van Veenhuizen & Danso (2007) but the problem emerges when the area of agricultural production is discussed. Some authors use the term *peri-urban* and *urban agriculture* which suggest that farming on the city outskirts is also included. While Mougeot (2000) concludes that urban agriculture is defined by its location above all, Van Veenhuizen (2006) argues that connectivity to the urban economy is also important, especially when many urban dwellers own their plots outside the city in quite distant areas and bring their products into the cities. Finally, Tinker (1994) writes that it could be difficult to define the meaning of *peri-urban* and *urban agriculture* today. She states that expanding cities are absorbing those areas where agriculture is practiced naturally and that transportation options integrate rural areas into the metropolis economy. Based on the definitions provided above, this dissertation focuses on urban crop production located at intra-urban areas.

As suggested at the Introduction, urban agriculture positively influences food security and enhances the socio-economic situation of urban poor. Therefore, it is not surprising that development of urban agriculture tightly relates to economic and food crisis in the cities during

[9] Generally, urban agriculture in developed countries is connected with different motivations and it is more driven by the need of healthy and/or trendy lifestyles rather than the need to sustain someone's livelihood.

1980s. Especially urban food crisis is often attributed to structural adjustment programmes (SAPs) (Maxwell, 1999). These neoliberal reforms resulted in extensive cuts in socially-focused policies and reduced (among others) food production subsidies which caused steep rise of food prices (Drescher et al., 2000). Furthermore, the failure of urban economy led to increase in unemployment rates, especially in formal sector (Maxwell, 1995). Purchasing power of urban poor was substantially weakened and increasing proportion of urban dwellers was unable to fulfil its basic needs, including food security. Consequently, urban agriculture started to emerge across numerous cities of developing world, where people were looking for new survival strategies, as a response to the widespread urban crisis (Ellis & Sumberg, 1998).

According to Smit et al. (2001), the majority of urban farmers in developing countries belongs to low-income group and represents small-scale or subsistence agriculture. Nevertheless, middle- and high-income households also engage in urban agriculture by maintaining food gardens adjacent to their houses (Bryld, 2003). Although urban agriculture is often perceived as a livelihood strategy of the poorest urban dwellers, the evidence shows that this group is partially disadvantaged as it lacks access to the major resources required for farming, such as land and money (Smit et al., 2001). Therefore, urban agriculture is more likely a domain of the poor who are better-of (i.e. less marginalized) and who dispose with, at least, basic capital (Webb, 2011). Mougeot (2006) claims that most urban farmers are represented by women. However, Hovorka (2009) argues that women are more often engaged in subsistence farming while men dominate market-oriented agriculture as women are usually forced out of business due to structural factors, such as lower education, difficult access to land and lack of property rights and limited access to other capital.

Furthermore, many authors believe that farming in cities is a consequence of rural-urban migration. However, current research shows that even though farmers originate from smaller towns, they have been living in current areas for longer time periods, usually decades[10] (Mougeot, 2000). Van Veenhuizen & Danso (2007) concludes that the relatively low share of recent migrants among urban farmers is given by their limited access to resources. While people living in the city for a long period of time have already created social networks, gained access

[10] For instance, Sawio (1994) who studied urban agriculture in Dar es Salaam (Tanzania) found, that almost half of the farmers have been living in the city from 10 to 20 years and nearly 30% of farmers had moved to the city more than 30 years ago. Only 20% of farmers were recent migrants to Dar es Salaam living in the area less than 10 years.

to land, etc., recent migrants are restricted to many of these aspects which are crucial for urban agriculture.

Table 2 describes Moustier & Danso's (2006) classification of urban agriculture according to the socio-economic profile of the farms. Such characteristics clearly demonstrates the wide range of urban agriculture activities and the various profiles of urban farmers and their motivation. The four categories reflect the location, scale and market-orientation of the farming. *Home-subsistence farmers* often cultivate land adjacent to their homes (e.g. backyard gardens) and their produce is mostly consumed by the household. The predominant group of farmers is represented by *family-type commercial farmers* who opt for agriculture as a new source of income generation after the loss of formal or informal employment. *Entrepreneurs* can be considered as large-scale producers, who control the marketing of the produce and who use advanced technologies. They also function as employers. Finally, *multi-cropping peri-urban farmers* balance between urban and rural agriculture. While their production and purpose of the farming more likely reflects the characteristics of rural agriculture, farmers are under significant land pressure arising from urbanization processes.

Table 2 *Classification of urban agriculture according to socio-economic profile*

	Home-subsistence Farmers	**Family-type commercial Farmers**	**Entrepreneurs**	**Multi-cropping peri-urban farmers**
Location	urban (peri-urban)	urban/peri-urban	peri-urban	peri-urban
Outlets	home	urban markets	urban markets + export	home + urban market
Objective	home consumption	income for subsistence	additional income leisure	home consumption and income for subsistence
Size	< 100 m^2	< 1 000 m^2	> 2 000 m^2	> 5 000 m^2
Products	leafy vegetables, cassava, plantain, maize, rice, goats and sheep, poultry, fruits	leafy vegetables, temperate vegetables, poultry	temperate vegetables, fruits, poultry, livestock, fish	staple food crops, local vegetable
Gender	Female	female + male	male	female + male
Limiting factor	size	size, land security, access to inputs, water and services, marketing risks	technical expertise, marketing risk	access to inputs, soil fertility

Source: Moustier & Danso (2006)

The major driver (and benefit) of urban agriculture is a more stable access to food and food security.[11] Banerjee & Duflo (2007) claim that food expenditures take the highest share of total expenses in low-income urban households, thus spending on food varies between 56 – 74% of all consumption. This high dependency on money makes the urban poor as one of the most vulnerable groups to increased food prices and food insecurity (Zezza & Tasciotti, 2010). Urban agriculture can help to prevent food insecurity in several ways. Firstly, it ensures direct access to food for farmers. For instance, survey data from Nairobi shows that households engaged in urban agriculture are able to produce at least 20 – 25% of their total food consumption (Mwangi, 1995). Freshly produced vegetables and easily accessible food may also enhance the nutritional status of households engaged in urban agriculture as proven by a study of Maxwell et al. (1998) from Kampala, Uganda. Secondly, urban agriculture shortens the production chain by producing food closer to the place of consumption, thus the final price of food on the markets is lower (Van Veenhuizen & Danso, 2007). Thirdly, urban agriculture provides a significant part of the income for farmers. Consequently, households are able to purchase additional and nutritionally valuable food (Nugent, 2000). Therefore, if included in a city's policy, it represents a cost-effective and empowering strategy to deal with food insecurity (Smit et al., 2001). In contradiction, Frayne et al. (2014), who researched the contribution of urban agriculture to food security with the data from African Food Security Urban Network (AFSUN), argues, that the results did not show any significant results. Furthermore, they add, that the difference in the level of food security between households practicing urban agriculture and those who are not engaged in this activity are insignificant.

Urban agriculture can also improve socio-economic status of farmers by rising employment opportunities. It creates jobs for the farmers themselves as well as provides seasonal occupation for other community members[12] (Smit et al., 2001). As farmers grow part of their food consumption, they are able to save a share of their income for further investment, such as schooling for children, health care, etc. (Mougeot, 2000). It also stimulates the local economy in terms of incentives for related industries since farmers need to obtain basic inputs, such as fertilizers, seeds, tools, and many others (Moustier, 2001). On the other hand, Nugent (2000) is sceptical to the boost for local economy as urban agriculture uses only a few resources and most of them are for free (land, water, labor). The real impact of urban agriculture on the local

[11] World Bank (1986) defines food security as "access of all people at all times to enough food for active and healthy life."

[12] Such seasonal jobs might include watering, weeding, preparation of raised beds but also guarding of the plot in order to prevent thefts.

economy is tricky to measure as most of the produce is sold on informal markets and the capital flow is not included in official statistics (Van Veenhuizen & Danso, 2007). Furthermore, there is no convincing evidence proving the socio-economic significance of urban agriculture due to the lack of quantitative data, lack of in-depth case studies, and exaggerated advocacy by the proponents of urban agriculture (Webb, 2011).

Finally, there is certain positive impact on the urban environment. The improvement of local climate through green space within the urban areas has already been recognized (Deelstra & Girardet, 2000). Urban agriculture also utilizes vacant land, for example floodplains, which is often unsuitable for other economic activities (Smit et al., 2001). The most pronounced environmental-friendly activity is the recycling of urban organic waste. Composting represents a great opportunity for waste management and a provision of organic and effective fertilizer at the same time (Cofie et al., 2006). On top of that, urban agriculture creates a green space which is often missing especially in the cities of the developing world. Therefore, agricultural production in the city can contribute to the improvement of the local micro-climate by supplying a public green (Bryld, 2003). The extent of environmental benefits depends mostly on the scale of urban food production as well as on the policies and municipal by-laws.

Several risks and threats are typical for urban agriculture. Probably the most pronounced are health risks caused by inappropriate agricultural practice, polluted land, and by poor preparation of such products (Smit et al., 2001; Armar-Klemesu, 2000). Certain controversy is also brought by the use of organic waste as a fertilizer. If the compost is managed badly, the risk of food contamination is very high as well as when the manure from vector-carrying animals is used (Armar-Klemesu, 2000). Cofie et al. (2006) also warn that high levels of human excreta are dangerous. Additionally, urban agriculture is very often criticized for the use of agrochemicals which can endanger human health as well as the environment. Land contamination is a very serious issue, especially when it is spread by groundwater or rain (Brown & Jameton, 2000). Agricultural production in cities may also put a lot of stress on water resources, especially in semi-arid areas where the competition for water is high (Buechler, et al., 2006). Finally, urban agriculture also includes animals raising in the close vicinity of densely populated areas. This might result into the spread of zoonosis causing serious health problems (Armar-Klemesu, 2000). Even though some of these risks are serious and can burden the city rather than improve the situation, the above-mentioned negatives can be handled by policies regulating (and favouring) urban agriculture.

3.1.1 Productivity of Urban Agriculture

As suggested above, urban agriculture has certain impacts on urban food security and economy. Nevertheless, the picture would be incomplete without detailed look into the productivity of urban agriculture as such. Generally, agricultural production depends on three broad categories of resources, namely resource endowments, technology, and human capital (Hayami & Ruttan, 1970). The access and utilization of these resources then results into a productivity of agriculture, crop productivity[13] respectively. As defined by OECD (2001:11) "productivity is commonly defined as a ratio of a volume measure of output to a volume measure of input use." A very generalized understanding of productivity can be represented by the measurement of the amount produced by a target group (micro to macro level) when utilizing certain set of resources and inputs (FAO, 2017). Coming to definition of agricultural/crop productivity, FAO (1986:9) offers more detailed one where crop productivity is defined as "actual harvested production from the field, orchard and gardens, excluding harvesting and threshing losses and that of part of crop not harvested for any reason."

There are numerous approaches to the measurement of agricultural/crop productivity. The most elementary measurement is represented by crop output per land area, where higher yields implies higher productivity. Nevertheless, such measurement does not include any inputs (from good quality seeds, agrochemicals, to labour and technology) which might significantly influence the overall productivity (FAO, 2017). Therefore, the productivity is the most frequently measured by using *partial factor productivity* (PFP) or *total factor productivity* (TPF)[14] (Benin & Nin-Pratt, 2016). PFP usually measures agricultural productivity as input-output ratio, where input is represented by land or labour and output is total yield (Block, 1995). PFP might be misleading and unclear as it does not include any clear indicator of the change in agricultural productivity (Zepeda, 2001). Therefore, TFP, defined as a ratio of aggregate input to aggregate output, is used (O'Donell, 2010). The changes in productivity then can be captured by indexing agricultural input and output[15] (Zepeda, 2001). Yet, some other approaches to productivity measurement exist, as indicated in the technical report issued by FAO (2017).

[13] As mentioned above, this research is mainly focused on crop-oriented agriculture, therefore the definition of productivity is more focused on crop productivity.
[14] TFP can be found in the literature also as multi-factor productivity (MFP). As OECD suggests, TFP is a synonym to MFP (OECD, 2005).
[15] The index of agricultural output is a value-weighted sum of all agricultural production components and the index of agricultural input is a value-weighted sum of conventional agricultural inputs (Zepeda, 2001:4).

Almost every study on urban agriculture in developing countries somehow touches its productivity in indirect way, for example by exploration of income generation (e.g. Adeoti et al., 2012) or by analysing its contribution to food security (e.g. Crush et al. 2011; Frayne et al. 2014, Rezai et al., 2016). Other authors, who are more policy-oriented, also call for the enhancement of urban farming productivity and exploring the ways of making urban agriculture viable (e.g. Dubbeling et al., 2011). However, the detailed exploration of urban agriculture's exact productivity is scarce and it more likely relates to the efficiency in developed countries. As suggested by Weidner et al. (2019), the measurement of productivity of urban agriculture in developing world is challenging, especially because of the insufficient data from the farmers. The information on inputs, yields and prices of the sold products is often inaccurate and based on the farmer's judgement rather than on the records kept by the urban food producers. Furthermore, due to high diversity of urban agriculture practice (ranging from backyard gardens, informal small-scale farming to animal husbandry) and the seasonality (i.e. the changes in the production over the year) it is challenging to systematically approach the productivity measurement (Van Veenhuizen & Danso, 2007).

However, some studies provide more detailed insights into the productivity of urban agriculture and offer various methods of data collection. Van Averbeke (2007) focused on yields of urban farmers in informal settlements of Pretoria, South Africa, within one-year period. In his study, farmers were asked to estimate the yearly harvest in the units they are familiar with[16] during face-to-face survey. Simultaneously, the units indicated by farmers were weighted in order to convert the information on yearly yields into scale allowing for comparison among farmers and for further computation. Consequently, the yield data were matched with the size of the farmer's plot in order to measure the potential of production in kg/m^2. Nevertheless, Van Averbeke's (2007) approach significantly simplifies the productivity measurement as the information on inputs is omitted. More profound measurement of productivity can be found in work of Dyer et al. (2015) who applied TFP approach in order to explore efficiency of micro-farms, which are run within Harvest of Hope social enterprise[17], at two Cape Town's (South Africa) townships. The authors claimed some difficulties with obtaining data due to weak record-keeping from the side of farmers. Although part of the information (especially on labour and land size) were obtained directly from the farmers, the data on the inputs and produce supply were missing in

[16] Farmers often do not weight their produce. Instead, they use units such as *bunch* for leafy vegetables, *bucket* for foot crops, etc. The amount/weight of the unit is then based on the farmer's judgement.
[17] Harvest of Hope is a social business run under Abalimi Bezekhaya NGO which support small-scale farmers in Capet Town.

their records, therefore the researchers gained them externally from Harvest of Hope. Dyer et al.'s (2015) work hints that farmers are usually able to provide sound information which is directly observable at the farm (e.g. land, labour, tools, water access, etc.) but it is hard for them to track more dynamic part of their production, such as yields and inputs.

Finally, some authors collected data on productivity and marketing through introduction of *record keeping diaries*. Mkwambisi et al. (2011), in their study on urban agriculture and poverty reduction in Malawi, measured productivity by surveying details on the land size, crops grown (including the information on the growing procedure), typical harvest and harvest usage. Furthermore, farmers in the research sample were asked to keep daily records by using pre-designed forms on expenditures and income related to their production. Although the records were not aiming at the measurement of the yields, it might serve as a vital tool for authors who would like to extract detailed data on the harvest. Similarly, CoDyre et al. (2015), in their study on evaluation of costs and potentials of backyard gardens in Guelph, Canada, used *garden diaries* to measure productivity. Gardeners were asked to track down not only the yields but also the inputs. Inputs were considered in terms of size of the land, hours dedicated to gardening and purchased inputs invested in the garden. The approach of CoDyre et al. (2015) might be also applicable for urban farmers in developing countries although one has to be aware of some challenges, such literacy rate among farmers. Furthermore, unlike the methods of Van Averbeke (2007) and Dyer et al. (2015), record keeping diaries used by Mkwambisi et al. (2011) and CoDyre et al. (2015) require long-term dedication of engaged farmers and the researcher themselves. Unfortunately, none of the authors elaborated on the ability of farmers to keep the diaries and the quality of information obtained.

3.1.2 Investments to Urban Agriculture

Another way how to approach productivity of urban agriculture might be through investments which is defined as "the change in fixed inputs used in a production process" (Zepeda, 2001:5). Furthermore, investments are represented by changes in physical capital stock improving land quality and total agricultural productivity (Zepeda, 2001). According to Syed & Miyazako (2013:4), investment refers to "forgoing consumption in the present to pursue a higher level of income in the future." As investments might be considered purchase of stocks, shares, bonds and securities, properties in terms of land and real estate and purchase of machinery and equipment. Besides these, investments might translate also into the human, social and natural capital (Syed & Miyazako, 2013). Considering economy of scale, investments to (urban)

agriculture represent one of the strategies of farm adaptation[18] in terms of increase of farm efficiency. Broadly speaking, investments in technologies, labour and knowledge result into higher revenues that exceeds the costs of investment, therefore farmers are allowed to expand their agricultural activities (Akimowicz et al., 2016). As investments to urban agriculture can be considered for example various inputs (e.g. seeds, agrochemicals, etc.) and tools (ranging from basic gardening tools to advanced irrigation systems).

The investments to agriculture at individual (farm) level are usually measured by using simple equation using inventory-based capital. This approach works with the current agricultural capital stock and the previous year's one, also involving capital depreciation rate of 5 % (Syed & Miyazako, 2013). Nevertheless, similarly as in case of productivity, such approach requires exact data and it can be more likely applied to large-scale agriculture. Therefore, its utilization for small-scale and often informal practice of urban agriculture in developing countries is not suitable for the similar reasons suggested in previous subchapter on productivity of urban agriculture. Consequently, some authors who researched investments in the context of small-scale agriculture of developing countries, often do not measure the level of investments as such but they rather use wide range of variables of long-term investments into the land as a crude proxy. For instance, Deininger & Jin (2006) proxied investments of rural farmers in Ethiopia through terracing and tree planting. Similarly, Place & Otsuka (2001), who studied small-scale maize farmers in Malawi, operationalize investments through tobacco planting at the maize fields, tree planting, terrain levelling and water management.

There is a number of other studies elaborating on the investments to agriculture, yet their scope is not suitable for the purpose of this thesis as these are more likely focusing on large-scale rural agriculture. Moreover, the literature exploring the situation about urban farmers' investments is scarce and considers mainly developed countries (e.g. Akimowicz et al., 2016). Instead, existing literature on urban agriculture in developing countries focuses on access to finances for investments in terms of credit accessibility and governmental funding schemes (e.g. Cabannes, 2006) rather than to provide tools for investment measurement or exploring the factors influencing it. These factors are further elaborated in the next subchapter.

[18] Other strategies of farm adaptation are, for instance, crop (produce) diversification or land expansion (Akimowicz et al., 2016).

3.1.3 Factors Influencing Investments to Urban Agriculture

Although the literature on investments to urban agriculture in developing countries is limited, majority of studies elaborates on the drivers and obstacles for urban farming in general. Despite the fact that these factors are usually considered in terms of viability of urban agriculture in general, it is also possible to think of them within the framework of investments to urban farming which, to certain extent, determine the productivity. Therefore, this subchapter focuses on the most important challenges for urban farmers and examines them in terms of investments to urban agriculture.

Probably the most pronounced obstacle for investment is insecure land tenure, which will be discussed in detail in following chapters. Another issue is lack of public support and/or persistent semi-legal status of urban agriculture. Particularly in sub-Saharan Africa, number of policies directly or indirectly restricts the urban food production (Mubvami & Mushamba, 2006). This situation influences investments at several levels. Firstly, farmers often opt for risk-reduction strategies such as seasonal crops with low yields which do not bring high financial returns and prevent farmers from further investments (Bryld, 2003). Secondly, if urban agriculture lacks public support, it also does not have support from financial institution (including micro-finance institutions). Therefore, farmers who do not dispose with the immediate financial capital, they do not have the possibility to reach for banking and micro-finance services (Cabannes, 2006). Weak urban agriculture governance constrains existence of farmers' organisations, such as cooperatives. Low level of organisation of farmers further hinders the access to finances which might be invested to the agriculture (Schmidt et al., 2015). On the other hand, inclusion of urban agriculture into policies which result into subsidy schemes might prevent farmers from investments at personal level as they await the support from the government side, such as in the case of Sowetan farmers in this research[19].

The informal character of urban agriculture also restricts the access to the official food markets. Instead, majority of farmers sells their produce through informal channels (Van Veenhuizen & Danso, 2007). Accessing official food markets is often subjected to the sales through intermediaries. Nevertheless, farmers often have only low bargain power to negotiate the final price of their produce and they are forced to sales for very low prices. Furthermore, farmers often do not process their produce into secondary products, such as jams or pickles, and orient themselves only on the production of unprocessed goods (FAO, 2012). The above-mentioned

[19] The governmental support of urban agriculture in Johannesburg is closely described in chapter 4.1.1.

circumstances significantly decrease the returns from urban agriculture production. Therefore, farmers are often not able to generate more than necessary income to sustain their livelihood and to purchase inputs needed to keep up with their agricultural activities. This situation then inhibits the accumulation of capital which would enable investments crucial for further expansion of urban agriculture (Moustier & Danso, 2006).

3.2 Land Tenure and Land Tenure Security

FAO (2002:7) defines *land tenure* as "the relationship, whether legally or customarily defined, among people, as individuals or groups, with respect to land." UN-Habitat (2011) adds, that this relationship is characterized by rights the tenant has over the land. These rights could be as follows: right to occupy, to use, to develop, to inherit, and to transfer land. Mubvami & Mushamba (2006) explain, that land tenure determines who can use the land and under what conditions. Therefore, land tenure defines the allocation, transfer, utilization, and management of *property rights.* Property rights then can be characterized as exclusivity, inheritability, transferability, and enforcement mechanisms related to land (Alichan & Demsetz, 1973). Thus, property rights define the legitimate use of the land (Feder & Feeny, 1991).

In the literature, three main types of land tenure are distinguished[20]: *customary land tenure*, *private land tenure,* and *public land ownership*. Customary land tenure is based on community ownership where land allocation follows the traditions and/or kinship. Under customary land tenure, land is perceived as a social resource. Unlike customary land tenure, private land tenure is the subject of the absolute free disposal of the land (in the limits of the laws and regulations) which results into high levels of land capitalization. Moreover, private land tenure is often subjected to national legal system. Finally, public land ownership could be seen as a counterbalance to private land tenure as the main purpose of publicly owned land is to serve for public good and to guarantee access to land for all society members (Payne, 1997; Feder & Feeny, 1991). Another distinction of land tenure systems can be done according its legal status, where *formal*, *statutory* and *legal* tenure systems represent land tenure regimes recognized by the national law while *informal*, *customary* and *illegal* or *extra-legal* tenure systems refer to those regimes lying outside the law (Hornby et al., 2017). Payne (1997) also operates the term *contemporary urban tenure systems* which balance on the edge of formality and informality, when officially approved tenure is relatively often unofficially sublet to others in order to satisfy

[20] Payne (1997) mentions other land tenure systems, such as religious land tenure concepts, indigenous, and imported land tenure systems. For the purpose of this thesis, these concepts are negligible.

the land needs of low-income groups. The above-mentioned concepts of land tenure also define the property rights over the land. Feder & Feeny (1991) determine four categories of property rights: *none or open access* with no exclusivity over the land; *communal property* where exclusivity is assigned to a community/group of individuals; *private property* with the rights assigned to an individual; and *state (crown) property* where the land is managed by the public sector.[21]

According to Simbizi et al. (2014) a wide range of *land tenure security* definitions exist across the literature. Nevertheless, many of these definitions are simplistic and do not emphasize all land tenure security dimensions. Therefore, they identify three land tenure security paradigms: (1) the *economic oriented school,*[22] where land title (i.e. full land ownership) is seen as the only mean of secure land tenure; (2) the *legal based school* which refers to land tenure security as the legal protection of users' rights and interest, thus it corresponds with the legal administration and enforcement of land rights; and (3) the *adaptation school*, a social-oriented understanding of land tenure security which acknowledge customary land tenure systems. The adaptation school is more oriented on a holder's perception of land tenure security emphasizing the role of community norms and values.

The three land tenure security paradigms translate into definition of UN-Habitat (2008:5), who states three perspectives on land tenure security definition: "(1) the degree of confidence that land users will not be arbitrarily deprived of the rights they enjoy over land and the economic benefits that flow from it; (2) the certainty that an individual's rights to land will be recognized by other and protected in cases of specific challenges; (3) the right of all individuals and groups to effective government protection against forced evictions." In the similar manner, Van Gelder (2010) presents three dimensions of land tenure security: (1) *tenure security as perceived* (further referred as *perceived tenure security*) corresponds with the user's experience of eviction and his/her perception of eviction threats; (2) *legal tenure security* is based on the enforcement of legal property rights and it emphasize the dichotomy between formal and informal, where property rights equate tenure security and their absence could be translated as tenure insecurity; and (3) *de facto security* which emphasizes the actual situation on the ground,

[21] However, these four categories are ideal analytical type and the reality could be often far away from these categories (Feder & Feeny, 1991).

[22] Economic oriented school is predominant among scholars. The domination of this concept is mainly caused by the emphasize of land and land tenure reforms which are proposed as the only way to ensure tenure security. Furthermore, this approach also serves as a hypothetical ground for modelling relationships between land tenure security and economic outcomes (Simbizi et al., 2014).

i.e. *de facto* tenure security is characterized by the length of the occupancy and community support rather than by the legal rights.

3.2.1 Land Tenure and Land Tenure Security – a Theoretical Perspective

As suggested in previous chapter, land tenure arrangements in urban areas result in a very complex system which combines both, customary (informal or extra-legal) and legal (formal) tenure systems. The coexistence of the wide range of land tenure arrangements results into disordered land rights and ambiguous tenure security (Payne, 1997). Furthermore, the significance of clearly defined land rights ensuring tenure security increases with higher population pressure. While customary land tenure in areas with low population density provides for long-term tenure security, the opposite applies for densely populated areas where land becomes a scarce resource (i.e. in cities) (Barrows & Roth, 1990). Therefore, it is not surprising that numerous authors and policy makers perceive land rights formalization as the key tool for the empowerment of urban poor through provision of secure land tenure. Although the importance of the land rights formalization is hardly questionable, the perspectives on the process and its aspects vary across different paradigms.

According to Bromley (2008), formalization of land rights means transition from land possession (potentially informal) to land ownership (legal titling). Although these two are hardly distinguishable by simple observation (i.e. at the first sight it is not clear whether the person using the land is the owner or possessor), land ownership clearly frames the land rights and access to land in terms of legal acceptance. Conversely, land possession only mirrors the possibility of access without no clear guidance for recognition of legitimate use nor land transfers and other rights. Therefore, as Bromley (2008:21) concludes "possessions begs questions; ownership settles questions." The question of the difference between ownership and possession is particularly appealing in case of Sub-Saharan Africa where majority of rural and urban land in low-income areas is managed under customary tenure regimes which rather reflects the latter[23]. Consequently, the level of land tenure security is questionable. Therefore, in respect to enhanced land tenure security, formalization of land rights translates through conversion of informal tenure to ownership (also referred as freehold title) or through extension of legal recognition to customary tenure arrangements (Lawry et al., 2014).

[23] As an example of urban land tenure in low-income areas can be considered the case of Soweto, described in subchapter 4.1.2 Development of Land Tenure in Soweto.

Probably the most famous proponent of land rights formalization is Hernando de Soto. According to him, there is extremely large amount of *dead capital*[24] which can be only activated through formalization of land rights thus allowing for mobilization of household assets. In this view, land tenure formalization, with private ownership at the top of the land tenure hierarchy, represents the only tool for establishment of land tenure security thus providing the stimulation for investments (de Soto, 2000). Furthermore, according to neo-classical economists, formalized land rights are considered as potential enabler for access to credit services, where people can use newly acquired land titles as a collateral for credit or loans. These might be used in order to enhance one's assets and turn them into vital capital (Barrows & Roth, 1990).[25]

However, de Soto's (2000) approach is critically assessed throughout academia. For instance, Bromley (2008) stresses the importance of solid legal system which must ensure effective enforcement of land rights, otherwise land titles become worthless. Land titles also cannot be perceived as panacea for poverty, as proposed by de Soto (2000), without other initiatives supporting the poor. Important point is also raised by Hornby et al. (2017), who question the dichotomic view of formal/informal, legal/illegal (extra-legal) land tenure which does not cover the complexity of reality of land tenure arrangements. Privileging formal tenure arrangements over the informal neglects social structures established in communities, such as power relations and kinship. Furthermore, land formalization usually stresses individualization of collective land rights, which can result into problematic situations in the areas treated under the customary land tenure (Barrows & Roth, 1990), where community is a cornerstone of society. Such persistent attempts of land rights formalization through its individualization can result into further marginalization of already disadvantaged poor, such as women (Lawry et al., 2014). Finally, unlike de Soto (2000), Ribot & Peluso (2003) consider land rights as too narrow concept. Corresponding to Bromley's (2008) distinction of possession and ownership, Ribot & Peluso (2003) emphasize the role of land user. While land owner often does not enjoy the full potential of the land, the land user is the only one who is able to derive all benefits from the land even in situation of the absence of (legally recognized) land rights. Therefore, they

[24] *Dead capital* is generally produced by poor outside of the legal system (i.e. within the extra-legal arrangements) in unauthorized small enterprises. Lacking the legal status, entrepreneurs cannot reach to formal banking systems and any governmental subsidies. Therefore, the capital produced within extra-legal arrangement is restricted from reproduction and creation of new capital. Such situation results into creation of dead capital (de Soto, 2000).

[25] Interestingly, even though de Soto's (2000) work can be considered as a cornerstone of economic oriented school, which is predominant among authors on land tenure (Simbizi et al., 2014), the scholars mostly build on this theory directly and aim to strengthen this theory by provision of empirical studies (see chapter 3.3) rather than by enriching the paradigm with other elements. If de Soto's (200) theory is elaborated from the theoretical perspective, it is done by his critics who pinpoint to the weaknesses of this paradigm and present the counterarguments (as described in this subchapter).

prioritize the land access over the rights to the land. Access to the land is consequently considered as the crucial driver of economic, social, or personal benefits emerging from the land.

As suggested above, land tenure, land tenure security and land rights formalization are very complex phenomena which are approached from several directions corresponding with the paradigms defined by Simbizi et al. (2014). While de Soto's (2000) paradigm stresses the legality and the importance of land rights formalization, thus represents economic oriented and legal based school, Hornby et al. (2017) rather trust the social dynamics and hierarchies which are often strongly established in customary tenure systems and Ribot & Peluso (2003) emphasize the role of land access over the land rights. Both, Hornby et al. (2017) and Ribot & Peluso (2003) then follow the adaptation school. Similarly, these three theoretical perspectives also correspond with Van Gelder's (2010), whose categorization of land tenure security reflects the phenomenon in a holistic way and, at the same time, reflects the range of perspectives of other authors. In this case, De Soto (2000) can be perceived as the proponent of legal tenure security, Hornby et al. (2017) as the advocates of perceived tenure security and Ribot & Peluso (2003) as the supporters of de facto tenure security. Here must be noted that this simplified categorization only enables easier orientation in this highly complex issue, as long as none of the above-mentioned authors is strictly operating within the boundaries of one paradigm alone. Furthermore, as the case study presented in chapter 4 suggests, it is important to consider all of these paradigms when examining land tenure for urban agriculture.

3.3 Land Tenure, Land Tenure Security and Productivity of Urban Agriculture

As mentioned in the introduction, the key element of urban agriculture is access to land and land tenure and its security. According to FAO (2012), most urban farmers in Sub-Saharan Africa do not own the land where they operate and the land is used under a wide range of temporal tenure arrangements (informal tenure arrangements predominate) or with no permissions/titles. It is possible to characterize two kinds of urban agriculture - *on-plot,* i.e. on spaces adjacent to their houses, such as backyards[26], with more clearly defined land rights and *off-plot*, i.e. open space distant from the household home, where land tenure is more ambiguous (Mougeot, 2000; Mougeot, 2015). Despite the fact that off-plot farmers usually use land with no other economic use, such as parks, flood plains, river banks, dumps, etc. (Smit et al., 2001), they might face forced evictions as the land mostly belongs to the municipality and farmers

[26] In this study, people cultivating vegetables and/or raring animals on plot are considered as owners of the land.

often use it without any permission from the governmental body responsible for municipal land distribution (Ruel et al., 1999). Such situation results into insecure land tenure for majority of farmers.

The lack of ownership and formality of tenure arrangements is caused by the clashes between legal and customary land tenure which is more visible in cities, especially because the extra-legal land machinations which are characteristic for contemporary urban tenure systems. On top of that, the confrontation between legal and customary tenure is even more escalated due to high commercialization of the urban land, where use value of land has been shifted to market value (Payne, 1997). As Van Veenhuizen (2006) suggests, agricultural activities in cities face harsh land competition with other industries and economic activities as well as with housing needs. Therefore, the informal tenure arrangement is often chosen as a first option by the urban poor as it enables quick access to land for a low or zero price (Durand-Lasserve & Selod, 2009). Furthermore, the prevalence of informal land tenure may indicate the inflexibility of statutory tenure systems that is usually provided by governmental bodies which lease or sublease public or institutional land[27] (Vélez-Guerra, 2004). Finally, Van Veenhuizen & Danso (2007) concludes, that while farmers in rural areas do not have to deal with such high prices of land and land tenure insecurity, urban farmers experience the exact opposite.

According to many authors, land tenure arrangements have a clear impact on the productivity of urban agriculture in terms of the choice of the crops, investment into the land, and farming tools as well as more environmentally oriented attitude towards crop and livestock production (e.g. Bryld, 2003; FAO, 2012; Ruel et al., 1999; Van Veenhuizen & Danso, 2007). Furthermore, Lynch et al. (2001) emphasize the importance of land rights formalization as titling can ensure access to credit services, subsidies and training which are often provided only to those with legal land tenure. However, these assumptions originate mostly from studies focusing on rural agriculture rather than urban as the body of literature empirically proving the statement is almost non-existing.

The role of land tenure and its security in respect to productivity and investments to agriculture is highly site and context specific (Barrows & Roth. 1990; Place, 2009). While some studies prove a positive effect of secure land tenure on investments and agricultural productivity, others show low or zero relations between these two. Conversely, Sjaastad & Bromley (1997) state that the logic can be applied reversely – i.e. that higher investment can provide people with

[27] As in the case of Johannesburg Municipality, South Africa.

higher tenure security. Furthermore, land tenure can encourage only certain types of investment. As an example, the difference between the investment into terracing and tree planting in Ethiopia could be put in place. While terracing decreases under unsecure land tenure, tree planting is not affected as trees could be seen a "tenure-building" strategy (Deininger & Jin, 2006). Place & Otsuka (2001) found that tobacco and maize farmers operating under lower tenure security in Malawi were investing less in tree planting but the productivity did not vary among farmers with different tenure arrangements as the tobacco and maize production in the research area is driven by short-term inputs which are not affected by land tenure. Finally, Smith (2004) found out that secure land tenure has a positive impact on fixed investments in Zambian agriculture. According to their study, fixed investments influence labour productivity but not land productivity.

Despite the importance of the above-mentioned examples, this evidence can be hardly transplanted into the urban context although it is stressed by numerous authors on urban agriculture, who support legalization of land rights for urban farmers in order to reach legal tenure security (e.g. Bryld, 2003; FAO, 2012; Redwood, 2009; Ruel et al., 1999; Van Veenhuizen & Danso, 2007). Yet, they do not consider properly the distinctive character of rural and urban agriculture, which is more dynamic. For instance, most of urban agriculture could be considered as small-scale production, therefore it is not expected that farmers will invest in building constructions such as terracing. They will rather invest into technologies which can be taken away in the case of lost access to the land. Secondly, customary tenure arrangements and protection mechanisms are often disrupted in urban areas as many of the traditional social networks are no longer functioning in the well-established manner. Tenure insecurity then might be perceived as more urgent and can discourage farmers to invest. Thirdly, urban agriculture takes place in areas of high population density with rapid land use dynamics, thus the land pressure is more acute than in rural areas. Finally, following the economic oriented school, the above-stated authors build on the dichotomic relation of formal and informal/extra-legal land tenure without profound exploration of the different land tenure contexts in cities. Consequently, they view informal/extra-legal land tenure arrangements automatically as insecure.

It is especially the persistent emphasis on legal rights and legal tenure security for urban farming which might be misleading and potentially result in ineffective policies (as discussed in next subchapter). As suggested by Van Gelder (2010), the concept of land tenure security must be expanded from the focus on legality to paying attention to perception of land tenure security by

farmers themselves and to their de facto security. For instance, if farmers have good relationship with the land owner and do not perceive eviction threats as high, they might feel secure on their land even though they do not have legal rights over it. Following this logic, and Ribot and Pelusos's (2003) theory of access, McLees' (2011) research of urban farmers in Dar s Salaam emphasizes the mutually beneficial relationship between the land owner and farmers. Land owners, including the municipality, often do not have the financial nor personal capacity to maintain the land they own thus neglecting their property. In such instances, urban farmers can enhance the vacant or neglected land and bring added value to the areas without any economic use. Consequently, farmers are often favoured by land owners on a temporary basis as they can maintain the land in exchange of using it for farming. Indeed, there are no legal guarantees for the farmers but it provides them with high levels of perceived tenure security resulting from this mutually beneficial relationship. In such cases, farmers might be even encouraged to invest into their agriculture as well as they can receive some sort of support from the land owner.

3.3.1 Policy Considerations for Land Tenure Security for Urban Farmers

The access to land and tenure security might be partially managed by policies at the municipal level. Recently, urban agriculture has balanced on the edge between legality and illegality, support, and ignorance in many cities of the developing world. Particularly, in Sub-Saharan Africa, agricultural production in the cities is often restricted by many laws and by-laws and several municipal governments consider urban agriculture as an unwanted activity which does not belong in the modern city (Mubvami & Mushamba, 2006; Halloran & Magid, 2013). Furthermore, as long as farmers often occupy municipally managed open spaces, they are perceived as another element of the sprawl of informal settlements (Lynch et al., 2001). Fortunately, this negative attitude is slowly shifting forward and many cities in developing countries are establishing their own policies and/or programs promoting urban agriculture.[28,29] The effort to institutionalize urban agriculture reached the top in 2015 by the issuing of the *Milan Urban Food Policy Pact* (MUFPP) which has been signed by 209 mayors[30] across the globe in 2020 (MUFPP, 2020). MUFPP additionally highlights the opportunities of urban and peri-urban agriculture as well as promoting and strengthening urban and peri-urban food production (MUFPP, 2015; for the case studies see Forster et al., 2015). Many policies and

[28] The promotion of urban agriculture is sometimes integrated into food security policies, such as in case of Johannesburg in South Africa (see City of Johannseburg, 2012).
[29] A very good overview over the municipal policies and strategies promoting urban agriculture brings book of Dubelling et al. (2011).
[30] City of Johannesburg is one of the signatories of MUFPP.

strategies on urban agriculture emphasize access to land and secure land tenure as a crux to the development of urban food production (see e.g. City of Cape Town, 2006; Cofie et al., 2005; City of Johannesburg, 2011; IMWI & RUAF, n.d.; MDP-ESA & RUAF, 2007; MDP-ESA & RUAF, n.d.; RUAF & IMWI, n.d.).

Some cities, such as Zambian Ndola, even promise farmers to get title deeds if they establish a cooperative (Voleníková & Opršal, 2016). The City of Johannesburg (2012), in its urban food policy, has committed to provide lease agreements to farmers who want to use public land. Finally, Quezon City (part of the Metro Manila), the Philippines, has an extensive program Joy of Urban Farming which, among other activities including the establishment of food gardens across the city and assistance to new farmers with knowledge, skills, and seeds, help to negotiate utilization of vacant land for urban agriculture under the memorandum of understanding between the landlords and farmers (Voleníková, 2016). Similar cases can be found across the globe. This logic can be applied conversely as well. If the city does not have an urban agriculture policy, the protection of farmers who use public land is much lower than at those cities with policies.

However, as Webb (2011) argues, there has been enough advocacy on behalf of urban agriculture and calls for urban agriculture policies but the urban agriculture has not shown to become more efficient. Furthermore, Webb (2011) also stress that the studies calling for better policy action are often superficial which only leads to unsuccessful policies. Nevertheless, it is not only the insufficient evidence and guidance, which causes partial failure of urban policies, especially in respect to land tenure formalization. Policy makers usually rely on inflexible mechanisms, often established in colonial era (Halloran & Magid, 2013), and omit the limited access of the poor to institutional support thus excluding them from the processes important for obtaining documentation for the land they utilize (Zevenbergen et al., 2013). Furthermore, as suggested by Hornby et al. (2017), policy makers often neglect the diversity of social relations and networks which is essential for urban farmers' access to land, for instance wide range of norms influencing people's disposal of land, the scope of shared or exclusive use of the land, and the legal, political and social structure of land access and control. This view is supported by findings of Halloran & Magid's (2013) study from Dar es Salaam on incorporation of urban agriculture to the city's master plan, that strict emphasis on land rights formalization might lead to marginalization of farmers, especially of those who are based off-plot. As long as these farmers mostly cultivate municipal land, they face to competing interests of other actors. Therefore, farmers can find themselves under significant pressure because of the demanding

conditions required from the municipal body responsible for land tenure formalization. Consequently, in the atmosphere of persistent distrust among urban poor and governing bodies, some farmers might perceive this situation as the way for undermining their activities.

4 Case Study: Land Tenure Security and its Implications for Investments to Urban Agriculture in Soweto, South Africa

This chapter aims to put theoretical discussion over the land tenure security and its implications on investments to urban agriculture into practice by bringing in an empirical case study researching these phenomena in Soweto, South Africa. It must be noted, that this chapter is primarily based on the author's paper *Land Tenure Security and its Implications for Investments to Urban Agriculture in Soweto, South Africa* (Suchá et al., 2020), published in Land Use Policy journal, which represents key findings of author's original research. This chapter, however, brings in an extension of the original paper by more detailed elaboration on the research methodology and by more complex complementarity of qualitative and quantitative data results presented in chapter 4.3. Moreover, this chapter is also extended content-wise. While the paper was explicitly focused on the relation between land tenure security and investments of Sowetan urban farmers, this part of the thesis is also focused on thorough exploration of land access and land tenure arrangements of urban farmers with respect to the research sample (chapter 4.3.2), which enables profound understanding of the contextual aspects of the researched phenomena.

The chapter firstly introduces the context of Johannesburg and Soweto, the study area of this research. Secondly, central research question and research framework is further developed, thus solid background for the study is created. Furthermore, the methodology of data collection, including quality criteria, is introduced in detail in order to provide complex understanding of how different methods were selected and designed in respect to the holistic nature of the presented research. Such a profound explanation also enables to use the methodology in different contexts. Consequently, the methods of data analysis are elaborated with a special emphasis on construction of Investment Index, which is one of the added values of the research and which can be used in studies of similar scope. Moreover, methodological considerations as well as research ethics are discussed in order to provide clarity over some of the issues and challenges emerging during the research process. This thick description of the methodological procedures, introduced in subchapter 4.2, strengthens the transparency of the research itself and its results presented in the last part of this chapter. Chapter 4.3 is focused on results and key findings presentation and follows the logic of the objectives and research questions presented in table 3.

4.1 Johannesburg and Sowetan Context

This chapter aims to put information from the literature review to Johannesburg and Sowetan Context. As long as the characteristics of urban agriculture in Soweto are pretty much similar to those stated in subchapter 3.1, this part of dissertation rather focuses on the state of urban agricultural policies in Johannesburg which essentially influence the state of urban farming in the city and Soweto (the study area). Furthermore, as land tenure is one of the main subjects of this thesis, special attention is paid to the development of land rights in the study area. This is especially important as the land rights in South Africa are extensively impacted by the laws and policies enforced during the Apartheid era (1948 – 1994). Although it is almost thirty years after the fall of Apartheid, the country is constantly dealing with its consequences. Apart racial issues, land issues are one of the most appealing problems the country is facing to. Finally, this chapter brings overview of the study site and the rationale for placing the research in Soweto.

4.1.1 State of Urban Agriculture and Policies in South Africa and Johannesburg

Even though the research is focused on Soweto, one of Johannesburg's townships, it is important to analyse the urban agriculture in South Africa and in Johannesburg context as the policies on the state and regional level influences urban agriculture in Soweto as well. Urban agriculture in South Africa is a wide spread and supported activity. It has been gaining great attention from the side of academia as well as policy makers over the last three decades and the practice is mainly linked to ensure urban food security. However, according Cloete et al. (2009), urban agriculture in South Africa is mainly practiced by poorly-skilled households with low resources, therefore the productivity is quite low and the effect on food security questionable. Furthermore, as Malan (2015) states, that even though urban agriculture seems to be a promising strategy for enhancing urban food security, the urban poor often buy food from formal and informal retail sector and not from urban farmers thus it is also needed to rethink the entire city food system. These facts correspond with many authors' opinions (see e.g. Crush et al., 2011; Frayne et al., 2014; Webb, 2011; Zezza & Tasciotti, 2010), that the significance of urban agriculture is often overemphasized while the results are unclear.

Despite Webb's (2011) call for less advocacy but more grounded evidence on the significance of urban agriculture in South Africa, new municipal policies on urban agriculture has been developed. Currently, South African municipalities were asked to support urban farming activities by several means: grant provision, making available idle municipality land, and encouraging ward councillors to engage in agricultural activities. The policies should involve

municipals' departments of local economic development and social development, NGOs, and other relevant stakeholders (Rogerson, 2011). In response, The City of Johannesburg mentions the development of urban agriculture in two key policy documents: *Joburg 2040 Growth and Development Strategy* (City of Johannesburg, 2011) and *A City where none Go Hungry: The City's of Joburg's Food Resilience Policy* (City of Johannesburg, 2012). Both policies emphasize the support of urban agriculture as a mean for the enhancement of food security.[31] The support of urban agriculture ranges from training and skill development, packaging, and retailing centres to the provision of municipality owned land for urban agriculture (City of Johannesburg, 2011). Access to land is especially important as Cloete et al. (2009) mentions, that in Johannesburg 72.4% of farmers cultivate their backyard gardens and only 20.4% practice urban agriculture on municipal/other land. The emphasis on land allocation is therefore even more important, especially if Mougeot's (2015) logic of *on-plot* (i.e. subsistence-oriented farmers) and *off-plot* (i.e. market-oriented farmers) urban agriculture is applied. If policies should enhance city food systems through urban agriculture, it is important to have more market-oriented farmers but this cannot happen when the majority of the farmers cultivate their backyard gardens.

Johannesburg's food security policy, among other issues, also addresses formalization of land rights for urban farmers through establishment of so-called five *empowerment zones*, located in the city outskirts. In these zones, farmers were enabled to lease land for agriculture from the city. The land is utilized under the memorandum of understanding between Joburg Property Company[32] (JPC) and the Department of Social Development of the City of Johannesburg.[33] The land in empowerment zones is leased for five years to farmers (cooperatives respectively) for free but they have to prove their commitment and will to increase their production. If farmers are successful the lease can be extended after five years (KI_4[34], 2017). Furthermore, document called "Mandate for the Food Resilience Strategy" also mentions, that land access will be administered through Agri hubs, a resource centres established at each City of Johannesburg's

[31] In 2012, the prevalence of food insecurity in Johannesburg was as follows: 14% households were mildly food insecure, 15% of households were moderately food insecure and 27% of households were severely food insecure. The measurements were undertaken in three low income suburbs: Orange Farm, Alexandra, and Inner City (Rudolph et al., 2012).

[32] Joburg Property Company is a city-owned company which administers land and properties owned by the municipality.

[33] The Department of Social Development of the City of Johannesburg, Food Resilience Unit is responsible for the food resilience strategy.

[34] In this subchapter, some of the context is based on the information provided by key informants. If this is applied, the information is cited followingly (code of the key informant, year). The codes of particular key informants together with the information on their position and expertise are stated in table 5 located in subchapter 4.2.3 Methods of Data Collection and Research Sample.

administrative unit, which have the mandate to "manage the process of applying for small parcels of land (1-2 ha) as part of city-owned properties set aside for farming under the food resilience programme" (City of Johannesburg, n.d.:4).

However, research of Halloran & Magid (2013) shows, that this zoning can endanger farmers by several means. Zones are usually located at urban fringe, therefore urban agriculture is pushed outside of the city, where zones might potentially absorb already existing agricultural areas. Moreover, zones are more likely accessible to medium-scale agriculture. This causes triple discrimination to urban farmers. They are losing the advantage of having their job close to their homes and have to allocate special funds for commuting. Furthermore, if zones are located in already agricultural areas, other farmers have only limited access to this land as it is previously occupied. Finally, by preference of larger agricultural enterprises, small-scalers can only hardly reach for the land in the zones. Although the above-described case origins from Dar es Salaam (Tanzania), it can be, with little modifications, applicable to the situation with Johannesburg's empowerment zones. As suggested by one of the key informants involved in the research, City of Johannesburg enforce the condition of being a cooperative in order to access the land in empowerment zones, which basically cut off small-scale farmers from their place in the zones. Additionally, farmers originally involved in empowerment zones were little by little losing their interest in being located there, especially after the municipality cancelled subsidized transportation to the zones and farmers had to search for their means of commuting by themselves (KI_2, 2017).

Dedicating special zones for urban agriculture also indirectly undermines open space farmers located outside them[35] as long as they must apply for lease or purchase directly at JPC which administers all municipally owned land[36]. The mechanism of gaining land through JPC is very complicated and bureaucratic and the entire process may take more than eight months with uncertain results (as closely described in chapter 4.3.2.1). Furthermore, the rules for land allocation are the same for all, i.e. even though the city claims support of urban farmers, they have to meet the same criteria and conditions as a serious business (KI_5, 2017). Therefore, the approach to land tenure formalization through empowerment zones is more likely discouraging and ineffective and have only little impact on farmers in townships and inner city. They prefer build on their social networks (which provide them with certain, yet informal, legitimacy) rather

[35] Similar doubts can be also found at the study of Halloram & Magid (2013).
[36] Majority of open space gardens is officially owned by City of Johannesburg.

than to undertake the long and slow process of land tenure formalization from JPC with uncertain results.

4.1.2 Development of Land Tenure in Soweto

Today land tenure situation in Soweto is greatly given by South African modern history. Although the native's land dispossession started with the arrival of first Europeans in 17th century, early 20th century might be marked as the milestone for the new land policy of South Africa. In 1913 was passed Natives Land Act 27 which triggered institutionalization of race segregation and discrimination (Kingwill et al., 2017). In accordance with this act, African people were allowed to own land only in so called "homelands", i.e. in native reserves where most of them was repatriated (Marais et al., 2018). Furthermore, Apartheid regime strictly regulated the immigration and presence of non-white people in cities. Group Area Act, passed in 1950, introduced spatial separation of citizens, implying forced removal of non-white urban population from the city centres to urban fringe to so called townships (Ogura, 1996). As the regime perceived non-whites as only temporal citizens of urban areas, most of the township population were accommodated in state-owned rental housing, usually hostels (Crankshaw et al., 2000). Family housing in townships was available only to those who disposed of full urban rights, i.e. to those who have been born in the city or who have been working for the same employer more than 10 years or for different employers for more than 15 years (Crankshaw, 2005). Due to Soweto riots in 1976 the government had to change its attitude towards land ownership in cities. Therefore, in the late 1980's, non-white tenants had an opportunity to buy state-owned houses at market price (Marais et al., 2018). Although property could be bought through mortgage, the interest rates were so high that it was not affordable for most of the township residents. This situation has not changed significantly even after the fall of apartheid (Marais and Cloete, 2017), when the "willing buyer willing seller" (where government represents the side of the seller in the case of urban areas) model of land reform was introduced (Bradstock, 2005).

Low accessibility of housing has resulted into the development of informal dwellings, mainly in backyard shacks. Although informal settlements were regulated during apartheid by Prevention of Illegal Squatting Act (1951), backyard shacks were emerging across the townships due to shortcuts in availability of state-owned rental housing. After the fall of apartheid, the development of informal settlements was at its hike because of the uncontrolled urbanization and governmental policy reinforcing homeowning for all. Those in need of rental

accommodation were forced to look for housing at informal markets (Crankshaw et al., 2000). Today, less than half of the Soweto's households (43,2%) owns or pays off its home while 16% of its population lives in informal settlements of any kind (StatsSA, 2019).

The situation with housing is clearly reflected in the availability and accessibility of land for urban agriculture in Soweto. The open space is primarily owned by the City of Johannesburg or South African government, while the land ownership is linked only to home ownership. I.e. only those farmers who cultivate their backyards are also the land owners. The rest of the farmers are located elsewhere, under various informal tenure arrangements. Therefore, land rights legalization for urban farmers seems to be substantial for the municipal government. Nevertheless, as suggested in previous subchapter, the policies are more likely ineffective and did not prove themselves as satisfactory solution of the urban agriculture informality. Consequently, majority of farmers prefers non-formal or none agreements with the land owners in order to ensure access to land.

4.1.3 Study Site

Soweto is a part of the greater Johannesburg Metropolitan Area. Being located in the southwest of Johannesburg, the name originally stands for South-Western Townships, sometimes referred as Region D. Soweto has been built in the apartheid era, when blacks were forced out of Johannesburg. It is mostly composed of the *matchbox houses* built for the workers and encompass large areas of informal settlements (City of Johannesburg, 2007). Although there have been significant revitalization efforts, high level of social deprivation is still present in Soweto. It is especially unemployment, shortages in education and healthcare, housing backlog and high environmental pollution caused by mining industry which burdens Soweto's population (City of Johannesburg, 2018). The total population of Soweto is 1 271 628 inhabitants, while 18.7% of the population has no income[37] (StatsSA, 2020).

The area was chosen because of the long history of poverty and deprivation. Furthermore, there is a relatively high accessibility to land comparing to the suburbs in the inner city of Johannesburg. Unlike other, and smaller townships located around central Johannesburg, Soweto keeps the most urban character. Finally, Soweto has thriving urban agriculture and it is also home of iZindaba Zokudla, an initiative supporting urban farmers in the area.

[37] The data are based on 2011 Census.

4.2 Research Methodology

As suggested in chapter 2.1 Research Limitations, this dissertation builds on single case study of farmers in Soweto, South Africa, which makes its result applicability to different environments tricky. Nevertheless, detailed description of research methodology enables its use for similar studies in diverse contexts with little or no modification. This chapter introduces the mixed-method research methodology used in this case study. Firstly, central research question with specific objectives of the research and research framework are described. Secondly, the methodology of primary data collection will be introduced. Consequently, the methods of data analysis will be examined. Finally, ethical as well as research limiting issues will be discussed. This in-depth elaboration can help other researchers to conduct analogous or follow-up studies.

4.2.1 Central Research Question

As described in chapter 2 Methodology, Aim 1 and Aim 2 of this dissertation are elaborated in chapter 3 Literature Review. Therefore, Aim 3 represents central research question ***How land tenure of urban farmers influences the investments to urban agriculture in Soweto, South Africa?*** which is subject of this chapter. The set of objectives and specific research questions, together with data sources and methods of data analysis, is shown in table 3. Aim 3 consist of six objectives and fourteen research questions. The research questions are intentionally set exhaustively in order to provide comprehensive understanding of the phenomena under investigation. Furthermore, the objectives and research questions also suggest the structure of the case study. Identification of data sources and primary methods of data analysis for each question then demonstrate the nature of mixed-method research and its complementarity.

Table 3 *Objectives, research questions, data sources and methods of data analysis of Aim 3.*
Source: Author

Objectives	Research questions	Data source	Methods of data analysis
1. to characterize farmers of Soweto	**1.** *What are the characteristics of urban farmers and their agricultural practice?*	Questionnaires, farmers' interviews, observation	Relative and absolute frequencies, Cramér's V, thematic analysis
	2. *What is the motivation of farmers for urban agriculture?*	Farmers' interviews, observation	Thematic analysis
2. to analyse access to the land of urban farmers in Soweto	**1.** *Who are the landowners of the land where urban agriculture is carried out?*	Questionnaires, key informant interviews, farmers interviews, observation	Relative and absolute frequencies, Cramér's V, thematic analysis
	2. *How does the mechanism of land access for farmers look like?*	Key informant interviews, farmers interviews, observation	Thematic analysis
3. to analyse the forms of land tenure among urban farmers in Soweto	**1.** *Under which circumstances and tenure arrangements farmers cultivate the land?*	Questionnaires, farmers interviews, participatory workshop, observation	Relative and absolute frequencies, thematic analysis
	2. *What are the benefits and constraints resulting from the different forms of land tenure?*	Participatory workshop, farmers interviews	SWOT analysis, thematic analysis
4. to analyse three dimensions of land tenure security among farmers in Soweto	**1.** *What is the relation between legal and perceived tenure security?*	Questionnaires	Hypothesis testing
	2. *What are the drivers of perceived tenure security?*	Farmers interviews	Thematic analysis
5. to analyse the level investments to urban agriculture in Soweto	**1.** *What is the investment level among farmers of Soweto?*	Questionnaires	Investment Index descriptive statistics
	2. *What are the factors influencing farmers' investments?*	Farmers interviews	Thematic analysis
6. to analyse the implications of different types of land tenure security for investments of urban agriculture	**1.** *What is the association between Investment Index and single dimensions of land tenure security?*	Questionnaires, farmers interview	Hypothesis testing, Spearman's rank coefficient, Cramér's V, thematic analysis

4.2.2 Research Framework

This chapter represents an overview of the research framework, which is focused on the relations among three dimensions of land tenure security and investments. In the analysis, the socio-demographic characteristics, which might also influence land tenure security and investments, are intentionally left out from the research framework and serve as providers of background and context information.

As discussed in the literature review (namely in chapters 3.2 and 3.3), the issue of land tenure and land tenure security is widely discussed across academia. Nevertheless, it is often viewed in a very narrow manner, especially among authors on urban agriculture. Such approach might lead towards misunderstanding of the complex phenomenon and consequently might result in inaccurate policy action. Therefore, by building on Van Gelder's (2010) tripartite view of land tenure security and by considering the different theories examining land tenure and land rights formalization, this research represents a comprehensive approach to this issue. Thus, the research framework does not recognize only one tenure security, it rather embodies *legal tenure security, perceived tenure security,* and *de facto security* as three components of the overall tenure security.

In the research framework, legal tenure security is represented by the land tenure regime under which farmer cultivates the land. This follows a simple logic that farmers who do not dispose with any permission/agreement for land cultivation have the lowest level of legal tenure security comparing to those with ownership who reach the highest level. Furthermore, legal tenure security, to certain extent, also defines farmers' land rights, i.e. the conditions of the land utilization. In order to uncover the level of legal tenure security according to above-mentioned key, four types of land tenure are distinguished: *land ownership* (i.e. freeholders), *formal contractors* (i.e. leaseholders), *informal contractors* (i.e. farmers utilizing the land with written or oral non-formal agreement), and *non-contractors* (i.e. farmer occupying land without any permission). Land ownership is characterized by the farmer's ownership of the land thus the property rights are the most complex. Formal contractors operate the land under lease agreement which is based on the official contract between the farmer and the land owner with clearly stated conditions of land disposal and duration of the contract. In this case, property rights could vary according to the conditions given in the lease. Informal contractors received some sort of written or oral agreement from the land owner or from a person enjoying

significant authority within the community[38] (e.g. ward councilor, school principal, etc.). Such land tenure arrangement can state the property rights but it does not necessarily guarantee them. Finally, non-contractors do not possess any permission which would somehow define their land rights. In contrast to legal tenure security, perceived tenure security reflects farmers' own perception of tenure security. Although perceived tenure security does not directly define the land rights, it might indirectly translate into them by provision of the "security feeling." For instance, if the farmers feel secure on their land even though they do not have any agreement for its utilization, they might act like they have full ownership (e.g. they can sublet part of their garden to someone else, etc.). Of course, perceived tenure security does not provide any legal support. Finally, de facto security reflects the situation on the ground. In this research framework, it is represented by the number of years spent in the respective garden and by the presence of fencing. The length of garden possession is an integral part of de facto security. On top of that, it also proxies other dimensions related to perceived tenure security, such as the density of social networks and the strength of relations with surrounding community. In these terms, it provides an informal protection of farmers' land rights in case and support from the community. Fencing is considered as a tenure building strategy, as suggested by Deninger & Jin (2006), as well as a physical protection against thefts.

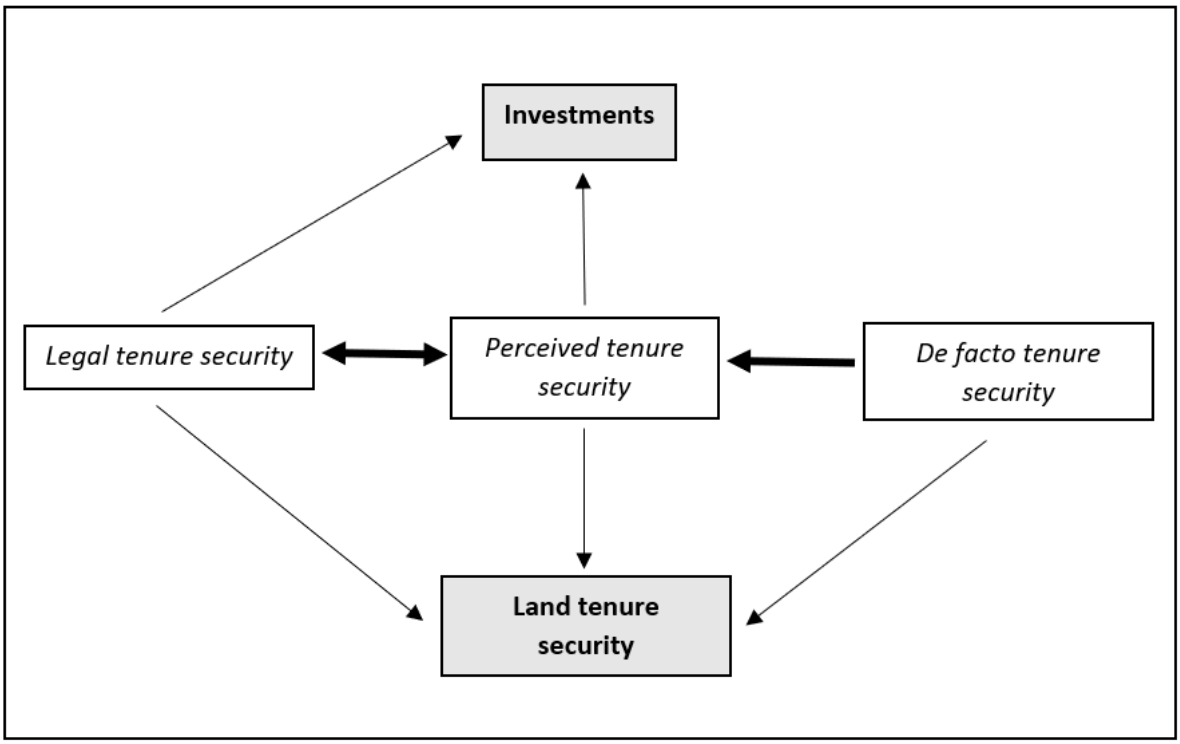
The last part of the research framework is represented by the level of investment which is operationalized by Investment Index, which reflects the inputs and tools used by the farmers (see table 10). As will be described in the next parts of the thesis, the level of investments among farmers is generally low. Therefore, Investment Index contains only such inputs and tools which can be considered as "more advanced", for example plough, greenhouse or use of labourers. It does not include basic equipment which is available among majority of farmers, such as rake, spade or hosepipe.

Figure 2 shows the research framework introduced in previous paragraphs, which mostly builds on the statement of Hornby et al. (2017), that not only farmers with legal tenure security are willing to invest into their farming. At first, single dimensions of tenure security will be explored. Slightly diverging from conceptualization of land tenure security of Van Gelder (2010), de facto tenure security is viewed as an integral part determining perceived tenure security. Therefore, legal and perceived tenure security are directly associated with investments,

[38] Generally, majority of land in Soweto is owned by the municipality or by the state. However, farmers often access land and establish their land tenure with people, such as ward councillors or school principals, who do not have any mandate to lease the land.

de facto tenure security is influencing investments through perceived tenure security. Furthermore, legal and perceived tenure security are operationalized as interlinked and might influence each other. Following the qualitative inquiry, farmers interview respectively, perceived tenure security does not have to stem naturally out of legal tenure security and vice versa. Therefore, this relation is also examined during the statistical analysis. Secondly, as described in table 3, all dimensions of tenure security and their impact on investments in urban agriculture are examined. Finally, in order to contribute to the more effective policy formulation, legal and perceived tenure security are analysed in respect to their particular impact on investments in urban agriculture while aiming at exploring which one of them has higher impact on them.

Figure 2 Research framework



Source: Author

4.2.3 Methods of Data Collection and Research Sample

The case study is based on fieldwork in Soweto carried out in two research periods, February to May 2017 and February to March 2018. As suggested in chapter 2 Methodology, the dissertation is based on mixed methods research approach which consisted of following methods of data collection: (1) observation; (2) a participatory workshop with farmers of Soweto; (3) key informant interviews; (4) questionnaire survey; and (5) farmers interviews. Each of the research objectives, as described in table 3, is reached by using the combination of data sources. In this chapter, the nature of mixed method research will be closely explained in general and as applied in this study. Furthermore, the issue of quality indicators of the research will be elaborated. Finally, each of the method of data collection will be described together with the research sample related to the particular research method.

Mixed method research presents a suitable approach for understanding complex phenomenon which requires exploration from multiple perspectives. According to Creswell (2009:213), mixing quantitative and qualitative research methods is particularly important if this combination is viewed "as a means to offset the weaknesses inherent within one method with the strengths of the other (or conversely, the strength of one adds to the strength of the other)." Quantitative research brings in standardized observation through variables conceptualization and allows for systematic descriptions and comparisons within and outside of the case under investigation. On the other hand, qualitative research strengths can be seen in flexible methodology, which might be adjusted alongside the research development, and in its holistic approach and richness of description which are substantial for dealing with complexity of researched reality. Finally, using combination of quantitative and qualitative research methods enables to embody multiple paradigms (Punch, 2009), which is crucial for holistic approach to complex phenomena.

The methodology of this mixed method research embodies elements of both, *explanatory* and *exploratory design.* According to Punch (2009), *explanatory design* could be characterized as a two-phase research where the first phase consists of a quantitative survey which is then complemented by qualitative methods in the second phase. On the other side, *exploratory design* requires qualitative methods at the first phase and quantitative methods at the second. The research presented in this dissertation consists of five consecutive phases (together with data analysis), as described in table 4, where explanatory steps are complemented with exploratory. First phase aimed to draw a baseline for questionnaire survey by employment of

observation, participatory workshop and key informant interviews. The second phase consisted of data collection through questionnaire survey. Afterwards, this data were subjected to preliminary analysis in order to identify phenomena requiring more detailed explanation through interviews and another round of observation. Fourth step encompassed interviews with farmers and key informants. Finally, all gained data were subjected to both, quantitative and qualitative analysis (chapter 4.2.4).

Table 4 Overview of research phases

Research phase	Method used	Note
First phase (February – April 2017)	Observation	- Qualitative methods of data collection - Baseline for the questionnaire design → clarification of the terminology → wider perspective of researched topic
	Workshop and SWOT analysis	
	Key informant interviews (UA and policy experts)	
Second phase (May – September 2017)	Questionnaire survey	- Quantitative methods of data collection - Done remotely by trained fieldworkers - Baseline for the semi-structured interviews with farmers
Third phase (September 2017 – January 2018)	Questionnaire survey data preliminary analysis	- Preliminary quantitative analysis of the data gained through questionnaire survey - Identification of topics requiring further exploration through interviews
Fourth phase (February 2018 – March 2018)	Farmers interviews	- Qualitative methods of data collection - Complementation of the data gained through the questionnaire → clarification and explanation of the outcomes from questionnaire survey
	Key informant interviews (landlords)	
Fifth phase (April 2018 – September 2019)	Data analysis	- Quantitative analysis - Qualitative analysis → results synthesis

Source: Author

The choice of mixed methods also enables to fulfil one of the quality criteria, identified by Creswell (2007) as methods triangulation, prolonged engagement, consultation with other

researchers, and reflexivity. As explained by Maxwell (2013), using different methods enable to reduce bias caused either by authors themselves or by selected methods. Therefore, it improves reliability and validity of the research findings. Brewer & Hunter (1989) concludes, that if the findings of different methods agree (or are complementary), the researcher and the readers can be more confident about the significance of study results. The procedure of methods combination is closely described below in this chapter. The remaining Creswell's (2007) quality criteria were also met in this research. Altogether, almost five months were spent by the fieldwork in Johannesburg, Soweto specifically. Such a long-term stay enabled to uncover nuances of the phenomena under investigation by engagement with the farmers and key informants. The methods and results of this study were actively consulted with other academics from both, South Africa and Czech Republic. This was especially crucial when shaping the final outcomes of the research as long as the inputs of other colleagues brought in interesting insights from different perspectives. At the same time, the consultations helped to prevent author bias and to identify blind spots in the research. Finally, reflexivity, which according to Lewis & Ritchie (2003) helps to better understand the processes in the research and to identify the weak points resulting from author bias, was applied throughout the research. Therefore, the thorough description of the methodology as well as detailed elaboration on research limitations, including author bias (subchapters 2.1 and 4.2.5), is an *integral part of this dissertation.*

4.2.3.1 Observation

Observation is the essence of qualitative research, especially at the preparatory phase of the fieldwork. Data gained through observation represent the first encounter with the phenomenon under investigation which is not, at the initial phase, extensively influenced by more structured perspectives of the interviews (Merriam, 2009). Therefore, it is elementary for shaping the further research. Furthermore, it enables the researcher to obtain a rich context description and overview of the researched area, which is a basic principle needed for transferability of case study's findings (Maxwell, 2013).

In this research, the role of observation was twofold. At the initial research phase, it mediated first contact with the farmers and allowed to better understand their reality. Consequently, the overview gained through observation helped to shape number of questions in the questionnaire design, especially in respect to the land under cultivation, etc. During the first phase of the research, the observation consisted of several farm visits of non-formal character and of regular

visits at Farmers' school[39]. A special attention was given to the location of gardens as well as to conditions under which the farmers utilize their land. Engagement at Farmers' school also enabled to informally speak with a number of farmers and discuss with them off record their agricultural activities. Secondly, observation employed during the fourth phase, i.e. farmers interviews collection, was especially helpful in terms of verification of the information provided by the farmers as well as in terms of widening the perspective of the researched phenomenon. Here, observation had a complementary character to the interviews as well as was focused on the overall state of urban agriculture in Soweto. As closely described in section Farmers' interviews, the author was by foot exploring Soweto and actively looking for urban farms/gardens. This approach allowed to see a wide range of forms of urban agriculture in the area and reflects them in the research.

The notes from the observation and other information related to the research topic, such as additional input provided by farmers after/prior the interview, were carefully noted in the *field diary*. Furthermore, field diary also contains records of few informal talks with farmers outside the research sample. These notes are crucial for the description of the study context as well as for the rich overview of the study site and environment. Furthermore, the benefits arising from detailed observation are particularly useful in interpreting the results of the quantitative and qualitative inquiry as the field diary help to recall memories and facts which could easily faded by the time.

4.2.3.2 Participatory Workshop

As another method implemented at the initial research phase was participatory workshop with the farmers of Soweto. The workshop was organized with the idea of participatory knowledge building, which is substantial for making the research context-related and context-significant. Therefore, such processes should be based on mutual learning between the participants and the researcher. Furthermore, participatory research principles also facilitate direct confrontation of participants' perspectives with the perceptions and viewpoints of the researcher. If this process is implemented successfully, it consequently leads towards mutual understanding and to identification of gaps, which could be potentially omitted or left out of by the researcher but it is relevant for the participants in the study (Chevalier & Buckles, 2019).

[39] More information about Farmers' school is in section *Participatory workshop*.

The main focus of the workshop was a discussion of various types of land tenure in order to: (1) explore perception of land tenure among farmers; (2) develop a proper terminology for the questionnaire survey which would reflect the understanding of land tenure by farmers; (3) to initiate a discussion on land tenure security. As the format of the workshop, participatory SWOT analysis for each type of land tenure as defined by the farmers was employed. By using SWOT framework, famers were able to critically assess each of the land tenure arrangements as well as to discuss the features of the particular land tenure with their fellows. In these terms, the workshop was also beneficial to farmers themselves as they could openly discuss their views over land tenure and related issues. The main outcomes of the participatory workshops were used during the formulation of questionnaire survey. The insights from SWOT analyses of each land tenure type were also used for identification of benefits and constraints of land tenure arrangements.

The workshop was carried out on 18th March 2017 during Farmers' school initiated by iZindaba Zokudla[40]. The workshop was led by the author and lasted about 80 minutes. Altogether, there were about 100 participants. Although participatory workshops are often carried out in smaller groups, it was out of the scope of this research to follow these requirements due to financial and time demands. Nevertheless, as long as the workshop was carried out during the Farmers' school, which has long tradition and regular audience, the researcher was able to set just and friendly environment which supported farmers in their engagement.

4.2.3.3 Key Informant Interviews

Key informant interviews are an appropriate tool for gaining insight into the phenomena under investigation by approaching those actors who are outside of the research sample yet disponing with information substantial for the research outcomes. In this sense, key informants are able to provide the researcher with complementary information (often from the other perspective than the respondents included in the research sample) necessary for filling the blind spots of the investigated topic (Merriam, 2009).

In this research, ten key informant interviews were held in order to grasp the complexity of the research context. The overview of the key informant interviews is presented in table 5, including

[40] iZindaba Zokudla an action research initiative under University of Johannesburg, which brings together farmers, communities, entrepreneurs, researchers, students and other stakeholders active in developing sustainable food system. An integral part of iZindaba Zokudla is a Farmers' School and Innovation Lab which is a regular meeting of farmers serving as a platform for information and knowledge exchange.

the assigned key informant anonymization code (which is further used for referencing), profession, expertise and date of the interview. Key informant interviews in 2017 were conducted with the purpose of questionnaire shaping and in order to capture the reality from the perspectives of significant stakeholders. Therefore, the main focus of the interviews was centred around access to land and land tenure for urban agriculture in Johannesburg in general, and more specifically in Soweto. The interviews were also focused on the urban food security policy of the City of Johannesburg "A City where None Go Hungry" which reflects the need to ensure secure access to the land for urban farmers in the city (City of Johannesburg, 2012). On the other hand, key informant interviews in 2018 rather served as a complementary information to the one gained through farmers' interviews as long as they were carried out especially with the landlords. This set of key informant interviews was focused mainly on the process of allowing farmers at the landowner's property and the conditions of land utilization for agriculture.

As shown in table 5, four types of key informants were approached. In order to get overview from academical perspective, three key informants from University of Johannesburg and University of the Witwatersrand (WITS) were approached. Their expertise was especially valuable in terms of identifying research gaps related to land tenure and urban agriculture in the research area. Furthermore, two civil servants who were responsible either for the Johannesburg's food policy or for the municipally owned land administration were included in the key informant interviews. The knowledge provided helped to understand the policies directly influencing urban agriculture and land tenure in Soweto. Thirdly, a representative of training centre, which assists to young people with agricultural training, summarized the ways of getting institutional land in Soweto from the perspective of young farmers. Fourthly, three school representatives were approached in order to understand the rationale behind allowing farmers to the properties they manage. Furthermore, the insights from the school representatives enabled confrontation of farmers' and landlords' views. Finally, one of the members of iZindaba Zokudla was involved in key informant interviews as long a she/he undertook the process of accessing municipal land through JPC and had a significant experience of trying to leasing/buying the land in Soweto. Therefore, she/he was able to provide a substantial information reflecting the process introduced by KI_5.

The respondents from academia and two civil servants were purposively selected in order to provide information essential for the further research. School representatives and respondent KI_10, i.e. the key informant from the fourth phase of the research, were approached based on

recommendations from one of the gatekeepers in order to fill in the blind spots from preliminary analysis. All involved key informants agreed with their participation in the research and with the use of the information provided. Nevertheless, none of them was open to interview recording (except respondent KI_10). Therefore, the main points of these conversations were captured by hand. The limitations and ethical considerations arising from this fact are further discussed in chapters 4.2.5 and 4.2.6.

Table 5 Overview of key informants involved in the research

Key informant code	Profession	Expertise	Date of the interview
KI_1	Academia	Expert in urban agriculture practice in Soweto	Repetitive in 2017 and 2018[41]
KI_2	Academia	Expert in incorporation of urban planning in Johannesburg	27/04/2017
KI_3	Academia	Founder of community garden and expert on urban agriculture practice in Johannesburg	26/04/2017
KI_4	Public servant	One of the municipal officers familiar with City of Johannesburg's food policy	28/04/2017
KI_5	Public servant	Expert in land leasing mechanisms at JPC	21/04/2017
KI_6	Training centre representative	Representative of training centre providing agricultural courses for youth and assistance with land access	28/03/2017
KI_7	School representative	Representative of the school with urban farmer(s) at their property	28/02/2018
KI_8	School representative	Representative of the school with urban farmer(s) at their property	28/02/2018
KI_9	School representative	Representative of the school with urban farmer(s) at their property	28/02/2018
KI_10	Member of iZindaba Zokudla	Farmer familiar with the whole process of getting the land from JPC	02/03/2018

Source: Author

4.2.3.4 Questionnaire Survey

One of the core methods used in this research was questionnaire survey which represented a mean for quantitative data collection. Although quantitative data gained through surveys are being depersonalized, thus might be seen as detached from reality, they are essential in provision of well structured, factual and descriptive information which can be subjected to

[41] Unlike other key informants, KI_1 was approached several times in more informal manner.

quantitative analysis. Furthermore, by employing bigger research samples, questionnaire survey enables to get information from wider audience, therefore the results are (often) applicable on larger population (de Vaus, 2014).

Prior the construction of the questionnaire, the list of variables[42] was created in order to cover all aspects of the research topic. The variables were selected based on the existing literature reviewed in chapter 3, results of participatory workshops and on the input from observation. After the creation of the list of variables, there were sorted out into three categories: (1) socio-demographic characteristics; (2) access to land, land tenure and land tenure security; (3) productivity of urban agriculture. The list of variables and their division into categories is shown in table 6. The questionnaire consists predominantly of multiple-choice questions as well as from the Likert scales (i.e. ranking scales) questions. Such nature of the questions enabled to extract data suitable for statistical analysis. There is only limited number of open-ended questions which has complementary character to the multiple-choice questions or which were focused on socio-demographic characteristics of the respondent. The questionnaire (see annex 1) was divided into six parts covering following issues:

1. Socio-demographic characteristics;
2. Availability and access to land;
3. Land tenure and its security;
4. Crops and livestock;
5. Agricultural losses; and
6. Inputs.

[42] The questionnaire covers also other variables which are not listed in the Figure 4. These could be mostly considered as dummy variables.

Table 6 List of variables

Socio-demographic characteristics	Access to land, land tenure and land tenure security	Productivity of UA
Gender	Size of the plot	Crop varieties
Age	Share of the used land	Frequency of harvesting
Educational level	Location of the plot	Yields
Size of the household	Landlord	Types of agricultural inputs
Place of origin	Form of land tenure	Source of agricultural inputs
Number of years living in the area	Duration of the land lease	Water sources
Employment status	Rent/price of land	Farming technologies
Average household monthly income	Security of the land access	Labourers
		Marketing options

Source: Author

Before the distribution of the questionnaires, five pilots were made by the author. This helped the researcher to be sure that the questions were clear, understandable, and properly constructed. Few questions were restructured in clearer manner. Nevertheless, the piloting showed that, because of the complexity of the survey and its length (13 pages), it was relatively difficult for farmers to fill in the questionnaire on their own. Therefore, this situation led to the decision that the questionnaires were administered by well-trained fieldworkers, who were able to assist to the respondents with completion of the form as well as who were able to explain the questions in case of any unclarity. Furthermore, administration of the questionnaires by the fieldworkers allows to collect the data without the presence of the author in South Africa. The fieldworkers, students of the University of Johannesburg, were all aware of the urban agriculture in Soweto, were familiar with Soweto and spoke with more than one of the local languages.[43] The ethical considerations and limitations related to the employment of fieldworkers is further discussed in subchapters 4.2.5 and 4.2.6.

The questionnaires were collected in the period from beginning of May 2017 to the end of August 2017. All questionnaires were administered in paper. Consequently, they were converted to the computer-manageable form through using online-based application SurveyMonkey[44], which is widely used for survey collection. The application enabled to

[43] The questionnaire is in the English language. Even though a significant number of respondents speak English, which is one of the official languages in South Africa, it is important that the respondents have a possibility of translating the questionnaire to their native language.
[44] www.surveymonkey.com

transform the answers from particular questionnaires into complex spreadsheets which could be later on processed and analysed through STATA[45] software (methods of data analysis are further discussed in chapter 4.2.4).

Altogether, 177 questionnaires were collected. The sampling procedure was based on non-probability sampling because it was not possible to employ random sampling due to inability to meet its criteria (for example, there is no official list of urban farmers in Soweto which could serve as a base for random sampling). The sampling procedure done during the research can be viewed from two perspectives. The first one views all respondents as being part of one sample. From such perspective, the process done can be seen a *purposive sampling*, which enables to select participants according to a certain set of criteria (Ritchie, et al., 2003). In this case, purposive sampling was employed in order to get balanced proportion of respondents with all four types of land tenure, i.e. each category was supposed to be represented by roughly equal number of respondents. However, as visible in table 7, the quota for informal contractors diverges from the others as long as this category comprises of wide range of distinctive characteristics hence it was important to understand different modes of arrangements.

Table 7 Respondents according to land tenure type

Type of land tenure	**Number of respondents**
non-contractors	28
informal contractors	85
formal contractors	35
land ownership	29

Source: questionnaire survey

From second perspective, respondents of the questionnaire survey can be viewed as being part of four independent samples. Each of these four research samples includes only a particular land tenure category (i.e. first research sample consisted only from non-contractors, second one for informal contractors, etc.). The fieldworkers were said to actively search for farmers in different Sowetan neighbourhoods while focusing on looking for particular land tenure arrangements as defined in the research framework. Typically, fieldworkers could use relatively reliable and simple rule for looking for farmers with specific land tenure: farmers cultivating open space were usually non-contractors while farmers at institutions, such as schools or clinics,

[45] https://www.stata.com/

were formal or non-formal contractors, and farmers cultivating their backyards were mostly land owners.

Based on the two above mentioned views, the questionnaire collection was organized in a way which created samples with properties close to random samples (as much as it was feasible given the circumstances) by randomly contacting farmers. Such approach led to creation of an *approximately random* research sample (Sudman, 1976). The author assumes that the selected method of sampling did not introduce any considerable biases regarding the associations of the phenomena under investigation. The data for quantitative analysis does not come from random sampling, therefore the statistical significance is valid only for the respective sub-groups of farmers.

Although the original research sample involved all types of land tenure, the interviews and observation showed, that farmers cultivating land under their ownership have different profile than formal contractors, non-formal contractors and non-contractors. As closely described in chapter 4.1.2, land ownership in Soweto is rare and it generally applies only to land for housing. Therefore, the gardens utilized under land ownership were only found at farmers' backyards adjacent to their houses. This situation creates a significant difference between land owners and farmers who utilize land under another land tenure regime. This distinction is arising especially from the scale of farming as well as from the production patterns (as demonstrated in table 8). While land owners were mostly subsistence oriented and farming was often only a complementary activity, the other groups of farmers were more likely market oriented and urban agriculture represented one of the means of their survival strategy. On top of that, formal contractors, non-formal contractors, and non-contractors had to develop a significant effort to start with their farming activities, as they had to actively look for a piece of land suitable for cultivation. Such disparity implies also varying level of motivation/commitment, resulting from generally lower engagement of land owners (as supported by several land owners' statements from the interviews). Based on these facts, which are heavily supported by Mougeot's (2015) logic of on-plot and off-plot urban agriculture, the group of land owners was excluded from the statistical and qualitative analysis. Consequently, the number of respondents included in the statistical analysis is 147.

Table 8 Proportion of market-oriented farmers according to type of land tenure

Proportion of market-oriented farmers according to type of land tenure		
land tenure	**proportion**	**no. of respondents**
non-contractors	57.1%	28
informal contractors	46.4%	84
formal contractors	65.7%	35
land owners	27.6%	29

Source: Author, based on questionnaire survey

4.2.3.5 Farmers' Interviews

The last method used in this research were semi-structured farmers´ interviews. Semi-structured interview is one of the key methods of qualitative research, which represents a process of conversation between researcher and participant focused on the questions related to the study (deMarrais, 2004). Unlike structured interviewing, which is basically represented by questionnaires, semi-structured interviews allow for relatively high flexibility as long as the questions can be adjusted, left out or added during the process of interaction among the researcher and the participant (Bernard, 2006).

In this research, semi-structured farmers´ interviews were used in order to get complementary information to the results of questionnaire survey. Therefore, as visible in table 4, the collected questionnaires were subjected to preliminary analysis, which was focused on finding elementary patterns in the dataset and on identification of the weak points which required further exploration and explanation through qualitative information. Based on the outcomes, the interview guide aimed to elaborate on significant results of preliminary analysis from the qualitative perspective. Therefore, the main focus of the interviews was centred around the process of accessing land, the form of land tenure, perception of land tenure security, and the decisions about investments to urban agriculture.

Twenty-two farmers participated in the interviews. In order to reach the farmers, convenience sampling in combination with purposive sampling were implemented with the aim to acquire balanced proportion of each type of land tenure arrangement. In practice, the sampling procedure had two steps. Firstly, researcher together with one of the fieldworkers was walking different neighbourhoods of Soweto and was searching for gardens and farmers willing to take part in the research. Secondly, when the number of eight completed interviews was reached, the researcher started to control the sample for different forms of land tenure in order to balance

all four categories. However, as suggested in table 9, informal contractors were predominant. This disbalance is caused by the fact, that informal contractors were also predominant among the questionnaire survey respondents[46]. Furthermore, similarly like in the case of questionnaire survey, land owners were dropped out of the analysis. Therefore, the final number of interviews subjected to the analysis was 17. Still, the information provided through the interviews with land owners allowed to decide on the final version of the research sample subjected to both, qualitative and quantitative analysis.

The interviews were held by researcher in English. In case of the language barrier, the questions were translated by the assistant fieldworker to isiZulu or Sesotho according the need of the respondent. All the interviews were recorded and transcribed. The ethical considerations and limitations arising from the use of an interpreter is discussed in chapters 4.2.5 and 4.2.6. Table 9 brings an overview of the respondents participating in the study, including the assigned respondent anonymization code (which is later used for referencing), land tenure category, language of the interview, and date of the interview.

[46] This disbalance in both, questionnaire and interview research sample might also point to the fact, that some sort of informal agreement is the most often land tenure arrangement among Sowetan farmers. Nevertheless, it is out of the scope of this study to verify this assumption.

Table 9 Overview of farmers' interviews

Respondent code	Land tenure type	Type of the garden	Date	Interview translation YES/NO	Recorded YES/NO	Note
R_1	Formal contractor	Community centre	16.02.2018	NO	YES	farming as a complementary activity
R_2	Formal contractor	Church centre	16.02.2018	NO	YES	farming as a complementary activity
R_3	Informal contractor	Health clinic	19.02.2018	NO	YES	
R_4	Informal contractor	Community centre	19.02.2018	NO	YES	
R_5	Formal contractor	Open space garden	20.02.2018	NO	YES	
R_6	Informal contractor	School	20.02.2018	NO	YES	
R_7	Informal contractor	Health clinic	21.02.2018	NO	YES	
R_8	Freehold	Backyard garden	21.02.2018	NO	YES	the interview was dropped out from the analysis[47]
R_9	Informal contractor	Open space garden	26.02.2018	NO	YES	
R_10	Non-contractor	Open space garden	26.02.2018	YES	YES	
R_11	Informal contractor	Open space garden	26.02.2018	YES	YES	
R_12	Non-contractor	Open space garden	26.02.2018	NO	YES	
R_13	Non-contractor	Open space garden	27.02.2018	NO	YES	
R_14	Freehold	Backyard garden	27.02.2018	YES	YES	the interview was dropped out from the analysis
R_15	Non-contractor	Open space garden	27.02.2018	NO	YES	
R_16	Non-contractor	Open space garden	27.02.2018	NO	YES	the respondents had two gardens
R_17	Formal contractor	Open space garden	28.02.2018	NO	YES	garden managed by a cooperative
R_18	Informal contractor	School	02.03.2018	NO	YES	
R_19	Informal contractor	School	02.03.2018	NO	YES	the garden was established as a part of a bigger project
R_20	Freehold	Backyard garden	02.03.2018	NO	YES	the interview was dropped out from the analysis
R_21	Freehold	Backyard garden	05.03.2018	NO	YES	the interview was dropped out from the analysis
R_22	Freehold	Backyard garden	05.03.2018	NO	YES	the interview was dropped out from the analysis

Source: Author

[47] All landowners were excluded from the research sample based on the rationale provided in sections *Questionnaire Survey* and *Farmers' Interviews.*

4.2.4 Methods of Data Analysis

The fifth phase of the presented research consisted of data analysis which was carried out in four steps, which were mostly consecutive but at some points, for instance when crafting the research sample, were simultaneous. Firstly, univariate analysis of socio-demographic characteristics and land tenure related variables was done. At some instances, the chi quadrate test was used in order to measure association of two categorical variables. The elementary information about the research sample together with a brief overview of information in field diary helped to shape the research sample for further statistical procedures. Secondly, the composite Investment Index (II) measuring level of farmer's investments was constructed. Thirdly, statistical analysis aiming at testing different assumption was carried out in STATA 12 programme. Finally, thematic analysis of interviews using MAXQDA[48] programme was done in order to elaborate on some results of the statistical analysis and to create the overall picture of the researched phenomena. All methods of data analysis, following the order of four steps presented above, are more closely described below in this subchapter.

4.2.4.1 Construction of Composite Investment Index

The first step of quantitative analysis consisted of calculation of composite Investment Index (II) which demonstrates the level of investments to urban agriculture by farmers in the research sample. Composite indices represent a suitable tool for exploration of complex realities which require holistic explanations. While using separate indicators for examination of the researched phenomena might be difficult to interpret, composite indices allow to aggregate complexity into one single number (Schlossarek et al., 2019) which can be easier to interpret for all interested parties: academia, policy-makers and lay audience. In terms of this research, calculation of Investment Index allowed to create a relatively sophisticated tool for expressing the level of investments among farmers while using information easily recalled by farmers[49].

Although composite indices can serve as an excellent tool in development research, there are two challenges which needs to be overcome in order to prevent misinterpretation of the reality. The first issue is related to weighting. Weights can be assigned to the respective variables either by participatory/expert assessment or by statistical methods. Various statistical methods of

[48] www.maxqda.com

[49] As suggested in chapters 3.1.1 and 3.1.2, measurement of productivity and investments to urban agriculture can be difficult as long as farmers are often unable to provide sufficient information about their yields and agricultural inputs.

weighting, which are based on data characteristics, can be implemented. Among the mostly used can be found for example fuzzy analysis, polychoric principal component analysis, or multiple correspondence analysis (MCA) (OECD, 2008), which was used in this research. MCA was chosen because its wide popularity among other factorial analysis techniques as well as because it is easily adaptable to the structure of the data collected through questionnaire survey. The results of MCA were linearly rescaled: 100 points was assigned to respondents with the highest level of investments in the research sample and 0 points to those with the lowest level of investments in the sample.

The second challenge identified by OECD (2008) is the decision which indicators should be included in the index. Although constructors of composite indices can be tempted to use as many indicators as possible, one should always consider omitting variables on the ground of parsimony (Schlossarek et al., 2019). As long as the above-mentioned processes are based on the arbitrary choices, it is suitable to either test the index results sensitivity on decisions taken or to analyse links of new indices to other feasible variables which are measuring similar or same concepts. Another challenging issue during construction of composite indices can be, for instance, normalization and standardization of data. Nevertheless, the Investment Index consist of categorical variables only, therefore these issues are not as important as in other cases.

Table 10 summarize the composition and non-rescaled weights of single components for Investment Index. The indicators used in II can be divided into three categories. First category describes the basic tools and equipment which are easily accessible and majority of farmers claimed their ownership. Second category represents more advanced tools and equipment, which are not that common among farmers and their purchase require substantial capital. Furthermore, the possession of these tools and equipment also suggest more progressive crop production. Final category of indicator considers non-material inputs, i.e. use of agrochemicals and labourers, which suggest that farmer aims to increase its land productivity.

Table 10 Components and weights of Investment Index

Investment index (II)				
Indicator				**weights**
Tools and equipment owned	Basic tools and equipment	Cart	yes	-5.814
			no	0.121
		Plough	yes	-3.348
			no	0.325
		Wheel barrow	yes	-0.792
			no	0.871
	Advanced tools and equipment	Food storage	yes	-1.586
			no	0.868
		Greenhouse	yes	-2.520
			no	0.701
		Tunnel	yes	-3.764
			no	0.335
		Composter	yes	-3.502
			no	0.175
		Drip irrigation system	yes	-2.809
			no	0.205
		Sprinkler irrigation system	yes	-2.830
			no	0.552
Others		Use of agrochemicals	yes	-1.812
			no	0.336
		Having labourers	yes	-0.874
			no	0.863

Source: Author, based on questionnaire survey

The construction of Investment Index was followed by sensitivity analysis which was divided into two consecutive phases. Firstly, the weights of variables were adjusted. The weights determined by MCA were replaced by equal weights, where 1 indicated high level of investments and 0 implied low level of investments. There was a very strong positive correlation (0.98) between original and adjusted index. Second stage of sensitivity analysis was focused on the indicators used in the index. While keeping the equal weights, two modified versions of Investment Index were calculated. In the first version, the indicators of advanced tools and equipment were dropped. In the second version, all basic tools and equipment and other indicators were dropped while the group of advanced tools and equipment was kept. Correlation between the first adjusted version and the original II was 0.82, the correlation between the second adjusted version and the original II was 0.95. The high correlation implies

that the outcomes of original Investment Index are robust and relatively insensitive to decisions made during its construction process.

4.2.4.2 Statistical Data Analysis

The second step in the analysis was to verify five assumptions based on the research framework presented in subchapter 4.2.2 and figure 2. Table 11 summarizes the assumptions, particular hypotheses, statistical operation employed for their verification and operationalization of the variables. Two types of tests were done: two-sample proportion z test and Welch's t-test (unequal variances t-test). Also, Spearman's rank coefficient and Cramér's V were calculated for situation where suitable.

Assumption 1 was tested by using a two-sample proportion z test. Three sub-hypotheses were tested in order to explore the proportion of farmers with perceived tenure security among three land tenure categories (formal contractors, non-formal contractors, and non-contractors). Assumptions 2, 3 and 4 were examining the level of investments, which was represented by Investment Index (II), among different means of tenure security (legal, perceived and de facto tenure security). Assumption 2 was tested by using three sub-hypotheses which were examining the average level of investments among different forms of legal tenure security. In case of assumption 3, the average level of investments between farmers with and without perceived tenure security was analysed. Assumption 4 was focused on the level of investments among farmers who enjoy de facto tenure security. Firstly, Welch's t-test was used for testing the average level of investment among farmers who have or do not have fencing (which represents a physical security). Furthermore, de facto tenure security was proxied by the number of years spent in the garden. Because a linear relation between the II and the number of years spent in the garden was not expected, Spearman's rank coefficient for analysis of the association was used. Finally, validity of assumption 5 was analysed by Cramér's, and by comparing descriptive statistics for II for various groups respondents created based on their legal and perceived tenure security.

Table 11 Assumptions and statistical operations employed for its verification.

Assumption	Statistical operation	Hypotheses	Variables operationalization
Legal tenure security is positively associated with perceived tenure security	Two-sample proportion z test	H1a: proportion of farmers with perceived tenure security is different among formal contractors and among informal contractors	Perceived tenure security is based on the answer to the statement, "I feel my land tenure is secure." Farmers who answered "agree" are considered secure. Farmers who stated or "I am not sure" or "disagree" are considered insecure. The formality of the farmer's land tenure represents legal tenure security (further explained below).
		H1b: proportion of farmers with perceived tenure security is different among formal contractors and among non-contractors	
		H1c: proportion of farmers with perceived tenure security is different among informal contractors and among non-contractors	
Legal tenure security is positively associated with investments	Welch's t-test (unequal variances t-test)	H2a: average II of formal contractors is different from average II of informal contractors	Legal tenure security is represented by the forms of land tenure. While formal contractors are considered as legally secure and informal contractors have semi-legal security, non-contractors do not dispose with any form of legal security.
		H2b: average II of formal contractors is different from average II of non-contractors	
		H2c: average II of informal contractors is different from average II of non-contractors	
Perceived tenure security is positively associated with investments	Welch's t-test (unequal variances t-test)	H3: average II of farmers with perceived tenure security is different from average II of farmers without perceived tenure security	Perceived tenure security is based on the answer to the statement, "I feel my land tenure is secure." Farmers who answered "agree" or "I am not sure" are considered as secure. Farmers who stated "disagree" are considered as insecure.
De facto tenure security is positively associated with investments	Welch's t-test (unequal variances t-test), Spearman's rank coefficient	H4: average II of farmers with de facto (physical) tenure security is different from average II of farmers with no de facto (physical) tenure security	Physical tenure security is represented by the variable fence, which represents protection against thefts as well as a tenure building strategy.
Legal tenure security and perceived tenure security are interrelated, and both are important determinants of investments	Cramér's V, descriptive statistics	----------	Legal tenure security is represented by the forms of land tenure. While formal contractors are considered as legally secure and informal contractors have semi-legal security, non-contractors do not dispose with any form of legal security. Perceived tenure security is based on the answer to the statement, "I feel my land tenure is secure." Farmers who answered "agree" or "I am not sure" are considered as secure. Farmers who stated "disagree" are considered as insecure.

Source: Author

At all cases, the null hypotheses were tested on a 5% level of significance against the alternative two-tailed hypotheses introduced in table 11. As long as multiple testing for each assumption was carried out, the results might be prone to errors. Therefore, the Holm-Bonferroni method of correction was used for each set of hypotheses for respective assumption, in order to adjust the interpretation of the respective critical levels of p-values.

4.2.4.3 Qualitative Data Analysis

The qualitative data were analysed by using thematic analysis, which allows for interpretation and evaluation of the data content in relation to the research objective (Bryman, 2008). All the interviews were literally transcribed in order to capture all nuances arising from the interviews. Memos were used at points when some particular emotion was appealing for capturing. Data gained within the interviews were sorted and reduced through inductive coding. Subsequently, the codes were organized into particular categories reflecting the themes emerging across the interviews. This procedure enables identification, analysis and interpretations of patterns and relations occurring within the qualitative data (Ribbs, 2007). The interviews were proceeded by using MAXQDA[50] software.

4.2.5 Methodological Considerations

The methodological procedures, especially data collection, described above pose several considerations which require further discussion. The first issue can be seen within collection of key informant interviews which were not audio recorded in order to respond to the wish of respondents. Although author carefully noted down maximum of information received from the interviewees irrespective of her own judgements thus handwritten notes provide sufficient overview of the topics discussed, still some biases could occur. Therefore, some of the information were verified from other sources, such as websites of City of Johannesburg, etc. Such approach allowed the author to reflected her own biases which might influence understanding and interpretation of some of the notes.

Second consideration arises from the collection of questionnaire survey as long as the questionnaires were administered by well-trained fieldworkers who were students at University of Johannesburg (UJ) at the time of data collection and who were familiar with Soweto (as closely described in chapter 4.2.3). In order to prevent mistrust from the side of respondents, all fieldworkers were instructed to prove themselves to farmers as students of UJ by showing

[50] https://www.maxqda.com/

their student card. Furthermore, fieldworkers were instructed to provide overview of the research project and to clarify that they are not related to any municipal body. Despite the significant precatory measures, some farmers were not able to develop a trust-based relationship with the fieldworker. This could result into provision of adjusted information which would seem to farmers as more "appropriate". Consequently, this situation could skew the collected data. Similar concern can apply to the farmers' interviews as long as all of them were conducted by the researcher and one assistant who helped with the translation when needed. At some instances, farmers treated the researcher as a governmental official despite thorough explanation of the research and its purpose. Finally, at some cases farmers were not able to express themselves in English and the translation was in place.

As already suggested in chapter 2.1, the final consideration is related to the limited transferability of research findings caused by exploration of the researched phenomena by using a single case study. Furthermore, as long as the questionnaire survey collection was not based on random sampling but rather on purposive, the statistical significance of the results is valid only for the respective sub-group of farmers and the presented p-values are of informative character. Nevertheless, it is assumed that the method of purposive sampling did not introduce any major biases regarding the associations of the phenomena under investigation.

4.2.6 Research Ethics

The field research brought several ethical concerns as long as the results of the research were published in scientific journal and the dissertation thesis will be publicly available to wide audience. Therefore, all survey respondents, interviewees, and other people involved in the study needed to be ensured over the confidentiality and anonymity of the data and information provided. In order to do so, the researcher did not expose the names nor any other information which can reveal the identity of the research participants. Furthermore, all participants got acquainted with the purpose of the research by direct explanation from the researcher/fieldworkers or by short information sheet introducing the study, which was an integral part of the questionnaire form. Finally, all interviewees signed written consent (see annex 2) about the participation in the research which includes also the information of confidentiality and anonymity of provided information. In case of questionnaire survey, respondents agreed with the conditions of participation in the research by filling in the survey. As long as the participation in the research was not subjected to any reward, both, written consent and introduction to questionnaire survey, also explained the voluntary nature of the

information provision in order to clarify any expectations from the side of respondents, such as payment for the survey response, service provision, etc. Another ethical question arises from the fact, that the questionnaire survey was collected with the help of trained fieldworkers. In order to protect the farmers participating in the study as well as in order to keep the research codex, all fieldworkers signed a consent (see annex 3) which was clearing the potential ethical consideration.

During the process of both, interview and survey collection, all respondents had a right to withdraw from the study at any time and this option was clearly communicated to them. This was especially important as at some points, the research deals with sensitive information, such as household income, migration status as well as questions regarding land tenure. Especially in the matter of land tenure, the researcher touches the informal zone (for instance when some of the farmers spoke about some sort of extra-legal arrangements). In such situations, it is essential to not developing any pressure on answering any questions which can be uncomfortable for respondents. Instead, the researcher/fieldworker was encouraging farmers by reassuring the confidentiality.

4.3 Results

In this subchapter, the outcomes of the research are discussed. In order to keep a logical structure, the chapter follows the line of objectives presented in table 3. The results presented in this chapter are based on the adjusted research sample as explained in chapter 4.2.3 (i.e. without land owners). Firstly, farmers in the research sample will be introduced in terms of socio-demographic indicators as well as in terms of their farming practice (subsistence versus market-oriented) and motivation. Secondly, the forms of land tenure in Soweto together with access to land for urban farmers will be discussed. Thirdly, three dimensions of land tenure security will be examined in order to understand the different nature of their dynamics in urban environment. Fourthly, the level of investments among farmers as well as their attitudes towards them will be explored. Finally, the relationship between land tenure security and investments into agriculture will be unravelled and thoroughly discussed.

The presented results origin from the data and analytical approaches presented in table 3. In order to provide comprehensive overview and explanation of phenomena occurring in the research, the subchapters do not follow the strict division of quantitative and qualitative results. Instead, the two information are presented simultaneously in a complementary manner, i.e. results of quantitative analysis are directly accompanied by narratives based on the qualitative

analysis and, at some instances, on the literature review. As long as not all farmers answered all the questions, at some points, the number of responses does not correspond with the number of the respondents in the research sample.

4.3.1 Who are the farmers of Soweto?

This chapter brings an overview of the characteristics of the farmers included in the research sample for questionnaire survey. Firstly, the socio-demographic indicators are introduced. Although the socio-demographic indicators are intentionally left out from the research framework (see chapter 4.2.2), it is still important to understand what kind of people engage in urban agriculture. Secondly, the nature of urban agricultural practice among Sowetan farmers with an emphasis on market-oriented and subsistence farming is discussed. Finally, this chapter elaborates on the motivations of farmers to start with urban agriculture. Such characteristics allow the reader to get deeper insight into the research context which is substantial for explanation of the phenomena under investigation.

An average age of the farmers participating in the study was 45,7 years. The youngest farmer was 21 years old, while the oldest was 78. Out of the 147 respondents, 59% (n = 87) are women. Sixty-six percent of respondents (n = 97) were born in Soweto and those born in other provinces spent on average 24,4 years in Soweto. This confirms statements of Mouegot (2000) and Van Veenhuizen & Danso (2007), that recent migrants to the city rarely engage in urban agriculture, which is domain of long-term residents or people born in urban areas. Only two respondents did not have any formal education while majority of farmers (71%, n = 100) finished at least secondary school. Furthermore, 53 % (n = 78) farmers had also another occupation than farming (56%, n = 43, of them was formally employed as a full-time workers). This information corresponds with the statement of Smit et al. (2001) that people engaging in urban agriculture are doing so in order to extend their livelihood strategy. There is a strong association (Cramér's V = 0,378, p = 0,003) between the age and the employment status of the farmers, where the proportion of farmers having other occupation than farming was larger only among respondents who were between 31 and 50 years old (table 12). A strong association (Cramér's V = 0,372, p = 0,000) was also found between the occupational status of the farmers and their education. The lower was the education level, the higher was dependency on farming in terms of not having any other occupation as farming (table 13). Nevertheless, it must be noted, that not having any occupation except farming does not generally imply that farmers would not have any other income than the one from agriculture as long as number of respondents were getting some sort

of social grants (especially those over 60 years). As suggested by some of the interviewees, farmers of higher age often opt for farming in order to enhance their livelihoods and to earn extra money as well as in order to "keep themselves busy". Fifty-five percent (n = 81) of farmers was doing agriculture for less than 10 years.

Table 12 Distribution of farmers according to occupational status and age category

Age (interval)	**Having other occupation than farming**		**Total**
	NO	**YES**	
20 – 30 yrs	9 (14%)	6 (9%)	*15 (12%)*
31 – 40 yrs	11 (18%)	28 (43%)	*39 (30%)*
41 – 50 yrs	13 (21%)	19 (29%)	*32 (25%)*
51 – 60 yrs	16 (25%)	7 (11%)	*23 (18%)*
61 – 70 yrs	10 (16%)	5 (8%)	*15 (12%*
70 < yrs	4 (6%)	0 (0%)	*4 (3%)*
Total	*63 (100%)*	*65 (100%)*	*128 (100%)*

Source: Author, based on questionnaire survey

Table 13 Distribution of farmers according to occupational status and educational status

Highest level of education	**Having other occupation than farming**		**Total**
	NO	**YES**	
None	2 (3%)	0 (0%)	*2 (1%)*
Primary	25 (37%)	14 (19%)	*39 (28%)*
Secondary	32 (48%	28 (38%)	*60 (43%)*
Tertiary	8 (12%)	32 (43%)	*40 (28%)*
Total	*67 (100%)*	*74 (100%)*	*141 (100%)*

Source: Author, based on questionnaire survey

The proportion of market-oriented and subsistence-oriented farmers was balanced, where 53% (n = 78) of farmers were primarily growing for sale. Nevertheless, as suggested in table 14 and by the interviewees, farmers mostly combined both strategies. Some of the farmers only sell the surpluses which they are not able to consume, others grow combination of crops for home consumption (e.g. eggplants, pumpkins) and for sale (e.g. spinach, indigenous leafy vegetables, herbs and chillies). While crops grown for home consumption can be considered as plants with longer growing period and lower yields, crops grown for sale have higher yields and shorter growing period. As shown in table 14, only three farmers were specialized in growing for sale and did not contribute to their home consumption.

Table 14 Proportion of farmers growing for home-consumption and for sale

Growing for sale	**Growing for home consumption**		**Total**
	No	**Yes**	
No	28 (90%)	41 (35%)	*69 (47%)*
Yes	3 (10%)	75 (65%)	*78 (53%)*
Total	*31 (100%)*	*116 (100%)*	*147 (100%)*

Source: Author, based on questionnaire survey

Age, employment status and market/subsistence orientation of the farmers can be considered as the major motivations for starting with urban farming. Farmers in the interviews often mentioned that farming represents for them livelihood strategy as well as some sort of philosophy of subsistence inherited from their parents and/or grandparents. Especially thoughts on being dependent on purchasing food was appealing across the interviewees. Furthermore, some respondents also mentioned that farming enables them to have a healthier lifestyle which would be otherwise unaffordable.

> *We are not working and the things are too expensive. So, if I make a garden like this, I take some things and go home and cook. I cook it.* (R_16, 2018)

> *I used to visit the rural areas and my grandfather had land like this, he was a farmer. So, when we come this side, we ask ourselves "why we have to buy everything"? Every time we want to eat something we must buy something. Why don't start our own garden?* (R_9, 2018)

> […] *when I came here I came specifically* […] *The purpose was I wanted to eat vegetables that I'm growing by myself.* (R_4, 2018)

Farmers' background and their motivations described above translates into the classification of urban agriculture according to Moustier & Danso (2006) presented in chapter 3.1 (table 2). As long as almost none of the farmers can be considered as pure entrepreneur, majority of farmers can be characterized as combination of home-subsistence farmers and family-type commercial farmers. As suggested in next subchapters, the farmers' characteristics and motivations further influence their behaviour, especially in terms of investments.

4.3.2 Land Tenure Arrangements and Access to Land among Farmers of Soweto

Land access and land tenure arrangements are interrelated and influence each other. Therefore, this chapter aims to discuss both simultaneously in order to provide the reader with a comprehensive picture of the research problematics. Firstly, the overview of garden locations,

land owners and land tenure arrangements are provided based on relative and absolute frequencies. Secondly, the chapter is focused on the land availability and the process of getting the land. Therefore, the process of land acquisition as well as agreement negotiation is explored for each category of land tenure, i.e. for non-contractors, informal contractors and formal contractors. Finally, the perceptions of different land tenure categories are discussed based on the SWOT analyses for all categories.

More than half (55%, n = 80) of the farmers in the research sample cultivated open space gardens, which were located along roads, power lines, or on the dumpsites. Open space gardens were also found at parks or wetlands. About 35% (n = 51) of farmers were based on institutional land, mostly at schools, health clinics or at community centres. Some of the respondents (10%, n = 14) cultivated backyards of the houses they were renting out. Based on the very strong association (Cramér's V = 0,797, p = 0,000) between garden characteristics and the land owner, and as shown in the table 15, these most typical garden locations generally mirror the main land owners in Soweto, who dispose with the land suitable for urban agriculture.

Table 15 Land owners according to garden characteristics

Land owner	**Garden location**			**Total**
	Backyard garden	**Institutional garden**	**Open space**	
Unknown	0 (0%)	0 (0%)	1 (1%)	*1 (1%)*
A company	0 (0%)	2 (4%)	2 (3%)	*4 (3%)*
An individual	14 (100%)	1 (2%)	14 (18%)	*29 (20%)*
An institution	0 (0%)	44 (86%)	0 (0%)	*44 (30%)*
City council	0 (0%)	4 (8%)	63 (79%)	*67 (46%)*
Total	*14 (100%)*	*51 (100%)*	*80 (100%)*	*145 (100%)*

Source: Author, based on questionnaire survey

First land owner category identified in the research sample is represented by individuals (20%, n = 29). Privately owned land mostly referred either to backyard gardens (n = 14) or to open space gardens (n = 14). Roughly 46% (n = 67) of the land cultivated by farmers in the research sample is owned by the municipality, especially the open space gardens. The institutional gardens are mostly managed by the representatives of the respective institution (e.g. school board, etc.). Although nearly 30% (n = 44) of respondents stated, that the land they cultivate is owned by the institution where the garden is located, in fact the ownership can be more complicated especially at public schools which are mostly located on the state-owned land. Nevertheless, as explicitly stated in the South African Schools Act 84 of 1996, the public schools have the right "to occupy and use the immovable property for the benefit of the school for educational purposes at or in connection with the school". Furthermore, Basic Education

Laws Amendment Act 15 of 2011 allows to a governing body, with the approval of the Executive Council, to "(i) lease, burden, convert or alter immovable property of the school to provide for school activities or to supplement school fund of that school; and (ii) allow any person to conduct any business on school property to supplement the school fund." Therefore, even though the schools do not necessarily have to be legal owners of the land they manage, they have the right to lease the land to farmers in case that the school is benefiting from their presence (as more closely discussed below).

Majority of farmers (57%, n = 84) had some sort of non-formal agreement, either written or oral (i.e. they classified as informal contractors in quantitative analysis). Nevertheless, it must be noted that not all informal contractors had an agreement from the land owner. At some cases, farmers obtained an agreement/permission from another person/institution who is enjoying substantial authority in the area but who does not have the legal right to establish such agreements. It especially applies to farmers at open space gardens, who often have oral agreement from ward councillor. Although such agreement guarantees them some sort of legitimacy, it does not provide any legally based relation over the land as long as all the municipal land must be officially leased through JPC, as explained in chapter 4.1.1. Twenty-four percent (n = 35) of farmers were utilizing their gardens under lease agreement (i.e. formal contractors). Finally, 19% (n = 28) of respondents could be considered as illegal squatters as they did not have any agreement over the land they were using (i.e. non-contractors).

Table 16 shows, that there is strong association (Cramér's V = 0,335, p = 0,000) between the garden location and land tenure arrangement. Nevertheless, it is surprising, that non-formal agreements are predominant even among farmers located at institutional land. This might be partially explained by the fact, that leasing of institutional land can be quite long process which includes various meetings between the farmers and the representative bodies (KI_6, 2017; R_18). Therefore, some of the institutional representatives can rather prefer simple yet extra-legal process of oral agreement over the lease agreement which is formal and legally recognized but the procedure is slower and more complicated. Furthermore, as suggested by KI_7 (2018) and KI_9 (2018), lease represents a long-term liability which cannot be easily cancelled thus it necessarily does not have to be convenient for number of institutional representatives. Finally, according to KI_7 (2018), the lack of formalization of land rights even at institutional properties

is partially given by *ubuntu* principle[51] – when someone wants to use the land for the good purpose, the community has the right to do so.

Table 16 Proportion of farmers according to garden location and land tenure arrangement

Garden location	Land tenure			Total
	Non-contractors	Informal contractors	Formal contractors	
Backyard garden	0 (0%)	13 (15%)	1 (3%)	*14 (10%)*
Institutional garden	0 (0%)	35 (42%)	16 (48%)	*54 (35%)*
Open space	28 (100%)	36 (43%)	16 (48%)	*80 (55%)*
Total	*28 (100%)*	*84 (100%)*	*33 (100%)*	*145 (100%)*

Source: Author, based on questionnaire survey

4.3.2.1 Land Availability, Land Access and the Process of Agreement Negotiation

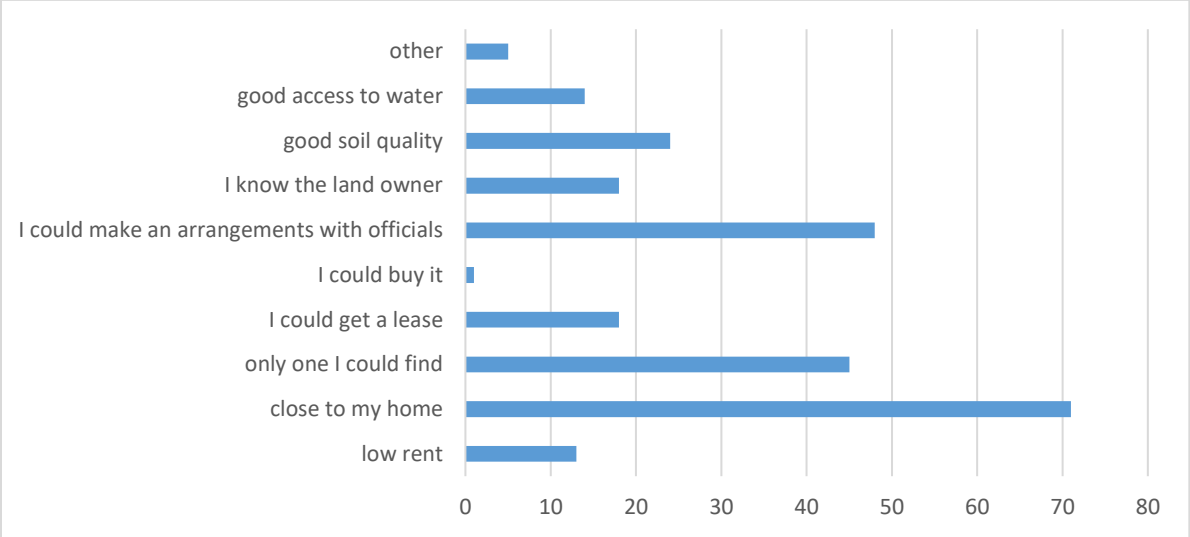
Considering the availability of land for urban agriculture, 72% (n = 106) of farmers in the research sample agreed that there is enough available land for agriculture in Soweto. According to majority of respondents, land is available especially through municipal government and institutions – 52% (n = 76) of respondents held an opinion that these two actors offer land for urban farming. The view of farmers on relatively high land availability in Soweto is further supported by the fact, that only 30% (n = 45) of respondents stated, that the land they cultivate was the only one they were able to find. Nevertheless, based on the views of respondents, access to the land might be tricky. While 46% (n = 68) of farmers thought that accessing the land they cultivate was not difficult, only 12% (n = 17) thought that everybody can easily access the land for farming. This fact suggests, that being a farmer requires certain connections and skills, as also mentioned by KI_6 (2017). Furthermore, it is also in accordance with the arguments from both, land tenure (e.g. Hornby et al., 2017) and urban agriculture (Bryld, 2003; Smit et al., 2001) literature which underlines the importance of the role of social relations during land acquisition and its sustaining. Finally, as further discussed in chapter 4.3.3, the social relations are also important driver of perceived tenure security.

Land availability, garden proximity to farmers' home and possibility of making some sort of arrangements with officials seem to be the most important factors in farmers decision towards garden location (figure 3). Nevertheless, the decisions also highly depended on the type of land tenure, as shown in table 17. For instance, non-contractors more often established their farm on the only land they could find (61%, n = 17) as well as on the land close to their homes (86%, n

[51] Ubuntu can be translated from Zulu as "I am because we are." In these terms, ubuntu can be viewed as a philosophy encouraging individuals to act with respect to others while developing both, the individual self and the community.

= 24) than other groups of farmers. Interestingly, the choice of the garden location based on the possibility of establishment of any agreement with officials was predominant only among farmers with lease agreement (54%, n = 19). Furthermore, while 67% (n = 48) of farmers claimed that they established their garden at the location because they could make arrangement with officials, only 12% (n = 18) of farmers mentioned that the possibility of getting a lease was important to them.

Figure 3 Reasons for establishing garden at current location



Source: Author, based on questionnaire survey

Table 17 Main reasons for garden location selection according to types of land tenure arrangements

Land tenure	Only one I could find			Close to my home			Could make arrangement with officials		
	Yes	No	Total	Yes	No	Total	Yes	No	Total
Non-contractors	17 (61%)	11 (39%)	*28 (100%)*	24 (86%)	4 (14%)	*28 (100%)*	1 (4%)	27 (96%)	*28 (100%)*
Informal contractors	23 (27%)	61 (73%)	*84 (100%)*	38 (45%)	46 (55%)	*84 (100%)*	28 (33%)	56 (67%)	*84 (100%)*
Formal contractors	5 (14%)	30 (86%)	*35 (100%)*	9 (26%)	26 (74%)	*35 (100%)*	19 (54%)	16 (46%)	*35 (100%)*
Total	*45 (31%)*	*102 (69%)*	*147 (100%)*	*71 (48%)*	*76 (52%)*	*147 (100%)*	*48 (67%)*	*99 (33%)*	*147 (100%)*

Source: Author, based on questionnaire survey

Non-Contractors and Access to Land

As suggested by interviewees as well as by observation, non-contractors mostly chose the land for farming (as well as the possibility of being a farmer in general) based on its availability as well as on its location. Farmers often took an advantage of having a neglected piece of land (such as dumpsite, bushes, wetlands or other vacant land) in the proximity of their homes. For instance, respondent R_16 started with farming at the land directly adjacent to her/his house.

As long as her/his agricultural practice was successful, she/he decided to expand the garden on the municipal land because "nobody is doing something there" (R_16, 2018). Other farmers stated, that they just cleaned the neglected land and start to farm there.

> *We started from the scratch. This place was just full of grass so we cleaned it up. And people were dumping dirt there. So we just decided that "no, this is enough, we have to put the fence around the place, we have to clean it out and then start with some farming."* '(R_15, 2018)

> *It was a dumping site so I saw an opportunity. After cleaning is when the we find the tap.* […]. *So when we cleaned it it's when we discovered the water pipes. So once we saw water there then we decided that we better make a food garden. Because of it was not for the first time when we cleaned this space. So we were cleaning in for some times and people they came and polluted it again. So to sustain it, to have it clean, we decided to do this garden here.* (R_13, 2018)

> *It was empty, it was dirty like. There were bushes. So we removed everything, to clean up everything so we can make a garden. Today, if you want to make a garden, you just clean your piece.* (R_12, 2018)

Taking the opportunity of neglected land provided farmers not only with the space for their farming, but also with some sort of legitimacy from the perspective of surrounding community but also from the perspective of ward councillors[52] who acknowledge their role of *property maintainers* and *food provider*. Moreover, bearing in mind the laws enforced during the apartheid era (as described in chapter 4.1.2), part of the respondents also viewed possession of vacant land as their right. Considering these terms, the importance of getting a consent for using the land from any authority (no matter if it supposed to be a municipal government representative or ward councillor) did not seemed important to some of the farmers.

> *Because I knew that what I'm doing - we need this thing. As a man I was born - everything was prepared for a man. You will find a piece of land where you live and plant and will be buried. It is a birth right for everyone of us. But the things have changed now. It was no piece of land where you can even build your shack. There was nothing for us. So this space has been there since I was a child. And no*

[52] The dynamics of the relationships among farmers, land owners and community are further discussed in chapter 4.3.3.

one used this space. The space was just a dumping site. We have turned it into a dumping site. So if I went there and plant there I don't see anything wrong. […] *You know I don't want to own this place, I want to use this place. I don't want to own it, I just want to use this land, for the benefit of my people.* (R_13, 2018)

As the people who are living in this area, we saw no need to approach anyone. Because I mean it's next to our house. (R_15, 2018)

There's no need to get a permission until someone is going to use this – then they can say that I have to leave. (R_16, 2018)

Informal Contractors, Access to Land and the Process of Agreement Negotiation

Similarly as non-contractors, informal contractors usually located their farming on land which was previously underutilized or neglected. As suggested above, informal contractors were mostly located at institutional land, but at some instances, also at open space gardens. Therefore, it is possible to distinguish informal contractors according to the location of their garden which determines the process of getting the land. First group can be represented by informal contractors at institutional garden. Some farmers of this group found the land through invitation from someone already farming at the institution (as suggested by R_4 and by R_19) or thanks to the invitation from the institution itself as indicated by KI_8 (2018). In case of KI_8 (2018), the school identified the space for garden and afterwards approached active community members with the offer to farm on its property. Other farmers got the land through participation at some project which included farming among other activities (e.g. R_18). Another group of farmers had already existing connection to the institution or to the people working there. For instance, R_3 (2018) was an employee at the clinic where her/his garden was located, therefore when she/he wanted to established a garden, she/he only asked her/his superiors. R_7 (2018) was invited to the garden by a person responsible for the development of the clinic's exterior. On the other hand, some of the farmers had to be more active when they were looking for a land. Respondent R_4 (2018) stated that she/he just decided to come to the school because she/he saw that it was empty and that the land was underutilized. Respondent R_6 (2018) said that he claimed the land from the school principal because he felt that it was her/his right. Although such farmers did not have any established relations with the institution they were farming in, they disposed with a certain knowledge which allowed them to approach the institution. While R_4 used to be a member of the school board (different from the one she/he was farming in) and she/he was familiar of the processes in such institutions, R_6 was aware

of the fact that schools can allow farmers on their properties and used this information to his advantage.

> *The school was left empty but then it is used by adults. It is called an adult centre now. So I decided to come to the school. The reason was, because when do you walk around the school was very untidy, long grass. Also the garden I was only able to clean the "face" close to the gate. So I came to ask for place to have a food garden and there was no problem. The principal gave me permission and she/he also said to me I can call as many people as I can so the people can come and use the school yard so it can be clean. And for security purposes. So that's how the whole thing started, we came one by one until the whole yard is how you can see.* (R_4, 2018)

> *We actually applied from the school. Because in terms of the government... Because of the government said that every school must give a portion to the community to plant and then we had to apply at the principal to give us the portion. Then we signed some documents for the portion that we got from the school.* (R_6, 2018)

Once farmers identified suitable place for farming at some of the institutions, they had to negotiate the agreement with the officials as well as the terms of use of the land. All of the respondents stated that they did not have any problems with getting the permission to farm as long as the institutions often dispose with large areas of land but usually do not have enough resources for taking sufficient care of it. Nevertheless, as long as gardens are located at the land with clear property rights, the access to land had to be framed by some sort of agreement between the land owner/person responsible for the land and the farmer. However, there is no unified version of this process and it varies from place to place. As long as farmers use the land based on the informal agreement, there were usually no or little difficulties of gaining the land – respondents mostly agreed that they just approach the responsible person at the institution and she/he gave them the permission without any significant complications (e.g. R_4, 2018). However, not all respondents had such an easy access to the land. For instance, respondent R_18 (2018) had to undertake quite difficult process of garden approval consisting of several meetings with the school principal and school board.

> *When I approached the principal, it was like something he was waiting for. And then he gave us just a verbal agreement. And there was no procedure. It was just like that we could do it.* (R_4, 2018)

We had to come here, we had to come first to the principal and the school board and then we had a meeting and then after having a meeting with the principal and the school board we had to invite all staff, even the department of education, because remember, that's their property, so we cannot do anything without them saying yes we can do. The principal and the school board can say: "yes you can work". But if the department of education comes here and then see that we are working and then they were not contacted they might be chased away. So even the department of education they know that the project is here at school. (R_18, 2018)

While informal contractors at institutions generally had to have some sort of the agreement from the institution representatives (otherwise they would not be able to access the land at all), farmers at open space could decide whether they would need (and want) some agreement for using the land or not. While number of farmers rather preferred to cultivate the land with no permission (as discussed above), some other farmers at opens space gardens opted for recognition of their garden from the side of the ward/community representatives. Nevertheless, the option of getting informal agreement over the open space garden did not depend only on the willingness and attitudes of the farmers themselves, but also on their relationship with the people who enjoyed respect in the community, such as ward councillors. For instance, R_10 (2018), who is now classified as non-contractor, stated that when she/he started with the garden, she/he knew the ward councillor and asked her/him for the permission to use the land for farming. Although she/he got the agreement for land cultivation at the initial point of her/his farming, nowadays there is a new ward councillor and as long as the farmer did not know her/him personally, she/he never approached her/him and asked her/him for a new permission. Some relation with ward councillor was also mentioned by R_9 (2018), who said that the ward councillor was her/his customer and when she/he asked the councillor about the necessity of an agreement, she/he received a positive answer. Probably to the most complicated situation had to face R_11 (2018), who had to approach two ward councillors as long as the land is between two wards.

[…] *they told us that this place does not belong to this Ward. So they said to us that "this ward, you must go to the councillor to whom belongs this place." This place does not belong to* [name of the ward]. *It belongs to* [name of the ward]. *This street is the one that divides the neighbourhoods. When we went to the councillor that side he said "no, this place does not belong to us you must go to another councillor". And that was confusing. The time we go, my mother used to go to the councillor*

> *from* [name of the ward], *then she told him that he can "do the nice thing for us. Just because it is confusing, they are going this side and they are telling them to go to another councillor." Then they come here and when they come here they just said "OK, no problem, you can use the land".* (R_11, 2018)

No matter the garden location, all of the respondents agreed, that they did not have a chance to negotiate the conditions of using the land. At the same time, it seemed that farmers did not perceive this fact as a threat as long as none of the interviewees complained about it. Although one would expect that farmers pay something for using the land at institution as a compensation, respondents usually did not have to pay any rent in monetary terms and if so, it was only for the water they use. Nevertheless, some of the farmers were providing part of their produce as a contribution to the feeding scheme (especially in case of school) or they were obliged by the property maintenance. In case of informal contractors at open space gardens, there was no sign that anybody would require any payment nor service provision from the farmers. However, the presence of farmers at both, institutional and open space land, is profitable for both parties as long as farmers are able to enhance the benefits arising from the land which would be otherwise underutilized.

Formal Contractors, Access to Land and the Process of Agreement Negotiation

Last category identified in the research sample were formal contractors, i.e. farmers who had a lease agreement over the land they were using. Although it might seem that the lease agreement should be something that farmers are craving for, the results of the questionnaire survey presented above rather suggest, that the possibility of getting a formal contract does not seem that important to the farmers as one would expect. Furthermore, the process of getting a land and lease agreement over it is very individual and also depends on the garden location. At institutional gardens the process is relatively similar to the one when getting informal agreement (although even here it might be very specific as in case of R_1). On the other hand, the process at open space gardens is completely different than any other practices described above. For instance, respondent R_1 (2018) established a child care centre together with a food garden at the abandoned school without no permission for doing so. However, she/he was approached by JPC and got the lease for the land. R_2 (2018), who was farming at a church property, approached the pastor who issued her/him a lease agreement. Conversely, respondents R_17 (2018) and R_5 (2018) received a lease agreement for the land they cultivated based on the support from the Department of Social Development of the City of Johannesburg (DSD). While

R_5 (2018) approached DSD with a proposal for using a vacant land in her/his neighbourhood, R_17 (2018) got the land lease based on the business plan made for the cooperative the farmer was part of. However, as both interviewees suggested, they have never approached JPC directly thus the process of getting the lease agreement was done for them by DSD. However, as pointed out by KI_10, if there is no support and farmers would like to apply for a lease as individuals, the process at JPC is very demanding and often confusing due to vague guidelines. At the end, this was also partially confirmed by KI_5 who was very well aware of the leasing process' complexity and of the fact that it can become too complicated for the urban farmers.

> *They closed this school in 1999. Then me, I was in that church. After that I asked another lady "Hey, the school is empty. Can we get the school because we want to use it." We don't know the owner of the school. We just got in, opened the classes and used it. The owners when they come here they found us inside. They said we can't chase you. Than we came to town to JPC in Braamfontein and fill the forms and then we're gonna give you place. Then they start to give me this* [showing some documents]. *From there they signed an agreement with me and give the lease agreement to me and permit of the use.* (R_1, 2018)

> *We had a garden at school but at school it was a small place to work under it. So we got many crops to grow. We approached this place to social development.* […] *We tried to make a forum, a Soweto forum. The Soweto forum.* […] *These different cooperatives selected us to forum, so by the minute you have in that forum, the forum suggested that people must have big enough land to grow their plants*. […] *We went to social development and asked for the place to grow our crops. We showed up our profiling and how do we grow crops. We can comply – we have business plan, business certificate, all those things. We had to prove that we are cooperative that is improving. So social development suggested to give us this land. It was allocated to us.* (R_17, 2018).

> *I tried to obtain a lease on two farms and I was referred to people who tried to help me. The only assistance I got there was "go to find out one after one if these plots are available, to whom they belong to". I went. At this office I gave them the site numbers, they checked you paid. You pay for that information. R20, it's OK, it's not a lot of money. I was told they belong to Johannesburg Property Company.* […] *I was given an address to go to. When I got there, the person said "I don't know what*

to do, I don't deliver. Go to…." They gave me the phone number, the street address and the person to go to see. I got there: "that's not us." I went between Johannesburg and Braamfontein[53] *in one day I went six times back and forth to different places. Places that I even didn't know existed in the town. Ultimately, I ended up at JPC. When I got there I was given forms to complete and I have to bring them back. I do all of that, I attached every required document and I took it back. After some two months or so, I think, I received an e-mail: "I received these documents, blablabla… I don't think I was the right person for you to send them to."* [...] *Then I gave up.* (KI_10, 2018)

Similarly as in case of informal contractors, farmers were not able to negotiate the conditions in their lease agreement. Except R_2 (2018), who was based at the church centre, therefore the land was privately owned, none of the respondents perceived the conditions in the lease as problematic. Interestingly, while respondents who leased their land from JPC were not bind by any rent payment, only R_2 was paying a rent to the land owner.

As suggested by R_17 (2018) and R_5 (2018), Department of Social Development of the City of Johannesburg can assist to farmers with obtaining a lease agreement for the land they are using. The process was clearly explained by KI_4 (2017). As long as JPC administers all the municipal land, DSD often serve as an intermediary between the farmer and JPC. On behalf of farmers, DSD can negotiate memorandum of understanding over the identified land parcel with JPC. Consequently, once the memorandum of understanding is signed by both, JPC and DSD, farmers can obtain a lease agreement for land utilization with DSD. The role of DSD in the process is substantial because, as described in next paragraph, land acquisition directly from JPC can be very demanding for the farmers. Moreover, DSD is aware, that without a lease agreement, farmers cannot seek funding at other municipal departments of the City of Johannesburg, because they need a proof that the farmer got an official approval for the land utilization from the city. Therefore, the DSD encourage farmers to get leases through them (KI_4, 2017).

Because of none of the interviewees acquired lease agreement directly through JPC, for complex perspective on lease procedures, it is also important to introduce this process as explained by KI_2 (2017). As stated in City of Johannesburg 2040 Growth and Development

[53] Braamfontein is a Johannesburg's district where majority of municipal and governmental offices is based.

Strategy, JPC should mediate the land allocation (small parcels from one to two hectares) and land leasing for small-scale farmers and cooperatives (City of Johannesburg, 2011). Unless assisted by some external agent, such as DSD, farmers interested at leasing the land must undertake several steps[54]. Firstly, farmers must enquire the possibility of leasing the selected land parcel. Based on the first step, JPC verifies the ownership and in case the land parcel belongs to the City of Johannesburg, it is consulted with the zoning in urban plan. If there are no conflicts with the zoning, the farmer can start with the application. Once the application is handed in, Departmental and Municipal Entity (DME) and ward councillors must provide comments over the application. This is the most complicated part of the process as the application goes to all interested parties (e.g. Department of Housing, Department of Social Development, other municipal departments and to ward councillors in the area) who can identify any conflict of interests over the enquired land. The whole procedure may take up to 6 months but it can be even longer. If some conflicting interests occur, the application is dismissed. After receiving positive comments from the DME and ward councillors, i.e. in case of non-existent conflict of interest, the report goes to Mayoral and Council Reporting (MCR) stage with the request for approval. However, if the comments from DME and ward councillors are older than 6 months, MCR will not consider the report. Once this stage is successfully passed, the approved report from MCR is submitted to Executive Adjudication Committee (EAC) which considers the terms of the proposed property transaction. If all the stages are successfully accomplished, JPC is allowed to issue the lease agreement (KI_2, 2017). The leaflet provided by JPC to people who want to lease/purchase municipal land can be found in annex 4.

4.3.2.2 Perception of Land Tenure Arrangements by Farmers

As written above, there is a great diversity of the processes of getting the access to the land and the agreement over it. However, once the process resulted in one of the identified tenure arrangements (non-contractors, informal contractors, and formal contractors), farmers also thought of the advantages and disadvantages of their land tenure situation. As long as the phenomenon of land tenure is very complex, the SWOT analyses (figures 4, 5, and 6) for each land tenure arrangement were created and are presented and discussed in this subchapter.

Figure 4 shows a SWOT analysis for non-contractors, i.e. for those farmers who cultivate their land without any permission. As suggested, such land tenure arrangement provides farmers with

[54] The same process applies also to land purchase.

significant freedom in terms of flexible and quick land access and no or little regulation of any activity which can be potentially carried at the garden. Furthermore, there is also a possibility of later recognition of the land rights. On the other side, farmers are aware that it is a sort of illegal/extra-legal activity which can prevent them from getting a funding and/or assistance (in terms of material supply or training provision) from the side of City of Johannesburg (CoJ). Furthermore, not having a documentation also restrict farmers to reach for banking services. Probably the most appealing threat is the possibility of forced eviction. Nevertheless, it must be noted that although 68% (n=100) farmers in the research sample agreed that they are afraid of being evicted from their land, there is no statistically significant association (Cramér's V = 0.132, p = 0,280) between the land tenure and fear of eviction. Another threat, which can actually hinder the perceived tenure security (as further discussed in chapter 4.3.3) are disputes with the community. As mentioned by some of the non-contractors (but also informal contractors) in the interviews (R_15, 2018; R_16, 2018; R_11, 2018), they had to face to a judgemental and rival behaviour from the side of their neighbours. Nevertheless, the problems with the surrounding community rather relate to the garden location than land tenure in general.

Figure 4 SWOT analysis for non-contractors

NON-CONTRACTORS	
STRENGTHS - No investment required (in terms of rent or buying the land) → it is cheap - Flexible – everything depends solely on the farmer - No regulations in terms of crops grown and land management - Quick land access	**WEAKNESSES** - Illegal/extra-legal - No safety/security (in terms of thefts) → constant monitoring - No or limited possibility to receive funding and assistance from CoJ/government - No documentation for further development (restriction from possibility to go to the bank and ask for loan)
OPPORTUNITIES - Indication of need (new purpose of the neglected land) - Use rights (usufruct) - Opportunity of later recognition	**THREATS** - Eviction – no legal tenure security - Disputes in the community - Lots of property investment

Source: Author, based on participatory workshop and interviews

As shown in figure 5, some of the perceptions related to informal contractors are overlapping with those of non-contractors. Farmers agreed that informal agreements are easy to get while preserving the relative flexibility of the agreement as such. Furthermore, this tenure arrangement already provides a certain level of legitimacy of the land utilization, at least for the landowner. Conversely, some features of informal agreement might be constraining. As long as informal agreement allows farmers to, for example, leave the land at any point they wish to do so, the same applies for the land owner, who could decide to move the farmer out at any time. At the same time, informal agreement also necessarily does not have to state clear conditions of the land use, which might be changeable over the time. Although informal contractors can receive some support from CoJ, as long as they do not have any legal document proving their land rights over the land, they cannot apply for any banking services. Probably the most pronounced inhibiting factor of informal agreement can be seen in limited land access in terms of land utilization because farmers are required to consult any bigger investments with land owner (especially in terms of building some fixed constructions, such as water tanks or tunnels). Finally, participants at the workshop as well as some respondents also mentioned that at some instances, land owners can overtake the existing activities and develop them further while leaving the farmers behind by breaking the agreement for the land utilization.

Figure 5 SWOT analysis for informal contractors

INFORMAL CONTRACTORS	
STRENGTHS - Flexibility – possibility of making changes and leave the garden at any time - Easy to get – there is no formal process of getting the agreement - Provision of certain level of legitimacy	**WEAKNESSES** - Unrecorded – farmer's word against the landowner's - Unclear conditions which can change at any time - Extra-legal - The owner must approve all investment – necessity to have permission from the owner (must consult with the owner)
OPPORTUNITIES - Use rights (usufruct) - Indication of need (new purpose of the neglected land) - Possibility of funding and further assistance from the institution - Possibility of assistance from DSD	**THREATS** - Termination of the agreement from the side of land owner at any time - No documentation for further development (restriction from possibility to go to the bank and ask for loan) - Restriction from gaining support from other CoJ departments than DSD - Competing interests of farmer and the land owner and other parties - Overtaking of the ideas by the owner – the owner can use already established activities in his advantage and overtake them

Source: Author, based on participatory workshop and interviews

Last category of land tenure arrangements is represented by formal contractors who cultivate the land under a lease agreement. Once again, some of the perceptions are overlapping with those of non-contractors and especially with those of informal contractors. The SWOT analysis is displayed at figure 6. Formal contractors are provided by long term stability as well as by legal protection. It can also result in to the land purchase. Moreover, apart from the assistance from the municipal government, as in case of informal contractors, farmers having a lease agreement are the only group which can, albeit limitedly, access the banking services. Although there is a number of positives, there is relatively a lot of constraints, which can partially explain also the relatively low enthusiasm of farmers to have a lease agreement, as long as it is the least flexible land tenure arrangement (indeed, it necessarily has to be at all cases). For instance, there is only a little possibility to make any changes in the lease agreement after its signature. Furthermore, long term contracts can force farmers to stay on the land even though their agriculture fail or if they want to move somewhere else. Simultaneously, while some farmers can be encouraged to undertake more effective and more time-wise planning, time limitation

might discourage farmers for larger investments (which must be mostly approved by the land owner) because they might lose it in case that the lease would not be extended. Finally, as some of the farmers are paying a rent, it can happen that the land owner will rise it or that someone can overbid the farmer and takeover the land.

Figure 6 SWOT analysis for formal contractors

FORMAL CONTRACTORS	
STRENGTHS	**WEAKNESSES**
- Low responsibility and low maintenance costs – it is more the owner's responsibility - Long term contracts - stability for certain period of time - Legal protection – you have an official document; protective clause	- Long term contracts – forced to stay even though the farmer does not want to stay - Fixed lease – little possibility to make any changes after the signature of the contract - The owner must approve all investment – necessity to have permission from the owner (must consult with the owner) - Rent payment (but depends on the land owner) - Ineffective planning – losing of motivation for investment as the land is leased only for certain period of time - Potential loss of the investment after the lease expiration
OPPORTUNITIES	**THREATS**
- Benevolent lease conditions - Sub-leasing if allowed - Viability/opportunity to expand (you can grow and expand your farming) - Lease with the intention to buy (lease as a cores stone for the land ownership) - The duration of the lease as a driver for more productive and effective in planning - Possibility of funding and further assistance from the institution - Possibility of funding and assistance from all CoJ departments/government - Access to banking services	- Potential loss of the investment after the lease expiration - Price hike - higher rent over the time and losing an ability to pay the rent - Overtaking of the ideas by the owner – the owner can use already established activities in his advantage after the lease expiration - Land competitiveness – someone can offer more money for the land and the farmer can lose access to it

Source: Author, based on participatory workshop and interviews

The SWOT analyses of all of the land tenure arrangement shows important features of each of them as well as allows for comparison across them. As long as the presented SWOT analyses are based on the results of the participatory workshop as well as on the results of thematic analysis, they combine the common wisdom of farmers together with personal experience and views. Such approach enables to gain comprehensive insight into the dynamics of different land

tenure arrangement, which is substantial for better understanding of three dimensions of land tenure security as well as investment-related behaviour (as further discussed in next chapters).

4.3.3 Land Tenure Security for Farmers of Soweto

As explained in the research framework (figure 2, chapter 4.2.2) and based on the work of Van Gelder (2010), the analysis distinguished three components of overall tenure security: legal tenure security, perceived tenure security and de facto tenure security, which is encompassed in perceived tenure security. While the research framework explained the components of tenure security through theoretical perspective and operationalized the variables used during the statistical analysis, this chapter aims to elaborate on all of them through provision of empirical evidence with a special emphasis on the relation of legal and perceived tenure security.

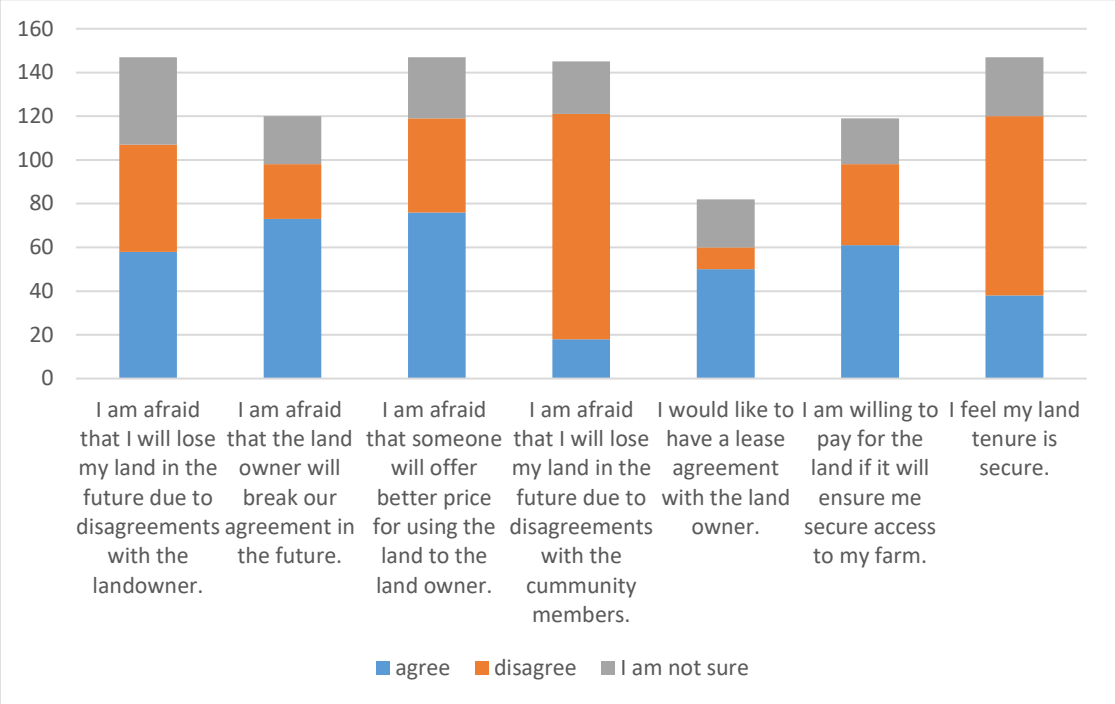
As long as legal tenure security is operationalized through the form of land tenure, the process of its acquisition is elaborated in detail in previous chapter (chapter 4.3.2). De facto tenure security is operationalized through two variables. De facto tenure security is firstly operationalized by number of years spent in the garden. On average, farmers were based at particular land parcel for 5 years. The shortest time period was half a year and the longest was 20 years. While the majority (73%, n = 108) of farmers were cultivating their gardens for 5 or less years, only 18 farmers (12%) cultivated their recent garden for more than 7 years. Secondly, de facto tenure security is driven by the presence of physical security, i.e. by the presence of fencing – 67% (n = 91) of farmers had a fully fenced garden while 21% (n = 29) respondents reported no fencing at all. The remaining farmers (12%, n = 16) claimed that their garden is partially fenced. Perceived tenure security was measured by the answer to the statement *I feel my land tenure is secure*. Twenty-six percent (n = 38) of farmers agreed with the statement, i.e. they can consider themselves as tenure secured, 18% (n = 27) said that they are not sure and 56% (n = 82) claimed that they do not agree with the statement, i.e. they did not dispose with the perceived tenure security[55].

Apart from the results of hypotheses testing presented below in table 21, perceived tenure security was also examined through a set of statements in the questionnaire survey, where farmers were asked about particular land tenure security challenges and possible solutions for

[55] Note, that during the hypothesis testing presented and explained in table 18, the categories of "I am not sur" and "disagree" are merged.

its strengthening. The relative and absolute frequencies according to land tenure category[56] for selected statements are summarized in tables 18, 19 and 20 and in figure 7.

Figure 7 Statements exploring farmers' perceived land tenure security and their responses.



Source: Author, based on questionnaire survey

Table 18 shows the respondents' doubts in respect to land owner-farmer relationship which mostly troubles formal and informal contractors (as, for instance, only 11% of non-contractors are worried about the disagreements with the land owner). Moreover, majority of informal (63%, n = 53) and formal contractors (54%, n = 19) is worried that the land owner will break their agreement in the future. Finally, the mistrust between the farmers and land owners was also demonstrated once farmers were asked about the possibility that the land owner would accept higher bid for the land (table 19). Sixty percent (n = 50) of informal contractors and 69% (n = 24) of formal contractors agreed that they were afraid of such situation. Interestingly, the situation among non-contractors was reversed as majority of them (50%, n = 14) was not afraid that someone would offer higher bid for the land to the land owner.

[56] As long as not all questions were applicable to all of the land tenure categories, the cells are intentionally left blank in such cases.

Table 18 Answers to selected statements according to land tenure category.

Land tenure category	I am afraid that I will lose my land in the future due to disagreements with the land owner.				I am afraid that the land owner will break our agreement in the future.			
	Agree	I am not sure	Disagree	Total	Agree	I am not sure	Disagree	Total
Non-contractors	3 (11%)	10 (36%)	15 (53%)	*28 (100%)*	---	---	---	---
Informal contractors	33 (39%)	25 (30%)	26 (31%)	*84 (100%)*	53 (63%)	13 (15%)	18 (21%)	*84 (100%)*
Formal contractors	22 (63%)	5 (14%)	8 (23%)	*35 (100%)*	19 (54%)	9 (26%)	7 (20%)	*35 (100%)*
Total	*58 (40%)*	*40 (27%)*	*49 (33%)*	*147 (100%)*	*72 (61%)*	*22 (18%)*	*25 (21%)*	*119 (100%)*

Source: Author, based on questionnaire survey

Table 19 Answers to selected statements according to land tenure category.

Land tenure category	I am afraid that someone will offer better price for using the land to the land owner.				I am afraid that I will lose my land in the future due to disagreements with the community members.			
	Agree	I am not sure	Disagree	Total	Agree	I am not sure	Disagree	Total
Non-contractors	2 (7%)	12 (43%)	14 (50%)	*28 (100%)*	1 (4%)	2 (7%)	25 (89%)	*28 (100%)*
Informal contractors	50 (60%)	13 (15%)	21 (25%)	*84 (100%)*	8 (10%)	20 (24%)	54 (66%)	*82 (100%)*
Formal contractors	24 (69%)	3 (8%)	8 (23%)	*35 (100%)*	9 (26%)	2 (6%)	24 (69%)	*35% (100%)*
Total	*76 (52%)*	*28 (9%)*	*43 (29%)*	*147 (100%)*	*18 (12%)*	*24 (17%)*	*103 (71%)*	*145 (100%)*

Source: Author, based on questionnaire survey

The second set of statements rather reflects the mechanisms for strengthening land tenure security in general (i.e. both, perceived and legal). According to results presented in table 19, farmers generally have good relations within the community as long as 71% (n = 103) of respondents disagreed with the statement that *I am afraid that I will lose my land in the future due to disagreements with the community members.* In fact, the relations with the surrounding neighbours seems to be essential for perceived tenure security, as further discussed below in this chapter. Furthermore, farmers were asked about the possible ways of upgrading their position in the view of the land owner (table 20), which can consequently result in higher levels of perceived tenure security. Although 51% (n = 61) of respondents stated that they are willing to pay for the land if it would ensure them secure access to their garden, it is mainly the case of formal and informal contractors as long as only 22% (n = 6) of non-contractors agreed with the statement. Moreover, 68% (n = 40%) of informal contractors agreed that they would like to have a lease agreement with the land owner, while among non-contractors the proportion of farmers who agreed or disagreed with the statement was rather balanced. The fact that especially informal and formal contractors are willing to undertake some steps in order to

strengthen their legal tenure security suggests that the trust between them and their land owner is rather lower (the rationale behind is discussed below) thus their perceived tenure security might be substantially influenced.

Table 20 Answers to selected statements according to land tenure category.

Land tenure category	**I am willing to pay for the land if it will ensure me secure access to my farm.**				**I would like to have a lease agreement with the land owner.**			
	Agree	**I am not sure**	**Disagree**	**Total**	**Agree**	**I am not sure**	**Disagree**	**Total**
Non-contractors	6 (22%)	6 (22%)	15 (56%)	*27 (100%)*	10 (43%)	5 (22%)	8 (35%)	*23 (100%)*
Informal contractors	37 (58%)	12 (19%)	15 (23%)	*64 (100%)*	40 (68%)	17 (29%)	2 (3%)	*59 (100%)*
Formal contractors	18 (64%)	3 (11%)	7 (25%)	*28 (100%)*	---	---	---	---
Total	*61 (51%)*	*21 (18%)*	*37 (31%)*	*119 (100%)*	*50 (61%)*	*22 (27%)*	*10 (12%)*	*82 (100%)*

Source: Author, based on questionnaire survey

The relative and absolute frequencies described above hint that the relationship between legal and perceived land tenure security does not necessarily have to be that straightforward as often suggested in the literature discussed in chapter 3.2, which mostly proposes that legal tenure security results into perceived tenure security (i.e. that farmers with any sort of agreement should feel more secure on the land they cultivate than non-contractors). Consequently, the exploration of the association of legal and perceived tenure security requires a statistical testing as explained in chapter 4.2.4.2. Therefore, an assumption that *legal tenure security is positively associated with perceived tenure security* was formulated in order to set three hypotheses for testing that aimed to verify this relation. The hypotheses, the results of the testing, and the operationalization of the variables are presented in table 21.

The results of hypotheses testing were not fully in accordance with the expectations drawn on the literature review and rather supported the suggestions arising from the relative and absolute frequencies. As shown in table 21, perceived tenure security was surprisingly high among non-contractors. Fifty-seven percent of non-contractors felt secure compared to 29% of formal contractors and 14% of informal contractors, i.e. the prevalence of perceived tenure security is higher among non-contractors than among both, formal and informal contractors. These unforeseen results were confirmed during the thematic analysis of the interviews as well.

Table 21 Results of hypotheses testing for assumption "legal tenure security is positively associated with perceived tenure security " (H1a-c).

Hypothesis	Results	Notes
H1a: proportion of farmers with perceived tenure security is different among formal contractors (p1) and among informal contractors (p2)	p1 = 28.57% (n= 35)	Perceived tenure security is based on the answer to the statement, "I feel my land tenure is secure." Farmers who answered "agree" are considered secure. Farmers who stated or "I am not sure" or "disagree" are considered insecure. The formality of the farmer's land tenure represents legal tenure security.
	p2 = 14.29% (n = 84)	
p1≠p2	z = -1.83, p = 0.067	
H1b: proportion of farmers with perceived tenure security is different among formal contractors (p1) and among non-contractors (p2)	p1 = 28.57% (n= 35)	
	p2 = 57.14% (n = 28)	
p1 ≠ p2	z = 2.29, p = 0.022*	
H1c: proportion of farmers with perceived tenure security is different among informal contractors (p1) and among non-contractors (p2)	p1 = 14.29% (n = 84)	
	p2 = 57.14% (n = 28)	
p1 ≠ p2	z = 4.54, p = 0.000*	

Source: Author, based on questionnaire survey

As already discussed and demonstrated above in tables 18, and 19, this paradox on the side of non-contractors can be explained by number of factors, such as the level of trust between the farmer and the land owner, relations within surrounding community, number of years spent in the garden and its location, or by the combination of all of these aspects[57]. Moreover, non-contractors often establish and rely on their own tenure security mechanisms which goes beyond the legal/illegal tenure dichotomy and are more place specific. For instance, R_10 (2018) based her/his tenure security through high voltage electricity wires above the garden which restrict the land from erection of any construction and development. R_12 (2018) rather relied on community relations established through service provision in terms of underutilized open space maintenance which also resulted into an enhanced public security, which is especially important in Johannesburg and Sowetan context due to very high criminality levels[58]. Finally, R_13 (2018) also built on her/his position within the surrounding community but, at the same time, she/he also applied an ubuntu principle to his farming, i.e. that as long as people benefit from her/his farming, she/he has the full right to use the land.

> *You can see the electricity wires here. You cannot erect any construction with a roof there. There cannot be any development here.* […] *My security is the electricity wires, I do not see any reason why would anyone wanted to move my garden from here.* (R_10, 2018)

[57] Except the level of trust between the farmer and the land owner, the rest of the factors can be considered as de facto tenure security.

[58] South Africa generally face to high levels of criminality. Nevertheless, central Johannesburg and surrounding townships are one of the places the with highest criminality rates in the country (CrimestatsSA.com, 2020).

> *We are feeling right because nobody is going to tell us to leave because we cleaned the area from scratch to move those things and get things here*. […] *It was very, very dirty here, people were going to work through* [the area] *every morning, so we started to clean up.* […] *It was very dangerous this place because there were big bushes. So we take care of it.* (R_12, 2018)

> *There is a set of security that myself have in this community. I'm respected. Most of my life I spend it with my people – we were doing a community development. So I'm sure of my people.* […] *It is OK because of mandate of the City of Johannesburg – you can occupy the working space only if there is something that benefits the people. So that's where I find my right and strength.* (R_13, 2108)

The interviewees' statements illustrate the diversity of drivers behind perceived tenure security. While some of the non-contractors based their perceived tenure security on limitations given by zoning regulations (e.g. as non-constructible land, such as land localized in wetlands or land under power lines), the others rather established strong relations within the community which ensured them the recognition of their practice. Farmers are often perceived as valuable community members who provide their neighbours by number of public good benefits, such as public safety, maintenance and food provision, occurring from farmers' work and presence. On the other hand, as discussed in chapter 4.3.2.2, the relations within community might also hinder perceived tenure security due to disputes with the neighbours and other issues.

The community recognition can be also applied to farmers found at the institutional gardens as long as they often provide food to a given institution (for instance to school feeding scheme) and/or they supplement the role of property maintainer. Consequently, the public good benefits provided by farmers at institutions are mostly equal to those of farmers at open space gardens. Based on this logic, informal and formal contractors should be principally enjoying the same level of perceived tenure security as non-contractors. However, as suggested in the SWOT analyses presented in figures 5 and 6 (chapter 4.3.2.2), by the relative and absolute frequencies in tables 18, 19 and 20, and by the statements provided during the interviews, the mutually beneficial relationship can be threatened by wide range of factors, such as lack of trust between the farmer and the land owner, unclear regulations of informal agreements, rent hike in case of formal contractors and/or by hidden power-relations within the institution. Doubts that the land owner or people with better position within the institution might overtake the activities developed by the farmers were strong among both, formal and informal contractors. These were

also confirmed by R_15 (2018), who had to move her/his garden from school property on the open space adjacent to her/his house.

> *I used to have a garden in that school across the street. But I had to pay the rent in-kind and then there was not enough for selling. And then one of the teachers came and said that he wants my garden and the school principal agreed. So I took this land. I know that the government will probably need the land, so I will have to leave one day. But at least I know what to expect.* (R_15, 2018)

The statement of R_15 (2018) greatly illustrates the uncertainty which is faced by farmers at institutional gardens, which is also supported by the relative and absolute frequencies displayed in tables 18, 19 and 20. Moreover, it can also partially explain the paradox of relatively low perceived tenure security among formal and informal contractors. Importantly, these doubts were confirmed independently by KI_7 (2018) and KI_9 (2018) who both stated that, in case the school would have any other plans with the land, they would not have any problem to tell the farmer to leave. These findings hints, that schools (or institutions in general) often perceive urban agriculture as a temporal activity which is very beneficial once there is no other use of the property but, at the same time, it can be easily replaced when a more appealing utilization of the space emerges. It can be, for example, building of new constructions (e.g. new buildings) or extension of the services provided by the institution. Moreover, similar situation can occur when some other interests over the land appears, such as in case of R_15 (2018), and it is also influenced by the hidden power relations at the institution, where farmers often had only a little influence.

4.3.4 Investments to Urban Agriculture among Farmers of Soweto

Before starting with the analysis of the implications of land tenure security on investments, it is essential to explore and discuss its actual level among farmers of Soweto. Based on the descriptive statistics of the Investment Index presented in table 22, the overall investment level to urban agriculture in Soweto seems to be low. The mean (19.16) is higher than the median (11.82) which together with a coefficient of skewness (1.84) indicate that only minority of farmers undertake substantial investments into their farming in comparison to the level of investments of the majority of farmers.

Table 22 Descriptive statistics of Investment Index

Descriptive statistics of Investment Index (II)	
No. of observations	147
Minimum value	0
Maximum value	100
Mean	19.16
Median	11.82
Standard deviation	21.99
Skewness	1.84
Kurtosis	6.26

Source: Author, based on questionnaire survey

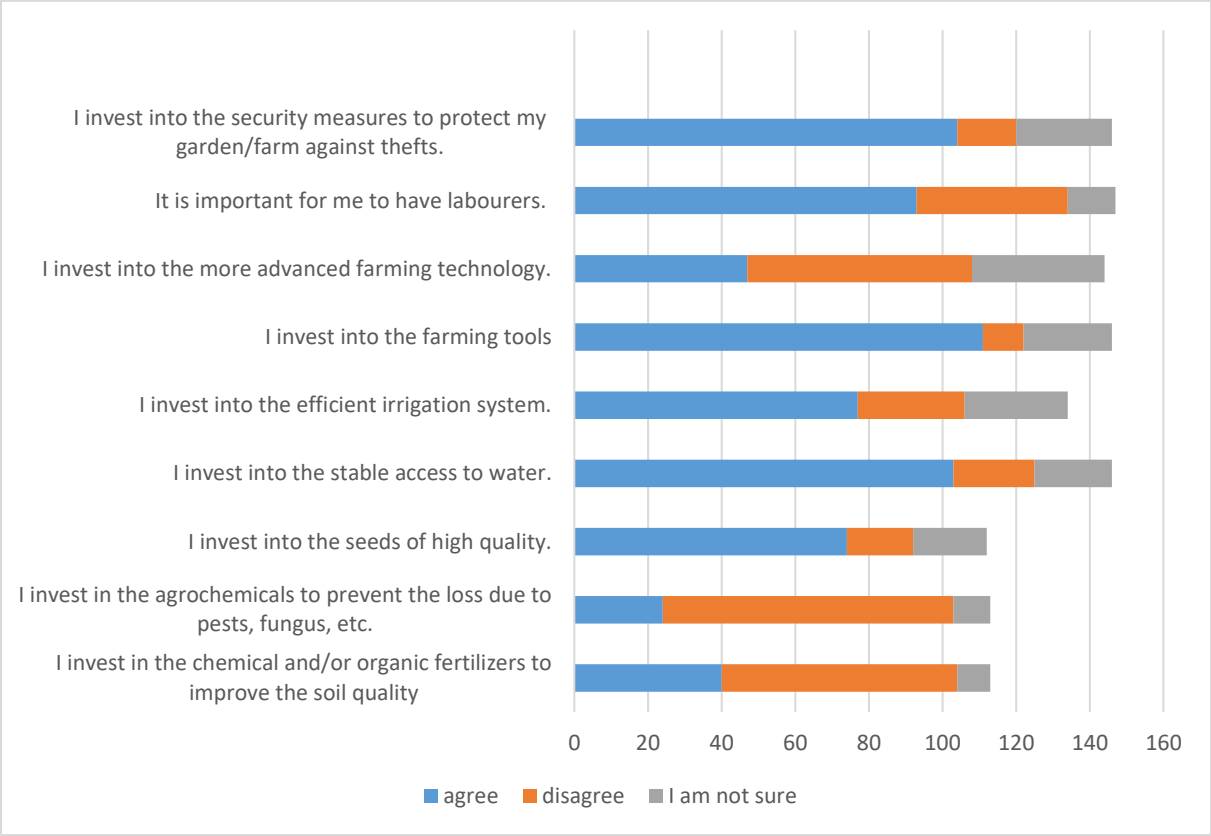
Despite the low investment level among Sowetan farmers, table 23 hints that farmers who are primarily market-oriented tend to invest more into agriculture than those who are subsistence oriented. An average Investment Index among farmers who were selling their crops was 22.20 while among those who grew only for home consumption was 14.55. Furthermore, as suggested in figure 8, some types of investments are important to the respondents but it generally depends on the necessity and financial intensity of such investment. For instance, 71% (n = 104) farmers agreed, that they invest to security measures in order to protect their garden. Sixty-three percent (n = 93) of respondents also stated, that it is important for them to have labourers. Furthermore, farmers mostly agreed, that they invest into elementary, and generally low capital intensive, inputs required for any farming practice, such as water (71%, n = 103), farming tools (76%, n = 111), or seeds of high quality (66%, n = 74). On the other hand, farmers were more hesitant when it came to the investments which would require higher financial commitment. Even though stable access to water is a matter of investment to three quarters of farmers, only half of them (57%, n = 77) stated that they invest into irrigation system. Similarly, farmers tend to invest into basic tools but only 33% (n = 47) of farmers said that they invest into advanced farming technology. Finally, less than half of the respondents stated that they invest in agrochemicals in order to prevent yield loss (21%, n = 24), and in chemical or organic fertilizers (35%, n = 40).

Table 23 Mean of Investment Index according to respondents growing their crops for sale

Growing for sale	Mean of Investment Index	No. of respondents
Yes	22.202	78
No	14.552	69
Total	*18.611*	*147*

Source: Author, based on questionnaire survey

Figure 8 Statements exploring farmers' position towards investments and their responses.



Source: Author, based on questionnaire survey

The relatively low level of investments among farmers in Soweto can be caused by a number of factors. Probably the mostly pronounced driver was a lack of financial assets which inhibits farmers to purchase inputs needed for further development of their farming. The issue of limited financial resources is also sustained by the access to and use of credit services. As shown in table 24, majority of farmers (82%, n = 118) did not have an access to credit services. Similarly, 89% (n = 129) of respondents stated that they do not use credit for agriculture. Both, limited access and use of credit services, can be partially explained by the nature of farmers' land tenure arrangement (as discussed in chapter 4.3.2.2) which hinders the possibility to reach financial

institutions. On the other and, it is questionable whether farmers would be willing to use credit for their farming if it would be available to them.

Table 24 Access and use of credit services by land tenure categories

Land tenure category	**I have access to credit services**			**I use credit for agriculture**		
	Agree	**Disagree**	**Total**	**Agree**	**Disagree**	**Total**
Non-contractors	0 (0%)	28 (100%)	*28 (100%)*	0 (0%)	28 (100%)	*28 (100%)*
Informal contractors	15 (19%)	66 (81%)	*81 (100%)*	6 (7%)	76 (93%)	*82 (100%)*
Formal contractors	11 (31%)	24 (69%)	*35 (100%)*	10 (29%)	25 (71%)	*35 (100%)*
Total	*26 (18%)*	*118 (82%)*	*144 (100%)*	*16 (11%)*	*129 (89%)*	*145 (100%)*

Source: Author, based on questionnaire survey

Due to lacking financial capital, farmers in the interviews often agreed that they mostly buy only the most essential inputs for their agriculture (which is also supported by the results presented in figure 8). However, in terms of investments of a larger scale, such as purchase of an irrigation system or a tunnel, there are two other factors which are considered by farmers and influence their attitudes towards investments significantly. Firstly, it is the permission from the side of land owner, as already suggested in chapter 4.3.2.2. Especially farmers at the institutional gardens agreed, that although tunnels and other possible constructions which can be erected are of non-permanent character (i.e. the construction can be easily removed), they would have to get a consent from the institutional representatives before starting with such investment. The willingness to allow farmers to build something at the institutional property as well as the process of getting the permission depends on the regulations within the respective institution. For instance, in case of R_3 (2018), she/he would have to write an application letter explaining the purpose of that investment. However, majority of farmers located at institutional gardens stated, that the institution would probably do not have any problem with some sort of construction being erected at its property. Interestingly, even non-contractors felt that they are obliged to get a permission for construction building because they are aware that it is an intervention which is, unlike farming itself, often a subject of some sort of regulation, as in case of R_10 (2018).

> *I would have to ask but they would not mind because we have a space*. […] *If you wanna have a building of irrigation system, you would have to have the water and may be a tank or something, but they wouldn't mind. You just have to get a*

permission from them. In fact, they want us to sort of write a letter where we state what do we want and how it is going to happen so they can consider it. (R_3, 2018)

I think that we would need to have a permit or something. Because this space, there are electricity wires so they do not want to somebody to build something what would have a roof. Because of the lines of electricity. […] *Because you see under the wires anything can happen. That wires if they fall on the house, it is going to burn everything.* (R_10, 2018)

Although this *permission for acting* can substantially influence farmers' decision towards the investments, probably the most significant factor considered by farmers is the possibility to receive an external support (in form of some sort of grant or material assistance) from the municipal government. This possibility was mentioned almost by all informal and formal contractors as long as they can reach the assistance from the DSD and (in case of formal contractors) also other municipal departments. At some instances, farmers even mentioned that the lack of support (in terms of inputs provision) is the main obstacle of their farming[59].

When we started here we had our own tools but along the way we were able to approach the department of agriculture. There is a person called extension officer – you phone and they will send you this person. That person will come and do the overview and ask you what you want and they also check the soil. […] *So we do have the tools that we got from the department. They call it as start up pack – it includes a rake, a spade, a fork, a hoe and they will give you small packet of seeds and ten kg of compost. And they will give you and monitor you for a year and after a year they will give you again the compost and the seeds and they review.* […] *But if I am to build a tunnel, firstly it needs funding. Because you cannot just do it on your own.* (R_4, 2018)

So the problem is that we don't have a support. We tried may times to get people to fund us […] *It's hard for us. And you say - why don't to go to government and tell them to come and fund us. At least if they can come here*. (R_9, 2018)

The external support can provide farmers with substantial means important for initial boost of their farming and for sustaining their agriculture practice later on. However, it can also create

[59] It must be noted that the conditions for receiving support from the municipality were not further explored as this process was out of the scope of this research.

great dependency on the assistance which can result into production problems, such as in case of R_5 (2018) and R_6 (2018), who were hesitating even about seed purchase and who were rather waiting for a donation from some of the municipal or governmental agency. Conversely, non-contractors seemed to be more self-dependent as they mostly mentioned that all the farming was developed by themselves. When they were asked about the possibility of investments, they mostly agreed that if they would have enough money and would consider such investment as a way for enhancing their productivity, they would not have any problem to buy something on their own.

> *We buy even tools.* […]. *Even that thing, that industrial machine, we bought it from the auction, that's where we bought the machine that we can cut the grass here. From the City Parks.* […] *It is us who make the space to look like this.* (R_13, 2018)

> *I bought the irrigation system, because I was thinking "How can I make any income, because I'm no longer working. So how can I make any income?" So I bought this one of those things that helped me to increase the productivity, make bigger income and develop this* [showing her/his garden]. (R_11, 2018)

4.3.5 Land Tenure Security and Investments to Urban Agriculture

The last aim of this dissertation is to explore the association of land tenure security with the investments to urban agriculture among farmers in Soweto, as described in the research framework and shown in figure 2 (chapter 4.2.2). Therefore, this chapter aims to clarify these relations and to discuss the findings of chapters 4.3.3 and 4.3.4 in terms of the four assumptions formulated for the statistical analysis: (1) *legal tenure security is positively associated with investments*; (2) *perceived tenure security is positively associated with investments*; (3) d*e facto tenure security is positively associated with investments*; and (4) *legal tenure security and perceived tenure security are interrelated and both are important determinants of investments.* Based on these assumptions, hypotheses for testing were set. Table 25 presents the formulated hypotheses for first three assumption, results of hypotheses testing, and operationalization of variables. The results for last assumption are shown in table 26.

Table 25 Results of hypotheses testing for assumptions "legal tenure security is positively associated with investments" (H2a-c); "perceived tenure security is positively associated with investments" (H3); and "de facto tenure security is positively associated with investments" (H5).

Hypothesis	Results	Notes
H2a: Ø II of formal contractors (FC) is different from Ø II of informal contractors (IC)	Ø II of FC = 35.13 (n = 35)	Legal tenure security is represented by the forms of land tenure. While formal contractors are considered as legally secure and informal contractors have semi-legal security, non-contractors do not dispose with any form of legal security.
	Ø II of IC = 15.07 (n = 84)	
Ø II of FC ≠ Ø II of IC	t = -4.09, p = 0.000*	
H2b: Ø II of formal contractors (FC) is different from Ø II of non-contractors (NC)	Ø II of FC = 35.13 (n = 35)	
	Ø II of NC = 8.59 (n = 28)	
Ø II of FC ≠ Ø II of NC	t = -5.5470, p = 0.000*	
H2c: Ø II of informal contractors (IC) is different from Ø II of non-contractors (NC)	Ø II of IC = 15.07 (n = 84)	
	Ø II of NC = 8.59 (n = 28)	
Ø II of IC ≠ Ø II of NC	t = -2.64%, p = 0.010 *	
H3: Ø II of farmers with perceived tenure security (PTS) is different from Ø II of farmers without perceived tenure security (NPTS)	Ø II of PTS = 23.43 (n = 65)	Perceived tenure security is based on the answer to the statement, "I feel my land tenure is secure." Farmers who answered "agree" or "I am not sure" are considered as secure. Farmers who stated "disagree" are considered as insecure.
	Ø II of NPTS = 14.79 (n = 82)	
Ø II of PTS ≠ Ø II of NPTS	t = 2.3872, p = 0.019 *	
H4: II of farmers with de facto (physical) tenure security (DTS) is different from II of farmers with no de facto (physical) tenure security (NDTS)	Ø II of DTS = 23.39 (n = 96)	Physical tenure security is represented by the variable fence, which represents protection against thefts as well as a tenure building strategy.
	Ø II of NDTS = 9.62 (n = 51)	
Ø II of farmers with PTS ≠ Ø II of farmers with NPTS	t = -4.83, p = 0.000*	

Source: Author, based on questionnaire survey

Table 25 shows, that the results of hypotheses testing were fully supporting the formulated assumptions, i.e. that each land tenure security dimension is positively associated with investments. Furthermore, third assumption, that *de facto tenure security is positively associated with investments*, was (additionally to Welsh's t-test) verified by correlation between the number of years spent in the garden and the level of investments. The value of Spearman's rank coefficient ($\rho = 0.223$, $p = 0.006$) suggests clear relation between the level of investment and the number of years spent in the garden. Fifth assumption, that *legal tenure security and perceived tenure security are interrelated and both are important determinants of investments* was verified by Cramér's V and by descriptive statistics of Investment Index. As long as de facto tenure security was considered as the determining component of perceived tenure security, only relation for legal and perceived tenure security were verified. The value of Cramér's V (Cramér's V = 0.31, p = 0.001) for variables perceived tenure security and land tenure security

showed a strong association between these two components of overall tenure security. Consequently, the descriptive statistics for various groups of respondents based on their legal and perceived tenure security and for the Investment Index were compared and summarized in table 26.

Table 26 Investment index (II) and distribution of farmers according to land tenure category and perceived tenure security.

Investment index (II) and distribution of farmers according to land tenure category and perceived tenure security				
	farmers with perceived tenure security		**farmers with no perceived tenure security**	
land tenure	**Mean of II**	**no. of respondents**	**Mean of II**	**no. of respondents**
non-contractors	9.83	16	6.94	12
informal contractors	14.30	12	15.20	72
formal contractors	46.25	25	30.69	10

Source: Author, based on questionnaire survey

As suggested in table 26, farmers with both, legal and perceived tenure security invest into their farming. Nevertheless, the results show that farmers who dispose with perceived tenure security tend to invest more than those who do not have any perceived tenure security, even when legal tenure security was controlled. However, once the *level* of land tenure is considered (where being formal contractor represent the highest level of land tenure arrangement while being a non-contractor is understood as the lowest level), the average investments are higher among farmers with more advanced levels of land tenure arrangement regardless the level of perceived tenure security. Accordingly, the presented results suggest conclusion that both dimensions of tenure security are substantial, yet legal tenure security seem to be more important driver of investment.

Even though the results presented in table 25 are statistically significant for this respective sub-group of farmers, one must be careful once interpreting them especially when considering some of the information discussed in chapter 4.3.4. Firstly, the level of investment is generally low and number of farmers depends on external support. Therefore, the fact that farmers possess some of the tools and equipment included in Investment Index does not have to necessarily imply that farmers bought them by themselves. Based on the qualitative analysis, it is more likely that formal and informal contractors received part of their tools and equipment from grants of Department of Social Development and Department of Agriculture of the City of Johannesburg. As long as non-contractors cannot receive such support, it can partially explain the reason behind lower levels of investments than among formal and informal contractors.

Secondly, despite the fact that perceived tenure security is widespread among non-contractors (as suggested by the presented analysis), it can differ in its relative intensity in comparison to informal and formal contractors[60]. Furthermore, if non-contractors are aware that some kind of investments would require an agreement from the officials otherwise it would attract unwelcomed attention, they might feel discouraged to spend their capital in such interventions. Instead, non-contractors can possibly invest in other inputs which were not included in the Investment Index. Hence the results should be dealt with care and must be understood only as one of the possible explanations for the investment behaviour among urban farmers.

[60] The measurement of perceived tenure security intensity was out of the scope of this research.

5 Discussion

The aim of the dissertation thesis is to contribute to the ongoing debate on urban agriculture by the provision of empirical evidence on land tenure and investments. Although the results presented in chapter 4.3 brings a thorough exploration of land tenure, land tenure security, investments and their interactions, it is essential to put the findings into the theoretical framework drawn in chapter 3. Therefore, this chapter focuses on the discussion of the results of the case study with regard to existing literature. Simultaneously, the need for a paradigm shift in urban agriculture literature from land tenure formalization discourse proclaimed by Feder et al. (1988) and de Soto (2000) to more socially oriented approaches proposed by Hornby et al. (2017) and Ribot & Peluso (2003) is emphasized. Additionally, this chapter offers policy considerations for farmer-tailored policy action which is respectful to the ongoing processes on the ground.

Although numerous authors (e.g., Bryld, 2003; FAO, 2012; Lynch et al., 2001; Van Veenhuizen & Danso, 2007) stated that urban farmers mostly utilize land under a wide range of tenure systems outside of the legal land rights framework, little is known about the actual process of acquiring the land. The findings of the case study show that Sowetan farmers acquired land for agriculture through a wide range of processes. Farmers cultivating land without any permission, who were in all cases based at open-space land managed by the municipality, obtained their land mostly by opportunity (i.e., they took advantage of the vacant land close to their homes and turned it into the gardens). Despite the fact that this approach might seem a bit aggressive, municipalities often do not dispose of their financial and personal capacity to maintain all properties, as suggested by McLees (2011). In these terms, urban farmers enhance underutilized land, which would otherwise have remained neglected and potentially cause public security flaws – these are especially relevant in the Sowetan context. Consequently, the immediate community benefits from cleaner and safer surroundings and the opportunity to buy fresh vegetables directly from the farmers. At the same time, the representatives of the municipality and ward councillors can easily, yet often unconsciously, transfer the responsibility over particular issues in their wards to others without significant effort. Therefore, in line with Ribot & Peluso's (2003) theory of access, such land tenure arrangement basically provides mutually beneficial links among different actors with little or no need for legally or extra-legally framed relations, or even without the awareness on the side of the land owner.

Unlike farmers cultivating land with no permission, those who have formal or informal arrangement over their gardens were mostly located at institutions, such as school, clinics, and community centres. The institutions across Soweto are often built on large land areas which require relatively high maintenance costs that are over the personal and/or financial capacity of the given subject. Therefore, farmers with formal and informal tenure arrangements established their land access through service provision, including property maintenance and/or contribution to the local feeding scheme, which has enabled the development of a beneficial relationship between the farmer and land owner (institution respectively). However, the process of attaining the access to land was carried out through a spectrum of various means as long as farmers had to negotiate permission for gardening at the respective institution. While some of the farmers knew institutional representative(s) or someone working at the given institution, others were either invited to the institutional garden by someone already farming there, or they actively searched for land. In case of no previous relations within the institution, farmers had to *prove themselves* to the institution and justify their case. At all instances, the process of land access and agreement negotiation (no matter on its formality level) was always driven by strong social relations within the community, by farmers' social status proving their trustworthiness, and/or by farmers' social skills. Therefore, the results support the theory of Hornby et al. (2017) who emphasize the essentiality of social dynamics and hierarchies in (customary) land tenure systems. Such relations often seemed to be more important during the process of land access and agreement establishment than their factual legality.

The knowledge of the processes behind land access for urban farmers is substantial for a deeper understanding of their land tenure security. Moreover, it is essential for further discussion over the land tenure formalization process for urban agriculture, which mostly builds on numerous case studies from rural agriculture (such as Feder et al., 1988), even though there is only limited transferability of their findings to the urban environment. In the spirit of de Soto's (2000) key idea that insufficient land rights and lack of legal tenure security are the main inhibitors for further development of marginalized communities, the mainstream urban agriculture researchers (e.g., Bryld, 2003; FAO, 2012; Mubvami & Mushamba, 2006; Ruel et al., 1999; Van Veenhuizen & Danso, 2007) often emphasize the need of land tenure formalization for the sake of legal land tenure security. Consequently, the issue of land tenure and land tenure security is viewed as a very narrow concept which is bounded almost exclusively by the recognition of farmers' legal rights over the land they cultivate. However, the results of this case study demonstrate that land tenure security is rather a multidimensional concept as

described by Van Gelder (2010), and that it necessarily does not have to emerge from the legally established land rights.

The research findings highlight the importance of perceived tenure security. Considering the fact that it was more prevalent among farmers with no permission over the land under cultivation than among farmers with informal and formal agreements, it can be concluded that perceived tenure security does not always arise from legal tenure security, as it was originally assumed prior to data analysis. While farmers with no permission often established and strengthened their perception of tenure security by alternative means originating from de facto tenure security, such as relations within the community and/or zoning regulations, farmers with formal or informal agreement felt relatively insecure mainly due to mistrust towards land owners and possible power relations influencing the viability of a given agreement. Hence, the findings of the presented case study clearly demonstrate that the conceptual understanding of land tenure security for urban agriculture is often low and goes along the economic oriented and legal based schools, as defined by Simbizi et al. (2014). Simultaneously, the recent literature on urban agriculture widely omits the importance of the context-related aspects, social relations, and hierarchies in land tenure security, as suggested by Hornby et al. (2017), as well as the essence of mutually beneficial relationships established among urban farmers, surrounding communities, and land owners as emphasized by McLees (2011) and Ribot & Peluso (2003).

One of the reasons behind the call for the formalization of land tenure security for urban farmers is the hypothesis of Feder et al. (1988) who claimed that farmers with secure land tenure tend to invest more into their agriculture thus increasing their productivity. Nevertheless, there is one major flaw in this argumentation emerging out of the lack of empirical evidence, as argued by Zezza & Tascioti (2010) and Webb (2011). As suggested in the literature review, the exact studies examining productivity of urban agriculture or exploring the investments to urban agriculture in developing countries are generally missing in both, academic and grey literature, and the same principle applies to land tenure security as discussed above. Furthermore, case studies (in English) researching the relation between land tenure and investments/productivity to urban agriculture are scarce. Consequently, academics and policy makers mostly build on the studies which are based on evidence from rural areas and/or on expert judgement. Therefore, one of the aims of this dissertation is to investigate the relation between the three dimensions of land tenure security and their impact on investments to urban agriculture.

The results of the dissertation show that there is a positive association between all three dimensions of land tenure security and investments. However, the factual level of investment among Sowetan farmers is very low, and the majority of farmers who cultivate their garden under some sort of agreement (formal or informal) depends on the external support from the municipal bodies and other parties. Moreover, although Cabannes (2006) and Lynch et al. (2001) suggest that farmers do not have access to financial services due to informality of their land tenure, the findings suggest that even those who had access to credit did not intend to use it for urban agriculture. It is especially the high dependency on external support and reluctancy to use credit for farming among farmers with formal and informal agreements which questions the validity of some of the arguments for land tenure formalization. In fact, it seems that farmers cultivating land under no agreement are more proactive in their farming and vice versa – those who were mostly relying on donations showed less enthusiasm for improving their agriculture practice. Undoubtedly, land tenure formalization in order to enhance the provision of and the ability to receive external support based on land tenure status can boost farmers' enterprise. On the other hand, it may hinder their willingness to actively and independently develop their farming. Nevertheless, it must be noted that the research included both subsistence and market-oriented farmers. As long as the results suggested that the attitudes towards investments are different between these two groups, as the average level of Investment Index was higher among market-oriented farmers, the findings on investments could diverge if the research would have been focused solely on them.[61]

Furthermore, despite the proclaimed land tenure efforts emphasized in numerous policies on urban agriculture and/or food security (e.g., City of Cape Town, 2006; Cofie et al., 2005; IMWI & RUAF, n.d.; MDP-ESA & RUAF, 2007; MDP-ESA & RUAF, n.d.; RUAF & IMWI, n.d.) as well as in Johannesburg's policy *A City where None Goes Hungry* (2012), the effectivity of the proposed solutions can be insufficient. The dynamics of land access processes described above suggest that the City of Johannesburg's food security policy had only limited impact on farmers participating in the research as long as only a few (if any) of them benefited from the land allocation and leasing procedures described in the document. Bearing in mind the high level of bureaucratical burden related to the leasing of municipal land through JPC without the

[61] Subsistence-oriented farmers often choose urban agriculture as a complementary element to their livelihood strategy; thus they do not necessarily have to feel the urge to improve their farming practice through investments. On the contrary, urban agriculture for market-oriented farmers more likely represents an income-generation strategy, therefore it is in their best interest to keep their farming practice competitive and to invest into their agriculture.

assistance of Department of Social Development as elaborated in chapter 4.3.2.1, the high prevalence of informal and extra-legal land tenure arrangements signifies the inflexibility of the statutory tenure systems as described by Veléz-Guerra (2004) and the possible marginalization of farmers outside the zones dedicated to urban agriculture as discussed by Halloran & Magid (2013).

5.1 Policy considerations

There has been much said about the productivity and investments of urban agriculture, though at a general level. Despite the importance of these two phenomena, the key message of this dissertation does not lie in the examination of investments of Sowetan farmers. Instead, the major contribution of the dissertation translates into the discussion over land tenure formalization and land tenure security of urban agriculture. As previously mentioned, land tenure formalization is often seen as a crux for further development of urban agriculture. Nevertheless, considering the discussion of the results and the literature presented above, an important question arises: Is it important for farmers to have their land tenure formalized? Even though the dissertation cannot fully answer this question, the author believes that insisting on land tenure formalization does not have to necessarily bring all the benefits to the farmers as long as it can distract the relations and links enrooted in the communities by introduction of the external actors, who are often represented by institutional authorities. The dissertation indicates that farmers who are outside of the system of informal and formal agreements (i.e., those who cultivate their land without any permission) are generally more confident in their land tenure security and farming than the others. Surprisingly, the confidence often emerges exactly from the fact that the farmers are out of the system and that they are independent, thus they are prone to any harms which can be caused by the authorities. Of course, the illegal status of their farming can be endangering in its nature, but the level of trust in the relations within the community is often far stronger than the level of trust in formal or informal agreement over the land, especially in the context of the apartheid-era heritage. Indeed, this is a very simplified narrative of an extremely complex phenomenon, nevertheless it demonstrates the need for a more holistic approach to the land tenure issue which would recognize the social relations and reflect the situation on the ground.

Surely land rights formalization is an important process, and from the governance perspective, it is not sustainable nor efficient to preserve the dual system of legal and extra-legal land tenure. However, as suggested by Bromley (2007), Hornby et al. (2017), and Ribot & Peluso (2003),

it is important to consider the slow withdrawal of the legally oriented land tenure paradigm and to rather work on its shift towards more socially and place-based approaches, which are even more appealing in Johannesburg and the sub-Saharan African context in general. Consequently, academia together with policy makers should focus on rethinking the existing mechanisms of land tenure formalization towards less bureaucratic and more farmer-friendly ones than currently are rooted in, for instance, Johannesburg's food security policy *A City where None Go Hungry*. The processes of land acquisition and the dynamics behind perceived tenure security suggest that the perception of urban farmers as food providers is too narrow as long as farmers provide other additional services. Nevertheless, these are considered only marginally since the farmers' position as valuable community members, who eventually take over services provided traditionally by the municipality, is omitted. Therefore, the author proposes a more thorough consideration of mutually beneficial relations between the farmers and landowners (as in detailed by McLees, 2012) as a base for land rights formalizations. In such a scenario, municipalities together with institutions located on large land areas can consider allowing farmers on their properties under simplified leasing procedure – while the land owner provides the land, the farmers can stand for property maintenance and other service provisions. Moreover, it is also important to develop a set of guarantees (such as a possibility of lease agreement negotiation) for the farmers in order to enhance their trust in authorities as well as increase the level of their perceived tenure security.

Undoubtedly, the entire land rights formalization process cannot be attained under this simplified leasing procedure, as it is of more a complementary character. Nevertheless, this proposition is crucial for the recognition of perceived tenure security as equal to legal tenure security, and as a key driver of overall tenure security in general. Nevertheless, if the principle of mutually beneficial relationship is embedded in the leasing procedures, the level of perceived tenure security can be significantly enhanced as long as it enables the establishment of a more sound relationship between farmers and land owners with clearly identified needs on both sides. Despite the fact that this proposition might seem abstract, it must be emphasized that it is not a new practice – it builds on existing, widely practiced processes established outside of the legal system that are more respectful to the needs of the farmers. Hence, instead of developing new, and often highly bureaucratic, procedures of land rights formalization which can result into farmers' marginalization, it is more efficient to empower farmers through processes they are already familiar with but, at this time, are anchored in the legal system.

Conclusion

The dissertation thesis aims to explore the relation between land tenure and productivity of urban agriculture based on the provision of empirical evidence from Soweto, South Africa. It addresses the call by Zezza & Tasciotti (2010) who emphasize the need for reliable data in urban agriculture research and Webb (2011) who stresses the importance of analytical studies for urban agriculture policy making. However, the existing body of literature examining land tenure and productivity of urban agriculture has been rather lacking or provide insufficient evidence. Therefore, this dissertation fills the identified research gap by thorough exploration of both land tenure and productivity proxied by investments and their interactions. Furthermore, although Zezza & Tasciotti (2010) advocate for mostly quantitative studies, the methodological approach of this research shows the importance of employing mixed-method research design which combines both qualitative and quantitative analyses. As the results show, the outcomes of the quantitative analysis often provide only limited evidence which requires further explanation of the underlying phenomena by qualitative data.

The dissertation consists of two parts which reflect on the identified research aims: the literature review and case study of Sowetan farmers. The results of the literature review in this thesis introduce the concept of urban agriculture and examine the literature on productivity of and investments in urban farming. The reviewed literature suggests that there are significant limits in the literature as only few studies have elaborated on the productivity and investments in urban agriculture in depth. Secondly, the literature review focuses on land tenure and land tenure security for urban agriculture. As the existent studies on urban agriculture lack a proper theoretical framework for the examination of land tenure and land tenure security, the findings of the parts of the literature review focus on these phenomena and are especially valuable in the terms of the modification of land tenure theories in a manner that fits into urban farming. Furthermore, the discussion of land tenure and land tenure security for urban farmers from the policy perspective identifies flaws in current policy practice.

The core of the dissertation presents the case study focused on land tenure security and its implications for investments to urban agriculture in Soweto, South Africa. The case study utilized the knowledge gained through literature review in terms of empirical research based on quantitative and qualitative data inquired among farmers of Soweto, South Africa. The thorough explanation and discussion of the methodology set a potential research framework for future research intending to deal with the related complex phenomena. Furthermore, the methodology

description also underpins the importance of mixed-method research and the complementarity of quantitative and qualitative data analysis in urban agriculture and land tenure research.

The main research interest is centered around land tenure and land tenure security for urban farmers, with a special emphasis on perceived tenure security. Although land ownership is considered at the top of the land tenure security hierarchy, farmers who owned the land were farming their backyards, therefore their agricultural practice was of different characteristics than of other groups. Consequently, the research was focused on farmers who cultivated the land under some sort of formal (i.e., lease) or informal agreement, or who cultivated their land without any permission. The case study firstly brought an overview of the processes of land access and land tenure arrangements among Sowetan farmers. Furthermore, the SWOT analyses for each land tenure arrangement is presented in order to create solid base for further data analysis and interpretation, and in order to provide readers with a rich description of the research context.

Secondly, the case study focused on the land tenure security for urban farmers in Soweto. The results of the quantitative and qualitative analyses show that the relationship between legal and perceived tenure security diverges from the traditional conception presented by numerous authors on urban agriculture. The fact that perceived tenure security does not necessarily have to result from legal tenure security represents a key message of this research, thus significantly enriches the existing literature on urban agriculture. Surprisingly, farmers who cultivated their land without any permission often felt more secure on their land than those who disposed with some sort of formal or informal agreement. These farmers, referred as non-contractors, established their land tenure security by various alternative means (e.g., farming of non-constructible land, strong relations within the community, etc.) which are beyond the scope of conventional understanding of literature on urban agriculture.

Thirdly, the case study also contributed to the discussion over the productivity of urban agriculture. Even though the original focus of this dissertation is centered around the productivity of urban agriculture in Soweto, the farmers were not able to provide sufficient data on their yields. Therefore, the productivity was proxied by investments into farming examined by the Investment Index developed by the author. The dimensionless Investment Index captured the level of investments among the Sowetan farmers based on a series of questions examining their ownership of productive assets. The constructed Investment Index was valuable not only for the analysis of farmers' investment behaviour, but it also represents a vital tool which can

be used by other research with the aim to analyse investments amongst small-scale and urban farmers.

Finally, the case study focused on the relationship between land tenure security and investments to urban agriculture. The analysis revealed that the level of investments among Sowetan farmers was generally very low, and most of the farmers with formal or informal agreement depended on the external support. Although the presented findings hint that all dimensions of tenure security are substantial for investments, it seems that legal tenure security was the most important. Nevertheless, the fact that the mean of the Investment Index among farmers with no permission for the land cultivation was lower than among farmers with formal or informal agreement necessarily does not have to imply that the first group of farmers invest less into their farming. As long as farmers with formal or informal agreement can reach external support, it is expectable that the tools and equipment they possess are obtained through donation rather than through direct purchase.

The results and the discussion presented in previous chapter represent a significant contribution to current literature on urban agriculture. Consequently, the findings should encourage policy makers and other researchers to shift their understanding of the relationship between land tenure and productivity from the interpretation based on the dichotomic view of legal-illegal land tenure towards a more holistic approach which considers the nuanced structures of various land tenure arrangements.

The Sowetan context is very specific due to the historical development of the location, thus the land rights structure in other countries/cities does not have to correspond with the one presented in the case study. Consequently, the transferability of the results can be limited. However, the aim of this dissertation is not to present universally applicable results to all situations. Therefore, the thesis should not be considered as an endpoint of research on land tenure implications for urban agriculture, but it should be rather perceived as a cornerstone for further exploration of the phenomena in developing countries. The author believes that the presented methodological framework as well as the results and their discussion will encourage further elaboration of other researchers. These might lead towards various directions. Firstly, it is substantial to unfold the conflicting nature of legal and customary land tenure for urban agriculture and to explore the competing interests of numerous actors, ranging from traditional leaders to urban authorities at all municipal levels. The identification and classification of various land tenure systems' conflicting areas will allow for improved policy formulation which

would be able to further elaborate on the considerations presented in this dissertation. Secondly, the relationship between the productivity and (perceived) land tenure security remained under-researched and the future investigation should consider two particular issues. While the exploration of urban agriculture productivity needs a more holistic approach which requires detailed and systematic data on its different aspects, the research on perceived land tenure security calls for a clearer and more nuanced measurement of its intensity. Finally, a crucial factor influencing bot productivity and (perceived) land tenure security, is represented by the social relations of urban farmers and their perception and recognition of legal authorities. Despite the fact that the mentioned drivers are substantial for any policy formulation, these remain insufficiently examined. Although the presented scopes of further research are indeed very complicated and require extensive cooperation among researchers from different disciplines, it is important to note that only more complex knowledge can significantly contribute to comprehensive policy formulation which will allow for further development of urban agriculture.

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Annex 1: Questionnaire Survey Form

Land Tenure and its Implications for Productivity of Urban Agriculture in Soweto

The research aims to explore and analyse urban farming in your area, especially how land tenure influences the productivity of urban agriculture. **The questionnaire has 6 parts**. In the first section, basic information about you will be collected. The second section aims to get an overview of the availability of the land in Soweto. In the third section, you will find a set of questions about land tenure at your farm or garden. In the following part of the survey you will be asked about your own production. The fifth section concerns agricultural losses. Finally, the sixth section aims to get an overview of the inputs you use for agricultural production. The results of the research will be used for the writing of a PhD thesis. However, the researcher aims to disseminate the findings amongst the farmers of Soweto and we would be more than happy if the findings will be used for the formulation of policy which will help in gaining easy and secure access to land.

Please, fill in each relevant column of the questionnaire. For questions with pre-defined response options please encircle the one which fits best. Please follow the instructions accompanied by questions (marked in grey colour). Feel free not to answer questions which are not comfortable for you. However, even if you are not sure what to answer, we would appreciate if you write what do you think. Remember that there are no good and bad or right and wrong answers. The questionnaire will take approximately 40 minutes to complete.

By filling in the questionnaire survey you agree to participating in this research project. Be aware that all the data you provide are confidential and will be used only for the research purpose. No other person apart from the researcher and her superiors will not have access to the information gathered for the questionnaire.

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Survey No.: Date of the survey collection:

Field worker:
Tel:
Email:
Location of the researched farm (street address if possible; GPS location):

Name of the respondent:
Tel:
Email:
*Please let us your contact details. Be sure your answers in the questionnaire **will not be matched with your name**. Your **name and contact information will not appear in any research outcome** (e.g. dissertation, papers, etc.). We need your contact details for case we would need to clarify some of the answers the questionnaire.*

1.	**How many gardens/farms do you have?**	
2.	**Where are your plots located? (e.g. Soweto, Orange Farm, Ivory Park, etc.)**	
3.	**Which of your plots do you consider as a main garden/farm?**	

*If you have more than one (1) garden/farm, for the purpose of this research choose that **garden/farm, were the questionnaire is collected.** Please note that all your answers in the questionnaire shall relate to this specific garden/farm.*

I. BASIC INFORMATION						
1.	**Age:**					
2.	**Gender:**	female	male			
3.	**What is your marital status?**	married	divorced	widowed	single	living together
		other :				
4.	**How many people live in your household?**					
5.	**What is the highest level of education you have completed?**	primary	secondary	tertiary	none	
6.	**Were you born in Soweto?** *If **YES**, go to the **question 10**.*	yes	no			
7.	**Which province were you living in before you come to Soweto?** *(In case you moved to Soweto from any other country, please write the country of origin)*					
8.	**How would you characterize the place from which you came?**	rural area	town	city		
9.	**How long have you been living in Soweto?** (years)					
10.	**How many days of the seven day week do you devote to agriculture?** (days)					
11.	**How many members of your household help you with farming?**					
12.	**Do you have any other occupation than farming?** *If **NO**, go to **question 15**.*	yes	no			
13.	**How would you characterize your other occupation?**	employed – full time	employed – part time	self-employed (formal)	self-employed (informal)	
		other:				
14.	**What is your occupation (e.g. gardener, traditional healer, etc.)?**					
15.	**What is the average monthly income of your household (ZAR)?**	0 - 499	500 - 999	1000 - 1499	1500 - 1999	2000 - 2499
		2500 - 2999	3000 - 3499	more than 3500, specify:		
16.	**For how many years have you been farming?**	just started	up to 1 year	up to 2 years	up to 3 years	up to 4 years
		up to 5 years	more than 5 years, specify:			
17.	**Are you a member of a cooperative/farming group?**	yes	no			

II. AVAILABILITY AND ACCESS TO THE LAND						
1.	**Please tick all relevant reasons why you decided to establish your garden/farm here.** *It is possible to select* ***more than 1 option.***	low rent	close to my home	only one I could find	I could get a lease	I could buy it
		I could make an arrangements with officials		I know the land owner	good soil quality	good access to water
		other:				
2.	**How long have you been farming at your garden/farm?**	just started	up to 6 months	up to 1 year	up to 2 years	up to 3 years
		up to 4 years	up to 5 years	more than 5 years, specify:		

Please choose which measurement is better for you. You can even draw your plots and write the approximate sizes there.

3.	**Can you estimate the approximate size of your garden/farm? One soccer field is 0,5 ha.**	less than 1/4 of soccer field	1/4 of soccer field	1/2 of soccer field	3/4 of soccer field	1 soccer field
		1 and 1/4 of soccer field	1 and 1/2 of soccer field	1 and 3/4 of soccer field	2 soccer fields	other:
	Can you estimate the approximate size of your garden/farm? E.g. 10 metres X 20 metres.					

4.	**What share of your garden/farm do you use for agriculture?**	100%	90%	80%	70%	60%
		50%	40%	30%	20%	10%
5.	**Please tick all relevant reasons why do you not use all your land for agriculture.** *It is possible to select **more than 1 option.***	lack of money	lack of labour	lack of equipment	lack of time	lack of security (fence)
		lack of water	poor soil quality	lack of inputs	difficulties with pests	lack of seeds
		I use all my land	other:			
6.	**Has the size of your garden/farm changed during the time since you started farming here?**	YES, smaller when I started	NO, no change	YES, larger when I started	other:	
7.	**Are you able to expand your garden/farm?** *If **YES,** go to **question 9.***	yes	no			
8.	**Please tick all relevant reasons why you cannot expand your garden/farm.** *It is possible to select **more than 1 option.***	lack of money	lack of labour	lack of equipment	lack of time	lack of fencing
		lack of water	poor soil quality	lack of inputs	difficulties with pests	lack of seeds
		lack of land (space)	other:			
9.	**Is your farm fenced?**	yes	no	partially		

*In the following **questions (10. - 18.)** aim to explore your opinions about land availability in Soweto. Please indicate your answer by ticking that option, which describes your opinion in the best way.*

10.	**I am satisfied with the total area of my current garden/farm.**	agree	disagree	I am not sure
11.	**I plan to expand my garden/farm within 1 year.**	agree	disagree	I am not sure
12.	**There is enough land for agriculture in Soweto.**	agree	disagree	I am not sure
13.	**I have easy access to land for urban agriculture in Soweto.**	agree	disagree	I am not sure
14.	**Everyone has easy access to the land for urban agriculture in Soweto.**	agree	disagree	I am not sure
15.	**Institutions in Soweto such as schools, churches, clinics or NGOs offers land for agriculture.**	agree	disagree	I am not sure
16.	**Government offers land for agriculture in Soweto.**	agree	disagree	I am not sure
17.	**Private business (companies) offers land for agriculture in Soweto.**	agree	disagree	I am not sure
18.	**Individuals offers land for agriculture in Soweto.**	agree	disagree	disagree

III. LAND TENURE						
1.	**How would you characterize your farm?**	backyard garden	clinic garden	school garden	church garden	community centre garden
		along roadside	along power line	dumpsite	wetlands	industrial area
		park	other:			
2.	**Who is the owner of the land?**	school	church	orphanage	health clinic	community centre
		city council/ government (open space)	an individual	a company	my family	my friends
	*If you **own the land**, go to **question 18.***	I do not know the owner	**I own the land**	other:		
3.	**What kind of agreement do you have with land owner?**	permission to occupy	contract/lease (formal document)	**non-formal written agreement**	**oral agreement**	**none**
	*If you have an **ORAL AGREEMENT/ NON-FORMAL WRITTEN AGREEMENT/ NO AGREEMENT** with the land owner, go to **question 8.***	other:				
4.	**What is the duration of your lease agreement/contract/permission to occupy?**	1 year	2 years	5 years	10 years	20 years
		other:				
5.	**Do you pay a rent?**	in cash	in-kind	in cash + in-kind	service provision	**no rent**
	*If you **DO NOT PAY** any rent, please go to **question 18**.*	other:				
6.	**How often do you pay the rent?**	once a week	every two weeks	once a month	once a year	irregularly
		other:				
7.	**How much do you pay the rent per period stated in question 6.?** *It is possible to select and fill in **more than 1 option.***	ZAR:	share of harvest:		share of animal produce:	
		other:				

*Please **answer the questions 8. – 17.** only in case if you **DO NOT HAVE ANY LEASE AGREEMENT WITH A LAND OWNER** (you answered NO in question 3) or if you have a **NON-FORMAL WRITTEN AGREEMENT** or **ORAL AGREEMENT**.*

*If you **HAVE A LEASE AGREEMENT WITH THE LAND OWNER** or **PERMISSION TO OCCUPY**, go to **question 18.***

8.	**Does the land owner know you use his/her land?**	yes	no	I do not know		
9.	**Does the land owner agree that you use his/her land?**	agrees	is tolerant	does not agree	I do not know	other:
10.	**Do you have permission from the land owner to use the land?**	written	oral	none	other:	
11.	**Do you pay something for using this land to the land owner?**	in cash	In-kind	in cash + in-kind	service provision	no payment
		other:				
12.	**Do you have permission from someone else to use the land?** *If you answered **none**, go to **question 14.***	written	oral	none	other:	
13.	**Who gave you this permission?**	governmental officer	ward councillor	school/clinic/ church representative	NGO/ community centre leader	other:
14.	**Do you pay something for using this land to someone else than the land owner?**	in cash	in-kind	in cash + in-kind	service provision	no payment
		other:				
15.	**To whom do you pay if not to the land owner?**	governmental officer	ward councillor	school/clinic/ church representative	NGO/ community centre leader	other:

*Please answer the **question 16. and 17.** only in case, **YOU PAY** for using the land to the land owner or to someone else.*

16.	**How often do you pay the rent?**	once a week	every two weeks	once a month	once a year	irregularly
		other:				
17.	**How much do you pay the rent per period stated in question 16.?**	ZAR:	share of harvest:		share of animal produce:	
		other:				

18.	**How would you characterize your land tenure?**	free hold (I own the land)	land lease with the owner (oral)	land lease with the owner (written)	no lease, no permission
		no lease agreement but I have permission (written)		no lease agreement but I have permission (oral)	
		other:			

*The following **questions (19. - 35.)** aim to explore your opinions about the security of your land tenure. Please indicate your answer by ticking that option, which describes your opinion in the best way. Please use the option **DOES NOT APPLY** only when you cannot select any other option (e.g. you cannot make any statement about your lease agreement as you do not have any lease agreement).*

19.	**I am aware of all conditions stated in my lease agreement.**	agree	disagree	I am not sure	does not apply
20.	**I had the opportunity to negotiate my lease agreement with the land owner prior I signed it (agreed in case of oral agreement).**	agree	disagree	I am not sure	does not apply
21.	**I think that some of the conditions in my lease agreement are problematic and can cause me troubles in future.**	agree	disagree	I am not sure	does not apply
22.	**I think the rent I pay (cash or in-kind) is expensive.**	agree	disagree	I am not sure	does not apply
23.	**I would like to have a lease agreement with the land owner.**	agree	disagree	I am not sure	does not apply
24.	**I am willing to pay for the land if it will ensure me secure access to my farm.**	agree	disagree	I am not sure	does not apply
25.	**I would like to own the land where I farm in the future.**	agree	disagree	I am not sure	does not apply
26.	**I am afraid that I will lose my land in the future due to disagreements with the landowner.**	agree	disagree	I am not sure	does not apply
27.	**I am afraid that I will lose my land in the future due to disagreements with the farming neighbours.**	agree	disagree	I am not sure	does not apply
28.	**I am afraid that someone will offer better price for using the land to the land owner.**	agree	disagree	I am not sure	does not apply
29.	**I am afraid I will lose my land because I will not be able to pay the rent (cash/in-kind).**	agree	disagree	I am not sure	does not apply
30.	**I am afraid that the land owner will break our agreement in the future.**	agree	disagree	I am not sure	does not apply
31.	**I am afraid that someone will occupy my land in the future.**	agree	disagree	I am not sure	does not apply
32.	**I am afraid that I will be evicted from my land.**	agree	disagree	I am not sure	does not apply
33.	**I am afraid that I will lose my land in the future due to development projects (e.g. new housing).**	agree	disagree	I am not sure	does not apply
34.	**I feel my land tenure is secure.**	agree	disagree	I am not sure	

IV. CROPS AND LIVESTOCK

1.	**Please tick all the crops which you grow.** *It is possible to select **more than 1 option.***	mielies	tomatoes	carrots	lettuce	spinach
		garlic	onions	spring onions	beetroots	okra
		cucumbers	butternut	pumpkins	chilli peppers	bell peppers
		beans	cabbage	radish	peanuts	peas
		egg plants	potatoes	sweet potatoes	melons	amaranth
		berries	sugar cane	chomolia	fruit trees	flowers
		citrus	parsley	oregano	rosemary	dill
		chives	basil	thyme	fennel	coriander
		other:				
2.	**Please tick the crops which you grow primarily for home consumption.** *It is possible to select **more than 1 option.***	mielies	tomatoes	carrots	lettuce	spinach
		garlic	onions	spring onions	beetroots	okra
		cucumbers	butternut	pumpkins	chilli peppers	bell peppers
		beans	cabbage	radish	peanuts	peas
		egg plants	potatoes	sweet potatoes	melons	amaranth
		berries	sugar cane	chomolia	fruit trees	flowers
		citrus	parsley	oregano	rosemary	dill
		chives	basil	thyme	fennel	coriander
		I do not grow any crops for home consumption		other:		
3.	**Please tick the crops which you grow primarily for sale.** *It is possible to select **more than 1 option.***	mielies	tomatoes	carrots	lettuce	spinach
		garlic	onions	spring onions	beetroots	okra
		cucumbers	butternut	pumpkins	chilli peppers	bell peppers
		beans	cabbage	radish	peanuts	peas
		egg plants	potatoes	sweet potatoes	melons	amaranth
		berries	sugar cane	chomolia	fruit trees	flowers
		citrus	parsley	oregano	rosemary	dill
		chives	basil	thyme	fennel	coriander
		I do not sell any crops	other:			

4.	**Please select 5 crops (maximum) you grow and you harvest the biggest amount. For each crop, fill in following information: how often do you harvest it (every day, every second day, twice a week, once a week, once in two weeks, etc.), production unit (e.g. piece, bunch, kilogrammes) and how much you harvest in a typical season (following the production unit and the harvest period). Please follow this example:**	**name of the crop:** *how often do you harvest it:* *production unit:* *how much do you harvest:*				
		name of the crop: *how often do you harvest it:* *production unit:* *how much do you harvest:*				
		name of the crop: *how often do you harvest it:* *production unit:* *how much do you harvest:*				
	name of the crop: SPINACH *how often do you harvest:* EVERY DAY *production unit:* BUNCH *how much do you harvest:* 15 per DAY	**name of the crop:** *how often do you harvest it:* *production unit:* *how much do you harvest:*				
	name of the crop: TOMATOES *how often do you harvest:* EVERY WEEK *production unit:* KG *how much do you harvest:* 3 per WEEK	**name of the crop:** *how often do you harvest it:* *production unit:* *how much do you harvest:*				
5.	**Please tick the main obstacles for growing more crop varieties.**	poor soil quality	lack of land	lack of water	lack of organic fertilizers	lack of chemical fertilizers
		pests problems	lack of tools	lack of labour	lack of knowledge	lack of tenure security
	*It is possible to select **more than 1 option.***	**I do not want to grow more varieties**		other:		
6.	**How often do you sell the crops you harvested?**	every day	twice a week	once a week	every two weeks	**I do not sell any crops (i.e. home consumption)**
	*If you **do not sell** any crops, go to **question 8.***	irregularly, specify:				
7.	**Please tick all the forms of marketing you use to sell your crops.**	directly from my garden/farm	personally at the market	via hawkers	via salesmen/ middlemen	to the supermarket
	*It is possible to select **more than 1 option.***	other:				

8.	**Please tick the livestock you keep.**	chickens (for meat)	hens (for eggs)	pigs	goats	cows
		rabbits	pigeons	**I do not have any livestock**		
	*If you **do not have any livestock**, go to **section V. Agricultural losses.***	other:				
9.	**How many of each animal do you keep?** *(e.g. 5 pigs)*	chickens:	hens:	pigs:	goats:	cows:
		rabbits:	pigeons:	other:		
10.	**Do you keep the animals at the same place where you grow vegetables and crops?** *If **NO**, go to **section V. Agricultural losses.***	Yes	no			
11.	**What percentage of your garden/farm is dedicated to livestock keeping?**	up to 10%	up to 20%	up to 30%	up to 40%	up to 50%
		more than 50%, specify:				

V. AGRICULTURAL LOSSES						
1.	**Please tick all relevant causes of serious agricultural losses during this season.** *It is possible to select **more than 1 option.***	pests – insect	pests - birds	pests -rats	pests - other animals	
		poor soil quality	drought	heavy rains	someone destroyed my crops	I was forced to leave my garden/farm
		I lost part of my land	plant diseases	thefts	bad access to the water	lack of water
		lack of fertilizers	lack of pesticides	lack of labour	lack of money	**no serious agricultural losses**
		other:				
2.	**How often (on average) do you experience thefts?**	more than once a week	once a week	more than once in two weeks	once in two weeks	once a month
	*If you have **never** experienced thefts, go to **question 4.***	**never**	other:			
3.	**What usually gets stolen?** *It is possible to select **more than 1 option.***	ripe crops	animals	animal produce (e.g. eggs)		tools
		other:				
4.	**Please tick all security measures you use in order to prevent thefts.** *It is possible to select **more than 1 option.***	neighbourhood watch		I take turn to guard with my neighbours		
		Fence	I have a guard	I refer to the police	other:	

VI. INPUTS						
1.	**Please tick all chemicals you use.**	fertilizers	herbicides	Pesticides	insecticides	fungicides
	*If you **do not use** any chemicals, go to **question 3.***	**none**	other:			
2.	**How often do you use chemicals?** *(e.g. once a week, once a month)*					
3.	**Please tick all organic fertilizers you use.**	compost	crop residuals	animal manure	animal urine	**none**
	*If you **do not use** any organic fertilizers, go to **question 6.***	liquid organic fertilizers that I made myself		other:		
4.	**Please tick organic fertilizers you buy.**	compost	crop residuals	animal manure	animal urine	**none**
		liquid organic fertilizers		other:		
5.	**How often do you use organic fertilizers?** *(e.g. once a week, once a month)*					
6.	**Do you buy any seeds and seedlings?**	yes	sometimes	No		
	*If you **do not buy** any seeds and seedlings, go to **question 9.***					
7.	**Which seeds/seedlings do you buy? Please specify.**					
8.	**How often do you buy seeds/seedlings?** *(e.g. once a month, once a year)*					
9.	**Please tick your primary sources (max. 3) of water for crop irrigation.**	piped water inside house	piped water outside the house	piped water on your farm	communal/ shared tap	public standpipe
		hand pump	storm drain	rain water harvesting	river/pond/ lake	borehole/ dug well
		water truck	mechanical pump	other:		
10.	**Please tick your primary irrigation system (max 3.)**	drip irrigation	sprinkler system	hosepipe	earthworks	handwater
		mechanical pump	furrows	**none**	other:	
11.	**Please tick all the farming technologies do use.**	spade	pitchfork	rake	hoe	cart
		plough	wheel barrow	food storage	greenhouse	composter
		tunnel	hydroponics	other:		
12.	**Do you have any labourers?**	yes	no			
	*If **NO**, go to **question 15**.*					
13.	**How many labourers do you have?**					
14.	**How often do your labourers come to work?**					
15.	**Do you use credit for agriculture?**	yes	no			

*The following **questions (16. - 27)** aim to explore your opinions and behaviour related to the agricultural inputs. Please indicate your answer by ticking that option, which describes your opinion and/or behaviour in the best way.*

16.	**I invest in the chemical and/or organic fertilizers to improve the soil quality.**	agree	disagree	I am not sure
17.	**I invest in the agrochemicals to prevent the loss due to pests, fungus, etc.**	agree	disagree	I am not sure
18.	**I invest into the seeds of high quality.**	agree	disagree	I am not sure
19.	**I invest into the stable access to water.**	agree	disagree	I am not sure
20.	**I invest into the efficient irrigation system.**	agree	disagree	I am not sure
21.	**I invest into the farming tools.**	agree	disagree	I am not sure
22.	**I invest into the more advanced farming technology.**	agree	disagree	I am not sure
23.	**It is important for me to have labourers.**	agree	disagree	I am not sure
24.	**I invest into the security measures to protect my garden/farm against thefts.**	agree	disagree	I am not sure
25.	**I have access to credit services.**	agree	disagree	I am not sure
26.	**I use credit services.**	agree	disagree	I am not sure
27.	**It is important for me to get farming advice to improve my farming skills.**	agree	disagree	I am not sure

*The following **questions (1. – 16.)** aim to explore the dynamics in your food production. Please indicate your answer by ticking that option, which describes your answer in the best way.*

1.	**Compared to the last season, in this season my yields are:**	higher	lower	it is the same
2.	**Compared to the last season, in this season the income I get from farming is:**	higher	lower	it is the same
3.	**Compared to the last season, in this season the variety of crops I grow is:**	bigger	smaller	it is the same
4.	**Compared to the last season, in this season my farming enterprise is getting:**	better	worse	it is the same
5.	**Compared to the last season, in this season my expenditures on chemicals (i.e. fertilizers, pesticides) are:**	higher	lower	it is the same
6.	**Compared to the last season, in this season my expenditures on organic fertilizers are:**	higher	lower	it is the same
7.	**Compared to the last season, in this season my expenditures on seeds and seedlings are:**	higher	lower	it is the same
8.	**Compared to the last season, in this season my expenditures on labourers are:**	higher	lower	it is the same
9.	**Compared to the last season, in this season my expenditures on farming technologies are:**	higher	lower	it is the same
10.	**Compared to the last season, in this season my expenditures on water are:**	higher	lower	it is the same
11.	**Compared to the last season, in this season I am selling my produce:**	more often	less often	in the same frequency
12.	**Since I start farming, the quality of food my household eat is:**	better	worse	it is the same
13.	**Since I start farming, my food expenditure have:**	it increased	it decreased	are the same
14.	**I think I grow as much as the land allows me (in terms of the size of the land I farm).**	agree	disagree	I am not sure
15.	**I feel I grow as much as the land allows me (in terms of soil quality).**	agree	disagree	I am not sure
16.	**I feel I grow as much as the land allows me (in terms of water accessibility).**	agree	disagree	I am not sure

THANK YOU FOR YOUR TIME AND FOR FILLING IN THE QUESTIONNAIRE

For the study, we would like to see your lease agreement (if you have one) for the purpose of analysis (we would like to see, how does it look like, what are the conditions in your lease agreement, etc.). We will not show your lease to anyone and your name and personal details will be kept confidential. If your lease agreement is not available now but you want to show us your lease agreement later, please let us have your contact details. Be aware that your answers in the questionnaire will not be matched with your name and contact information provided nor with the content of the lease. Your name and contact information will not appear in any research outcome (e.g. dissertation, papers, etc.).
Name:
Contact:
Cell phone number:
Email:

Annex 2: Informed Consent Form for Interviewees

Land Tenure and Productivity of Urban Agriculture in Soweto, South Africa

I…….. agree to voluntarily take part in this research study which aims to analyse how access to the land and formality of its tenure influence the productivity of urban agriculture in Soweto. The research project was clearly explained to me. I had the opportunity to ask any questions regarding to this study and discuss my concerns. I am aware of the fact that I can withdraw from the research at any time during the study if I no longer feel comfortable to continue. The withdrawal from the study will not incur any penalty nor disadvantages.

I understand that all the information I am going to provide will be used for the research purposes only and that my identity will not be disclosed in any research report and/or publication. No identifiable personal data will be published nor shared with any other organization.

I agree to the recording and processing information about me. I understand I have the right to decide about the use of a Dictaphone to record my interview(s).

I understand that I will not receive any financial nor material reward for my participation in this study.

……. ……

signature of the participant place and date of the signature

I, Lenka Voleníková, have provided the participant with all information about this study and have satisfactory answered all the questions raised by the participant. I further confirm that the participant has not been coerced into giving the consent. I have adequately informed the participant about the tape-recording of the interview and the participant has had the right to decide whether or not the interview will be recorded.

……. ……

signature of the researcher place and date of the signature

Contact details:

Lenka Volenikova, Palacky University in Olomouc

Volenikova.l@gmail.com, +420 724 307 673

Additional queries can be directed to:

Dr Naudé Malan

Anthropology and Development Studies, University of Johannesburg.

nmalan@uj.ac.za/ 011 5592859/ 0822145792.

Annex 3: Field Worker Consent Form

Land Tenure and Productivity of Urban Agriculture in Soweto, South Africa

FIELD WORKER CONSENT FORM

I…….. agree to voluntarily take part in this research study as a field worker. The research project and my role was clearly explained to me. I had the opportunity to ask any questions regarding to this study and regarding to the field work and discuss my concerns. I am aware of the fact that I can stop to do the field work at any time during the study if I no longer feel comfortable to continue. However, I have to notify the main research that I no longer want to participate in the research project. The withdrawal from the study will not incur any penalty nor disadvantages.

I understand that all the information I am going to gather will be used for the research purposes only and that I will not disclose any information from the survey to anyone else except the researcher and her supervisor. I will not show filled in questionnaires to any other person than the researcher and her supervisors at University of Johannesburg and the Palacky University. In case I will obtain a photographs of lease agreements and/or any other written agreements (e.g. permission to occupy) and/or documents, I will send them directly to the researcher's email. I will not reveal any information from above mentioned to documents to any other person than the researcher and her supervisors.

I understand that I will receive agreed financial reward for my participation in this study as a field worker. The financial reward is as follows: R50/questionnaire + up to R50/3 questionnaires for transportation costs.

……. ……

signature of the field worker place and date of the signature

I, Lenka Voleníková, have provided the field worker with all information about this study, the role of field workers in the study and have satisfactory answered all the questions raised by the fieldworker. I further confirm that the field worker has not been coerced into giving the consent. I have adequately informed the field worker about the financial reward given.

……. ……

signature of the researcher place and date of the signature

Contact details:

Lenka Volenikova, Palacky University in Olomouc

Volenikova.l@gmail.com, +420 724 307 673

Additional queries can be directed to:

Dr Naudé Malan

Anthropology and Development Studies, University of Johannesburg.

nmalan@uj.ac.za/ 011 5592859/ 0822145792.

Annex 4: Leaflet Provided by JPC to Entities Interested in Leasing/Purchase of Municipal Land

Process followed by the City of Joburg Property Company SOC Ltd (JPC) with regard to Leasing/Selling of Council-Owned Properties

Application process Stage 1

1 Enquiry

Persons wishing to enquire about the possibility of leasing/buying land or any other property related enquiries eg. encroachments, sanitary lanes, servitudes etc. must do so by lodging an enquiry on the standard enquiry form at JPC's Client Servicing Unit (CSU).

2 Assessment

All enquiries will be assessed within fourteen (14) working days of submission by JPC's Assessment Committee.

If the enquiry is supported, the enquiry will move onto Stage 2.

If the enquiry is not supported by JPC, eg. property required for future use, zoning, not for sale etc. the enquiry will be deemed to be closed.

3 Response

A written response to all enquiries will be issued within fourteen (14) working days.

The response will advise whether the sale/lease by private treaty can be supported as well as the estimated costs related thereto.

All other property related enquiries eg. encroachments, sanitary lanes, servitudes etc. will follow the same process.

Stage 2

1 Application

Applications may be submitted after a positive response has been received from the JPC Assessment Committee arising from the enquiry.

The application will then proceed with the approval process, upon payment of the application fee.

2 Departmental & Municipal Entity (D&Me) ward councillors comments

JPC will obtain the comments of D&ME's and Ward Councillors, to ensure that the property is not required by D&ME to provide basic municipal services in compliance with the Municipal Finance Management Act 56 of 2003 (MFMA).

If any objections are received to the lease or sale of the property, the applicant will be informed in writing and the application will be deemed finalised.

3 Mayoral & Council Reporting

Once all comments by D&ME's and Ward Councillors' are received, a report will be submitted to the City of Johannesburg's (COJ) committee cycle to request approval (in terms of section 14(2) of the MFMA) from Council for all property related transactions eg. sales, leases, encroachments, sanitary lanes, servitudes etc. of the property in principle.

4 Executive Adjudication Committee (EAC)

Once in-principle approval is obtained, a report will be submitted to the COJ's EAC to consider the terms of the proposed property transaction.

5 Agreement

Once EAC approval is obtained, an agreement will be drafted and signed by the applicant and JPC.

Request for Proposals

1 Request for Proposals (RFP)/Tender

JPC will issue four bulk public RFP/tenders per annum (one per quarter). This will include a number of properties which have been approved by Council, for both social and commercial purposes in all COJ regions.

Bids must be submitted on the prescribed forms within the timeframes stipulated on the bid document.

2 Executive Adjudication Committee (EAC)

Bids received will first be evaluated by the JPC Bid Evaluation Committee.

Thereafter, the COJ's EAC, in terms of the criteria stated in the bid document, will award the tender to the successful bidder.

3 Agreement

Once EAC approval is obtained, an agreement will be drafted by JPC and signed by the client.

Joburg

a world class African city

JOBURG PROPERTY COMPANY

City of Joburg
Property Company SOC Ltd.

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2017

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2017

Tel: +27 10 219 9000
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email: clientservicingunit@jhbproperty.co.za
www.jhbproperty.co.za

Frequently Asked Questions

Which Council-owned properties are available for selling/leasing?

In terms of the Municipal Finance Management Act 56 of 2003 (MFMA) only properties not required for the provision of basic municipal services may be sold/leased. For this reason, JPC is required to first obtain the comments of all Council Departments and Municipal Entities (ME's) before submitting a report to Council to obtain approval for the sale/lease of all properties.

When can properties be sold by direct negotiation (private treaty)?

The MFMA requires that, in principle, all properties are sold/leased by way of a competitive bidding process (public tender). In certain cases, however, the Council may approve a direct negotiation. The motivation for such deviation is stipulated in Clause 36 of the Municipal Supply Chain Regulations and Chapter 5 of the Supply Chain Management Policy for Land. Common reasons for approval of deviation include disposal/sale in the public interest or cases where it is impractical or impossible to issue a bid including the sale/lease of land to adjoining owners where the subject property can't be independently developed.

Is Council-owned land cheaper than other land?

In terms of the MFMA, the Council is required to sell/lease properties at full market related prices. Approval may be given for lower than market rental/sales in cases of public benefit and the plight of the poor only.

Who makes the decision regarding the sale/lease of properties?

The City of Joburg Property Company SOC Ltd acts as an agent for the City of Johannesburg for the lease/sale of Council-owned properties. The sale/lease of Council-owned properties is regulated in terms of the MFMA.

In terms of this Act, all decisions regarding the sale/lease of Council-owned properties are taken by the Council. A full sitting of Council must decide whether a property is not required for municipal services and can be leased/sold.

The Executive Adjudication Committee (EAC) of the City of Johannesburg (CoJ) must approve the terms of all leases or sales.

How long will my application take?

The full duration of the process from submitting of an application to the signing of an agreement should take approximately 10 – 12 months. Where objections are received to applications or delays are experienced from Council or D&ME's the process will take longer.

The following process will be followed:

Process	Time frame
• Enquiry	14 days
• Complete an application	Applicant
• Obtaining comments from D&MEs and Ward Councillors	3 – 4 months
• Council's Approval (Section 14(2)	4 months
• EAC approval	2 months
• Signature of agreement	1 – 2 months

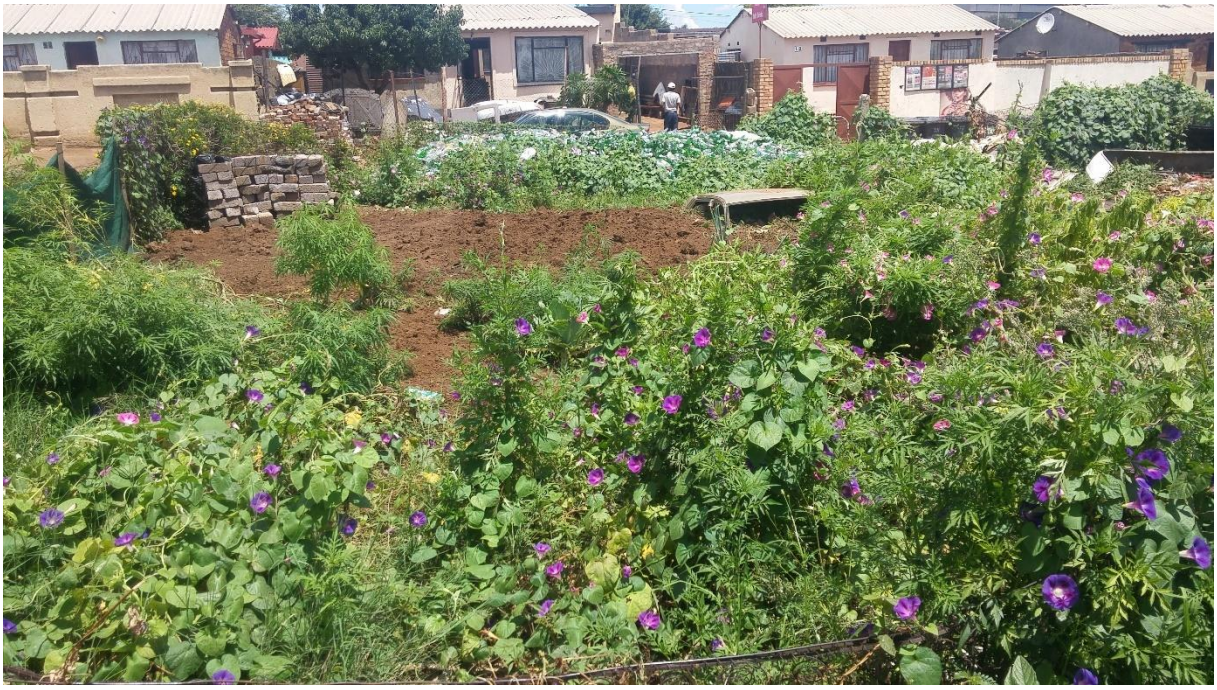
Is there a list of available properties/buildings?

JPC will release available properties/buildings for lease/sale by public tender once per quarter. A list of the properties being prepared for tender will be available from JPC's CSU.

The process outlined in the value chain above is merely a guideline. It is not intended to be all inclusive or exhaustive of each and every step, which must be followed of necessity in the value chain. The City of Joburg Property Company SOC Ltd (JPC) reserves the right to dispense with or add any step in appropriate cases within its discretionary powers in accordance with its authority and all relevant and applicable policies and legislation. Identification of a property or site by any person does not give such person a prior right or entitlement to such property. Subject to all legislative and policy requirements being met, any award, disposal, leasing, selling and management of property, site and/or land managed by the JPC shall be approved by the City of Johannesburg Metropolitan Municipality as the Principal of the JPC. The JPC offers no undertaking that the following of all the steps outlined above will result in the successful sale or leasing, or management of property, land or site to and/or by any person.

Annex 5: Photohraphical Documentation

An open space garden across the farmer's house. Source: Author



Open space garden adjacent to one of the shopping centres of Soweto. Source: Author

Open space gardens in informal settlement. Source: Author

An open space garden under the power lines. Source: Author

An institutional garden. Source: Author

An institutional garden. Source: Author

An institutional garden. Source: Author

VLIV DRŽBY PŮDY NA PRODUKTIVITU MĚSTSKÉHO ZEMĚDĚLSTVÍ V SOWETU, JIHOAFRICKÁ REPUBLIKA

AUTOREFERÁT DISERTAČNÍ PRÁCE

Studijní program: P1314 Geografie

Obor studia: Mezinárodní rozvojová studia

Školitel: prof. Dr. Ing. Bořivoj Šarapatka, CSc.

Katedra rozvojových a environmentálních studií

Přírodovědecká fakulta, Univerzita Palackého v Olomouci

Mgr. LENKA SUCHÁ

LAND TENURE AND ITS IMPLICATIONS FOR PRODUCTIVITY OF URBAN AGRICULTURE IN SOWETO, SOUTH AFRICA

Ph.D. DISSERTATION SUMMARY

Study Programme: P1314 Geography

Specialization: International Development Studies

Supervisor: prof. Dr. Ing. Bořivoj Šarapatka, CSc.

Department of Development and Environmental Studies

Faculty of Science, Palacký University Olomouc

OLOMOUC 2020

Disertační práce byla vypracována v prezenční formě doktorského studia na Katedře rozvojových a environmentálních studií Přírodovědecké fakulty Univerzity Palackého v Olomouci.

The dissertation was compiled within Ph.D. study programme at the Department of Development and Environmental Studies, Faculty of Science, Palacký University in Olomouc. 2

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Oponenti / Opponents:

Obhajoba disertační práce se koná před komisí pro obhajoby disertačních prací doktorského studia v programu P1314 Geografie, studijním oboru Mezinárodní rozvojová studia, v prostorách Přírodovědecké fakulty Univerzity Palackého v Olomouci, 17. listopadu 12, 771 47 Olomouc.

The defence of the Ph.D. dissertation will take place in front of the commission for the defence of Ph.D. dissertation in study programme P1314 Geography, specialization International Development Studies, in the premises of the Faculty of Science, Palacký University Olomouc, 17. listopadu 12, 771 47 Olomouc.

S disertační prací je možno se seznámit na studijním oddělení Přírodovědecké fakulty Univerzity Palackého v Olomouci, 17. listopadu 12, 77 46 Olomouc.

The Ph.D. dissertation is available at the Study Department, Faculty of Science, Palacký University Olomouc, 17. listopadu 12, 771 46 Olomouc.

Content

Abstract

Land tenure and land tenure security are often acknowledged as the most substantial assets determining the viability of urban agriculture, especially in terms of its productivity and of potential investments. Numerous researchers have built their ideas on traditional agricultural theory, which states that only legally based land tenure and land ownership can result in land tenure security and thus enhance the productivity of urban agriculture. Consequently, they have emphasized the need for legalized and secure land tenure for more prosperous urban agriculture. Nevertheless, such statements often origin from weak or non-existent evidence. In order to address this research gap, the dissertation aims to enrich the discussion on land tenure for urban agriculture by empirical examination of the above-mentioned theory by applying mixed-method research. Furthermore, the presented case study introduces an investment index for the measurement of investments among small-scale urban farmers. The index utilizes nonmonetary and easy-to-recall information from the farmers. The findings of the dissertation show that the concept of land tenure and land tenure security for urban farmers used in the literature is too narrow and need to be extended by other dimensions than the legal one. Finally, the dissertation concludes that it is vital to consider the importance of social relations and contextual information in order to fully understand the dynamics of land tenure and productivity of urban agriculture.

Key words: land tenure, tenure security, productivity, investments, investment index, urban agriculture, Soweto

Introduction

During the last three decades, urban agriculture in developing countries attracted the attention of various scholars, international organizations, and NGOs as well as national and local governments. The rising interest in urban agriculture is determined by the potentials and benefits of the activity, especially at the household level. With no doubts, urban agriculture can help to improve food security (e.g. Armar-Klemesu, 2000; Maxwell, 1995; Mwangi, 1995; Tinker, 1994) and enhance the economic situation of the urban poor (e.g. Van Veenhuizen & Danso, 2007; Moustier & Danso, 2006; Nugent, 2000). Concerning the benefits, it is not surprising that urban agriculture is one of the possible livelihood strategies of the poor in the cities. Furthermore, urban agriculture could be also considered as a significant employer in the cities across the world. For instance, Van Veenhuizen & Danso (2007) refer that more than 200 million people are involved in market-oriented urban agriculture, thereby providing 15 – 20% of global food. Additionally, Mougeot (2000) suggests that nearly 800 million urban dwellers are involved in agriculture. It is estimated that more than 40% of all African urban households are engaged in farming (FAO, 2012). On top of that, urban agriculture has certain benefits also at the city level, as it can improve the local environment (e.g. Cofie et al., 2006; Deelstra & Girardet, 2000). Despite the arguments given above, urban agriculture cannot be perceived as a panacea for problems of urban poor as the real impact, especially on improvement of food security, is questionable (see e.g. Crush et al., 2011; Frayne et al., 2014; Zezza & Tasciotti, 2010). Furthermore, Zezza & Tasciotti (2010) point out the unreliability of available data on urban agriculture. Most of them are cited repeatedly even though they are based on expert judgment and the evidence is more qualitative than quantitative (ibid.).

The success of urban agriculture as a livelihood strategy, as well as its contribution to food security, greatly depends on the availability of household capital. Farmers usually lack the most important capital – land. Only 20% of all urban agriculture activities are carried out on the privately-owned land. Furthermore, both title deeds and tenancy agreements are rare. Contracts are mostly unsecured and overpriced as a legal framework is very often missing (Bryld, 2003). Thus, the productivity of urban agriculture is highly affected by the form of land tenure (Lynch et al., 2001). Consequently, the formality of the land tenure defines the legal status of urban agriculture as well as its character (i.e. urban agriculture as a part of the formal or informal economy) (Van Veenhuizen & Danso, 2007). Land rights also play key role in accessing external financing for urban agriculture as land often serves as a collateral for institutions providing credit services (Cabannes, 2015). Ruel et al. (1999) adds that the security of land tenure highly affects the farmers' market behavior and further investment to the land in terms of environmentally friendly treatment. Bryld (2003) concludes that many farmers whose land tenure is insecure implement low-risk strategies, therefore growing vegetables with lower yield and short-duration seasonal crops. Finally, FAO (2002) states that land tenure influences the environmental sustainability, social conflicts, and food security of vulnerable groups and vice versa.

As suggested above, the question of land tenure is appealing throughout the literature on urban agriculture. However, most of the authors build on traditional agricultural theory of Feder et al. (1988) which emphasizes the need of secure land tenure in terms of productivity enhancement.

Nevertheless, the empirical evidence validating this relation within the literature on urban agriculture is scarce, often lacks solid data background and it is rather inspired by the studies from rural areas. Therefore, the applicability of Feder's et al. (1988) hypothesis is questionable, especially because of different character of urban and rural agriculture. While rural agriculture represents stability, urban agriculture has more dynamic and changeable character. Moreover, land utilization in cities is more diverse than in rural areas. Finally, as suggested by Place (2009), the links between land tenure and productivity are disputable. While some studies clearly show a positive effect of secure land tenure on agricultural productivity, others found only little or no evidence that tenure affects agricultural intensification and/or productivity.

The aim of this study is to explore to what extent land tenure arrangements influence the productivity of urban agriculture in Soweto, one of the Johannesburg's townships, South Africa. By drawing on the case study of Sowetan farmers, the ambition of the dissertation is to establish research framework allowing for theoretical and empirical examination of land tenure and productivity issues of urban agriculture. Due to the complexity of the researched phenomena, the study employs a mixed-method research design as the combination of both quantitative and qualitative approaches allows for better understanding of the issue under investigation. Thus, in the situation of vast predominance of qualitative research on the topic, this study addresses recent calls for more qualitative-oriented studies (Zezza &Tasciotti, 2010).

1 Scope of the Study, Aims and Objectives

The urgency of Zezza & Tasciotti's (2010) appeal for deeper examination of urban agriculture has grown even further as food production in cities has become the subject of number of policies emerging in developing countries. Majority of these policies have two things in common: securing land tenure for urban agriculture and enhancing its productivity. However, these documents often build on insufficient evidence (Webb, 2011) and, especially in terms of land tenure formalization, often draw on examples and policy actions from rural areas. Nevertheless, there are many differences between rural and urban agriculture, thus the transferability of rural agriculture policy practices into urban areas is limited and might result into ineffectiveness of proposed policies (Van Veenhuizen & Danso, 2007).

Therefore, the ambition of this thesis is to extend the knowledge of urban agriculture in developing countries by provision of empirical evidence on land tenure and productivity of urban agriculture. The scope of this thesis is threefold: firstly, it examines productivity of urban agriculture through investments into urban farming; secondly, it explores land tenure and land tenure security for urban agriculture. Finally, the thesis also enriches current research practice on urban agriculture and land tenure in terms of methodological innovation by thorough description of the data collection and analysis which can further help to other researchers focused on the phenomena under investigation or similar topics. The described scope of the thesis translates to three objectives summarized in table 1.

Firstly, the dissertation thesis brings insight into productivity of urban agriculture. The knowledge about the productivity of urban agriculture is mostly provided through cases studies or through generalized information. Furthermore, instead of producing knowledge on the

productivity of urban agriculture, authors rather examine related issues such as income generation or contribution to food security (e.g. Adeoti et al., 2012, Crush et al. 2011; Frayne et al. 2014; Rezai et al., 2016). Moreover, because of the small-scale and mostly informal character of urban agriculture, capturing data related to urban agriculture yields in developing countries is relatively difficult as farmers mostly do not keep any records necessary for productivity measurement. In order to contribute to the existing literature, this study addresses productivity through measurement of investments by Investment Index constructed by the author. This index is based on the easily accessible data and presents a simple tool for other researchers who are interested in small-scale, informal (urban) agriculture.

Secondly, the dissertation enriches ongoing debate on land tenure formalization for urban agriculture by provision of empirical evidence from Soweto, South Africa. Despite the number of research papers analysing land tenure and its security in developing context, majority of them focus either on housing or on agriculture in rural areas. Nevertheless, applying these frameworks to urban agriculture might be tricky as the land tenure for urban farmers have different dynamics than land tenure for rural agriculture and housing. In order to address the above-mentioned issues, the thesis brings two innovations into the urban agriculture research:

(1) While majority of authors builds on the paradigm of land tenure formalization, i.e. highlights the importance of legality, the dissertation builds on Van Gelder's (2010) *tripartite view* of land tenure security and particularly focuses on perceived tenure security. Detailed exploration of diverse dimensions of land tenure security contributes to possible paradigm shift which is essential to effective policy-making.

(2) The presented research enables a deeper understanding of land tenure processes on the ground by employment of mixed-method research combined with participatory approaches to knowledge building. The results of this study enable improvement of policy planning and can also support policymakers when re-thinking existing approach to land tenure formalization and productivity enhancement of urban agriculture.

Therefore, the last part of the dissertation will provide set of policy recommendations based on the results of the study.

Table 27 *Aims and objectives of the thesis*

Aims	Objectives
1. to analyze the phenomenon of urban agriculture	**1.** to characterize the phenomenon of urban agriculture
	2. to examine the productivity of and investments to urban agriculture and the approaches to its measurement
2. to describe and analyze land tenure and its security and its role in urban agriculture	**1.** to explore land tenure and land tenure security from different theoretical perspectives
	2. to analyze the impact of land tenure and its security on (urban) agriculture (based on existing literature)
	3. to discuss land tenure for urban agriculture from the policy perspective
3. to analyze how land tenure influences urban farmers' investments to urban agriculture in Soweto, South Africa	**1.** to characterize farmers of Soweto
	2. to analyse access to the land of urban farmers in Soweto
	3. to analyse the forms of land tenure among urban farmers in Soweto
	4. to analyse three dimensions of land tenure security among farmers in Soweto
	5. to analyse the level investments to urban agriculture in Soweto
	6. to analyse the implications of different types of land tenure security for investments of urban agriculture

2 Methodology

The thesis is based on the mixed-methods research, i.e. on the combination of qualitative and quantitative research methods. While quantitative components enable to acquire statistically significant view on the researched phenomena, qualitative elements allow for deeper understanding of the research context and for explanation of the statistical results. In this research, mixed methods research includes wide range of methods, such as literature review, interviews and questionnaire survey, which are subjected to quantitative and qualitative data analysis.

Aim 1: *To analyze the phenomenon of urban agriculture* and Aim 2: *To describe and analyze land tenure and its security and its role in urban agriculture* are based on the desk research, i.e. on the literature review examining existing works. Academic journals and books as well as grey literature were used and reviewed. Due to lacking literature on productivity of urban agriculture, investments to urban agriculture and land tenure and its security for urban agriculture, the literature review also utilizes studies researching the above-mentioned phenomena in terms of rural agriculture. Furthermore, literature discussing land tenure and related issues under different paradigms as defined by Simbizi et al. (2014), namely the economic oriented school, legal based school and adaptation school, is included in order to set up an appropriate framework for the analytical part of the thesis. The findings responding to the Aims 1 and 2 are presented in chapter 3 Literature Review.

Aim 3: *To analyze how land tenure influences urban farmers' investments to urban agriculture in Soweto, South Africa* is based on the field research conducted in Soweto during the periods of February to May 2017 and February to March 2018. The field study employs mixed methods of data collection, i.e. a combination of quantitative and qualitative research methods. This approach benefits from the strengths of both, and helps to better understand the researched reality in terms of collection of statistical data by questionnaire survey and its complementation by data gained through in-depth interviews (Punch, 2009). The following methods of data collection are used in this study: *observation, participatory workshop, questionnaire* and *in-depth interviews* with key informants and farmers. The methods used during the field research as well as during the data analysis are described in detail in the case study presented in chapter 4.

2.1 Research Limitations

The research in this thesis faces several limitations and challenges. The first limitation concerns the accessible literature on the subject under the investigation. As long as the theoretical part of this thesis does not exclusively build on the cases from urban agriculture literature, one must consider the limits of applicability of the frameworks from rural agriculture to urban agriculture because, as suggested in the introduction, urban farming has different dynamics than rural agriculture. Therefore, rather than drawing conclusions related to urban farming based on rural agriculture research, this sort of evidence serves more likely as a source of inspiration while bearing in mind the limitations arising from diverse natures of the two agricultural systems. The similar issue arises from the employment of literature examining urban land tenure and land

tenure security for other than farming uses, such as housing or small-scale family businesses which are of more legitimate character[62]. At the same time, tenure for "legitimate" land uses is significantly influenced by high population pressure and satisfaction of basic needs (especially in terms of housing). Nevertheless, these dynamics necessarily do not have to be related to urban farming as long as the land used by urban farmers is often underutilized for a long time. In conclusion, although the suitability of theories examining urban and rural land tenure for urban agriculture might be questionable, it is substantial to critically assess the insights from the concepts discussed in literature review in order to shape functional theory for urban agriculture.

The second limitation concerns the transferability of the research findings. As the fieldwork has been taking place only in Soweto, South Africa, the context is too specific in order to transplant the findings to another environment, even within another location in South Africa. Although the suggested approach to land tenure security does not have to necessarily reflect the situation elsewhere (for instance, the suggested categories of land tenure might be different in other context), the research methodology and the questionnaire survey were designed carefully and could be used in different study sites with little or no modification.

The last limitation is connected to measurement of productivity. The original focus of this study was on the measurement of productivity. Although some of the tools (such as record keeping diaries) used by other researchers (e.g. CoDyre et al., 2015; Dyer et al., 2015; Mkwambisi et al., 2011; Van Averbeke; 2007) would be suitable for the farmers of Soweto, these methods would require longer stay of the author at the study site which was not possible due to financial demands. Furthermore, due to inaccurate data regarding the productivity coming out of the questionnaires, it was not possible to employ any approach to the measurement of productivity indicated in literature review. In fact, employment of distorted and inaccurate data would skew the analysis thus jeopardizing the overall results of this research. Therefore, the author decided to proxy productivity through investment measurement by the construction of composite Investment Index (the methodology is further described in chapter 4.2).

3 Literature Review

3.1 Urban Agriculture, Productivity and Investments

Despite many efforts, there is no single definition of *urban agriculture*. According to Van Veenhuizen & Danso (2007:1), urban agriculture is defined as "the growing of plants and the raising of animals for food and other uses within and around the cities and towns, and related activities such as the production and delivery of inputs, processing, and marketing of products." The major driver (and benefit) of urban agriculture is food security, which can be enhanced through improved direct access to food for farmers (Mwangi, 1995; Maxwell et al., 1998),

[62] While housing needs are legitimate in terms of sustaining basic human needs, small-scale family business represents a widely recognized form of urban livelihood strategy. As long as urban agriculture is, at some cities, missing this recognition, it can be perceived as less legitimate by the municipal government as well as by local residents.

through lowering of final price of food by shortened production chain (Van Veenhuizen & Danso, 2007) and through provision of additional income to farmers used for purchase of nutritionally valuable food (Nugent, 2000). Urban agriculture can also improve socio-economic status of farmers by rising employment opportunities (Smit et al., 2001). As farmers grow part of their food consumption, they are able to save a share of their income for further investment, such as schooling for children, health care, etc. (Mougeot, 2000). Finally, there is certain positive impact on the urban environment, such as improvement of local climate through green space (Deelstra & Girardet, 2000). The most pronounced environmental-friendly activity is the recycling of urban organic waste (Cofie et al., 2006). On top of that, urban agriculture creates a green space which is often missing especially in the cities of the developing world (Bryld, 2003).

Productivity and Investments to Urban Agriculture

In traditional agricultural research, numerous approaches to measuring agricultural/crop productivity exist. Considering the definition of OECD (2001:11) that "productivity is commonly defined as a ratio of a volume measure of output to a volume measure of input use.", the most frequently used measurement is based on *partial factor productivity* (PFP) or *total factor productivity* (TFP) (Benin & Nin-Pratt, 2016). However, as suggested by Weidner et al. (2019), the measurement of productivity of urban agriculture in developing world is challenging, especially because of the insufficient data from the farmers. The information on inputs, yields and prices of the sold products is often inaccurate and based on the farmer's judgement rather than on the records kept by urban food producers. Furthermore, due to high diversity of urban agricultural practice (ranging from backyard gardens, informal small-scale farming to animal husbandry) and its seasonality (i.e. the changes in the production over the year) it is challenging to systematically approach the productivity measurement (Van Veenhuizen & Danso, 2007). Nevertheless, limited number of studies focused on explicit measurement of urban agriculture productivity exist (e.g. CoDyre et al., 2015; Dyer et al., 2015; Mkwambisi et al. 2011; Van Averbeke, 2007) although these are using rather alternative approaches to productivity than PFP or TFP. On the other hand, almost every study on urban agriculture in developing countries touches upon the issue of productivity indirectly, for example by exploring income generation (e.g. Adeoti et al., 2012) or by analysing its contribution to food security (e.g. Crush et al. 2011; Frayne et al. 2014, Rezai et al., 2016). Other authors, who are more policy-oriented, also call for the enhancement of urban farming productivity and exploring the ways of making urban agriculture viable (e.g. Dubbeling et al., 2011). However, the detailed exploration of urban agriculture's exact productivity is scarce and it more likely relates to the efficiency in developed countries.

The productivity of urban agriculture can also be approached through investments which, according to Syed & Miyazako (2013:4), refers to "forgoing consumption in the present to pursue a higher level of income in the future." Investments represent purchase of stocks, shares, bonds and securities, properties in terms of land and real estate and purchase of machinery and equipment. Besides these, investments might translate also into the human, social and natural capital (Syed & Miyazako, 2013). Considering economy of scale, investments to (urban) agriculture represent one of the strategies of farm adaptation in terms of increase in farm

efficiency. Broadly speaking, investments in technologies, labour and knowledge result into higher revenues that exceeds the costs of investment, therefore farmers are allowed to expand their agricultural activities (Akimowicz et al., 2016). As investments to urban agriculture can be considered for example various inputs (e.g. seeds, agrochemicals, etc.) and tools (ranging from basic gardening tools to advanced irrigation systems). Nevertheless, similarly as in case of productivity, approaches for investment measurement adopted from traditional agriculture economy require exact data and are more likely applicable to large-scale agriculture. Therefore, its utilization for small-scale and often informal practice of urban agriculture in developing countries is not suitable for the similar reasons as suggested above. Consequently, some authors who researched investments in the context of small-scale agriculture of developing countries, often do not measure the level of investments as such but they rather use wide range of variables of long-term investments into the land as a crude proxy. For instance, Deininger & Jin (2006) proxied investments of rural farmers in Ethiopia through terracing and tree planting. Similarly, Place & Otsuka (2001), who studied small-scale maize farmers in Malawi, operationalize investments through tobacco planting at the maize fields, tree planting, terrain levelling and water management.

There are several factors hindering the productivity and investments to urban agriculture. Probably the most pronounced obstacle for investment is insecure land tenure, which is discussed in detail in following chapters. Another issue is lack of public support and/or persistent semi-legal status of urban agriculture (Mubvami & Mushamba, 2006), resulting in implementation of risk-reduction strategies such as seasonal crops with low yields which do not bring high financial returns and prevent farmers from further investments (Bryld, 2003), low or non-existent access to support from financial institutions (Cabannes, 2006). The informal character of urban agriculture also restricts the access to the official food markets. Instead, majority of farmers sells their produce through informal channels (Van Veenhuizen & Danso, 2007), especially through intermediaries. In such circumstances farmers often have only low bargain power to negotiate the final price of their produce and they are forced to sales for very low prices (FAO, 2012). Consequently, farmers are often not able to generate more than necessary income to sustain their livelihood and to purchase inputs needed to keep up with their agricultural activities (Moustier & Danso, 2006).

3.2 Land Tenure and Land Tenure Security

Land tenure arrangements in urban areas result in a very complex system which combines both, customary (informal or extra-legal) and legal (formal) tenure systems. The coexistence of the wide range of land tenure arrangements results into disordered land rights and ambiguous tenure security (Payne, 1997). Furthermore, the significance of clearly defined land rights ensuring tenure security increases with higher population pressure. While customary land tenure in areas with low population density provides for long-term tenure security, the opposite applies for densely populated areas where land becomes a scarce resource (i.e. in cities) (Barrows & Roth, 1990). Therefore, it is not surprising that numerous authors and policy makers perceive land rights formalization as the key tool for the empowerment of urban poor through provision of secure land tenure. Although the importance of the land rights formalization is hardly questionable, the perspectives on the process and its aspects vary across different paradigms,

as identified by Simbizi et al. (2014)[63]. Furthermore, authors usually focus their attention only to legal aspects of tenure security (i.e. to titling), while omitting other dimensions, such as *perceived* and *de facto* tenure security (Van Gelder, 2010).

Probably the most famous proponent of land rights formalization is Hernando de Soto. According to him, there is extremely large amount of *dead capital* which can be only activated through formalization of land rights thus allowing for mobilization of household assets. In this view, land tenure formalization, with private ownership at the top of the land tenure hierarchy, represents the only tool for establishment of land tenure security thus providing the stimulation for investments (de Soto, 2000). Furthermore, according to neo-classical economists, formalized land rights are considered as potential enabler for access to credit services, where people can use newly acquired land titles as a collateral for credit or loans. These might be used in order to enhance one's assets and turn them into vital capital (Barrows & Roth, 1990).

However, de Soto's (2000) approach is critically assessed throughout academia. For instance, Bromley (2008) stresses the importance of solid legal system which must ensure effective enforcement of land rights, otherwise land titles become worthless. Land titles also cannot be perceived as panacea for poverty, as proposed by de Soto (2000), without other initiatives supporting the poor. Important point is also raised by Hornby et al. (2017), who question the dichotomic view of formal/informal, legal/illegal (extra-legal) land tenure which does not cover the complexity of reality of land tenure arrangements. Privileging formal tenure arrangements over the informal neglects social structures established in communities, such as power relations and kinship. Furthermore, land formalization usually stresses individualization of collective land rights, which can result into problematic situations in the areas treated under the customary land tenure (Barrows & Roth, 1990), where community is a cornerstone of society. Such persistent attempts of land rights formalization through its individualization can result into further marginalization of already disadvantaged poor, such as women (Lawry et al., 2014). Finally, unlike de Soto (2000), Ribot & Peluso (2003) consider land rights as too narrow concept and they emphasize the role of land user. While land owner often does not enjoy the full potential of the land, the land user is the only one who is able to derive all benefits from the land even in situation of the absence of (legally recognized) land rights. Therefore, they prioritize the land access over the rights to the land. Access to the land is consequently considered as the crucial driver of economic, social, or personal benefits emerging from the land.

3.3 Land Tenure, Land Tenure Security and Productivity of Urban Agriculture

As mentioned in the introduction, the key element of urban agriculture is access to land and land tenure and its security. According to FAO (2012), most urban farmers in Sub-Saharan Africa do not own the land where they operate and the land is used under a wide range of temporal tenure arrangements (informal tenure arrangements predominate) or with no permissions/titles. Despite the fact that off-plot (i.e. open space distant from the household home with ambiguous land tenure) farmers usually use land with no other economic use, such

[63] Simbizi et al. (2014) identified three predominant paradigms in land tenure security research: (1) economic oriented school; (2) legal based school; and (3) adaptation school.

as parks, flood plains, river banks, dumps, etc. (Smit et al., 2001), they might face forced evictions as the land mostly belongs to the municipality and farmers often use it without any permission from the governmental body responsible for municipal land distribution (Ruel et al., 1999). Such situation results in insecure land tenure for majority of farmers.

The lack of ownership and formality of tenure arrangements is caused by the clashes between legal and customary land tenure which is more visible in cities, especially because the extra-legal land machinations which are characteristic for contemporary urban tenure systems. On top of that, the confrontation between legal and customary tenure is even more escalated due to high commercialization of the urban land, where use value of land has been shifted to market value (Payne, 1997). As Van Veenhuizen (2006) suggests, agricultural activities in cities face harsh land competition with other industries and economic activities as well as with housing needs. Therefore, the informal tenure arrangement is often chosen as a first option by the urban poor as it enables quick access to land for a low or zero price (Durand-Lasserve & Selod, 2009). Furthermore, the prevalence of informal land tenure may indicate the inflexibility of statutory tenure systems that is usually provided by governmental bodies which lease or sublease public or institutional land[64] (Vélez-Guerra, 2004). Finally, Van Veenhuizen & Danso (2007) concludes, that while farmers in rural areas do not have to deal with such high prices of land and land tenure insecurity, urban farmers experience the exact opposite.

According to many authors, land tenure arrangements have a clear impact on the productivity of urban agriculture in terms of the choice of the crops, investment into the land, and farming tools as well as more environmentally oriented attitude towards crop and livestock production (e.g. Bryld, 2003; FAO, 2012; Ruel et al., 1999; Van Veenhuizen & Danso, 2007). Furthermore, Lynch et al. (2001) emphasize the importance of land rights formalization as titling can ensure access to credit services, subsidies and training which are often provided only to those with legal land tenure. However, these assumptions originate mostly from studies focusing on rural agriculture rather than urban as the body of literature empirically proving the statement is almost non-existing. Furthermore, as studies from rural agriculture shows, the role of land tenure and its security in respect to productivity and investments to agriculture is highly site and context specific (Barrows & Roth. 1990; Place, 2009). While some studies prove a positive effect of secure land tenure on investments and agricultural productivity, others show low or zero relations between these two (e.g. Deininger & Jin, 2006; Place & Otsuka, 2001; Smith, 2004). Conversely, Sjaastad & Bromley (1997) state that the logic can be applied reversely – i.e. that higher investment can provide people with higher tenure security.

Despite the importance of the above-mentioned examples, this evidence can be hardly transplanted into the urban context although it is stressed by numerous authors on urban agriculture, who support legalization of land rights for urban farmers in order to reach legal tenure security (e.g. Bryld, 2003; FAO, 2012; Redwood, 2009; Ruel et al., 1999; Van Veenhuizen & Danso, 2007). Yet, they do not consider properly the distinctive character of rural and urban agriculture, which is more dynamic. For instance, most of urban agriculture could be considered as small-scale production, therefore it is not expected that farmers will invest in building constructions such as terracing. Secondly, customary tenure arrangements

[64] As in the case of Johannesburg Municipality, South Africa.

and protection mechanisms are often disrupted in urban areas as many of the traditional social networks are no longer functioning in the well-established manner. Thirdly, urban agriculture takes place in areas of high population density with rapid land use dynamics, thus the land pressure is more acute than in rural areas. Finally, following the economic oriented school, the above-stated authors build on the dichotomic relation of formal and informal/extra-legal land tenure without profound exploration of the different land tenure contexts in cities. Consequently, they view informal/extra-legal land tenure arrangements automatically as insecure.

It is especially the persistent emphasis on legal rights and legal tenure security for urban farming which might be misleading and potentially result in ineffective policies. As suggested by Van Gelder (2010), the concept of land tenure security must be expanded from the focus on legality to paying attention to perception of land tenure security by farmers themselves and to their de facto security. For instance, if farmers have good relationship with the land owner and do not perceive eviction threats as high, they might feel secure on their land even though they do not have legal rights over it. Following this logic, and Ribot and Pelusos's (2003) theory of access, McLees' (2011) research of urban farmers in Dar s Salaam emphasizes the mutually beneficial relationship between the land owner and farmers. Land owners, including the municipality, often do not have the financial nor personal capacity to maintain the land they own thus neglecting their property. In such instances, urban farmers can enhance the vacant or neglected land and bring added value to the areas without any economic use. Consequently, farmers are often favoured by land owners on a temporary basis as they can maintain the land in exchange of using it for farming. Indeed, there are no legal guarantees for the farmers but it provides them with high levels of perceived tenure security resulting from this mutually beneficial relationship. In such cases, farmers might be even encouraged to invest into their agriculture as well as they can receive some sort of support from the land owner.

4 Case Study: Land Tenure Security and its Implications for Investments to Urban Agriculture in Soweto, South Africa[65]

4.1 Johannesburg and Sowetan Context

Urban agriculture in South Africa is a wide spread and supported activity. It has been gaining great attention from the side of academia as well as policy makers over the last three decades and the practice is mainly linked to ensure urban food security. Currently, the City of Johannesburg mentions the development of urban agriculture in two key policy documents: *Joburg 2040 Growth and Development Strategy* (City of Johannesburg, 2011) and *A City where none Go Hungry: The City's of Joburg's Food Resilience Policy* (City of Johannesburg, 2012). Both policies emphasize the support of urban agriculture as a mean for the enhancement of food security. The support of urban agriculture ranges from training and skill development,

[65] Majority of this chapter is primarily based on the author's paper *Land Tenure Security and its Implications for Investments to Urban Agriculture in Soweto, South Africa* (Suchá et al., 2020), published in Land Use Policy journal, which represents key findings of author's original research. The dissertation contains extended and enriched version of the original research paper.

packaging, and retailing centres to the provision of municipality owned land for urban agriculture (City of Johannesburg, 2011). Furthermore, the policy addresses formalization of land rights for urban farmers through establishment of so-called five *empowerment zones*, located in the city outskirts. In these zones, farmers were enabled to lease land for agriculture from the city.

Soweto is a part of the greater Johannesburg Metropolitan Area. Being located in the southwest of Johannesburg, the name originally stands for South-Western Townships, sometimes referred as Region D. Soweto has been built in the apartheid era, when blacks were forced out of Johannesburg. It is mostly composed of the *matchbox houses* built for the workers and encompass large areas of informal settlements (City of Johannesburg, 2007). Although there have been significant revitalization efforts, high level of social deprivation is still present in Soweto. It is especially unemployment, shortages in education and healthcare, housing backlog and high environmental pollution caused by mining industry which burdens Soweto's population (City of Johannesburg, 2018). The total population of Soweto is 1 271 628 inhabitants, while 18.7% of the population has no income (StatsSA, 2020). In this context, urban agriculture is widely practiced across Soweto.

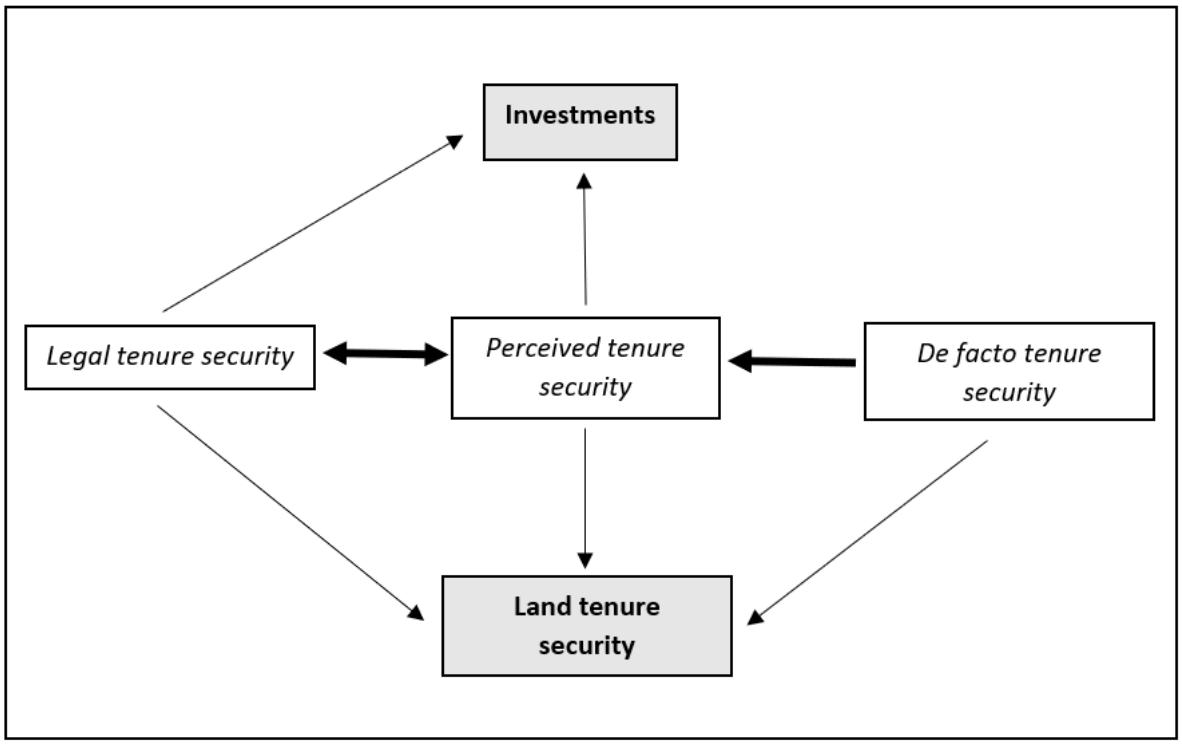
4.2 Research Methodology

The central research interest focuses on land tenure security and its influence on investments of urban farmers in Soweto, South Africa, while considering three dimensions of land tenure security as defined by Van Gelder (2010), i.e. *legal tenure security*, *perceived tenure security*, and *de facto security.* Legal tenure security is measured by the farmer's land tenure: people with no permission/agreement for land utilization have the lowest level of legal tenure security while those with ownership reach the highest levels. Four types of land tenure are distinguished: land ownership, formal contractors (i.e. leasehold), informal contractors (i.e. farmers who cultivate the land with written or oral non-formal agreement), and non-contractors (i.e. farmers who occupy land with no permission). Perceived tenure security is expressed by the farmer's own perception of tenure security. De facto security is operationalized by the number of years spent in the garden and the existence of fencing. Finally, the level of investments is operationalized by the Investment Index which is based on a list of inputs and tools farmers have at their disposal (see table 3).

The overall research framework is shown in figure 1. Based on the statement of Hornby et al. (2017) that farmers who do not enjoy legal tenure security invest into their farming, the research framework shows that all three dimensions of tenure security influence investments in urban agriculture. While legal and perceived tenure security are directly associated with investments, de facto tenure security translates to it indirectly through perceived tenure security. Diverging slightly from Van Gelder (2010) conceptualization of land tenure security, de facto security is considered as an important component determining perceived tenure security. Simultaneously, legal tenure security and perceived tenure security are operationalized as interlinked concepts influencing each other. Secondly, the interest is set around the impact of all three dimensions of tenure security on investments in urban agriculture. Finally, it is analysed which land tenure

security dimensions directly influencing investments has higher impact on them in urban agriculture.

Figure 9 Research framework (Suchá et al., 2020)



Methods of Data Collection and Research Sample

The case study is based on data collected during fieldwork in Soweto, which was carried out in periods of February to May 2017 and February to March 2018. The fieldwork employed a mixed-method approach consisting of the methods, which were complementary to each other: (1) a participatory workshop with Sowetan farmers; (2) ten key informant interviews with experts; (3) a questionnaire survey; and (4) twenty-two semi-structured farmers' interviews. All stages of the fieldwork were accompanied by non-structured non-participatory observation.

The purpose of participatory workshop was to allow for a bottom-up process in order to define land tenure and to develop an appropriate terminology for the survey as well as to elaborate on participatory SWOT analysis of different forms of land tenure. In such circumstances, farmers were able to participate in the survey without misunderstanding of questions asked. The outcomes of the workshop were complemented with information provided by key informants[66], findings of observation as well as by literature. This combination of knowledge served as a basis for the questionnaire survey, which was a core of this study. Altogether, 176 questionnaires were collected in the period of May 2017 and June 2018 with the help of trained fieldworkers. As long as the collection of questionnaires was assisted and despite the significant precatory measures (such as introduction of fieldworkers as students of University of Johannesburg and clear explanation of the research and its purposes), some farmers were not

[66] Different groups of interviewees were included in key informants' survey: representatives of academia (n=3), public servants (n=2), school representatives (n=3), and member of iZindaba Zokudla (n=1).

able to develop a trust-based relationship with the fieldworker. This could result into provision of adjusted information which would seem to farmers as more "appropriate". Consequently, this situation could skew the collected data. The survey was complemented with 22 semi-structured interviews, which were held in English by the author of the dissertation. In case of language barrier, the questions and answers were translated to Sesotho or Zulu according to the need of the respondent.

The original research sample for both questionnaire survey and interviews, involved all types of land tenure. Nevertheless, the interviews and observation showed, that farmers cultivating land under their ownership have different profile than formal contractors, non-formal contractors and non-contractors. As land ownership in Soweto is rare and it can be generally found only at land for housing, the gardens utilized under land ownership were only found at farmers' backyards adjacent to their houses. This situation creates a significant difference between land owners and farmers who utilize land under another land tenure regime. This distinction is arising especially from the scale of farming as well as from the production patterns (as demonstrated in table 2). While land owners were mostly subsistence oriented and farming was often only a complementary activity, the other groups of farmers were more likely market oriented and urban agriculture represented one of the means of their survival strategy. On top of that, formal contractors, non-formal contractors, and non-contractors had to develop a significant effort to start with their farming activities, as they had to actively look for a piece of land suitable for cultivation. Such disparity implies also varying level of motivation/commitment, resulting from generally lower engagement of land owners (as supported by several land owners' statements from the interviews). Based on these facts, the group of land owners was excluded from the statistical and qualitative analysis. Consequently, the number of respondents included in the statistical analysis is 147.

Table 28 Proportion of market-oriented farmers according to type of land tenure

Proportion of market-oriented farmers according to type of land tenure		
land tenure	**proportion**	**no. of respondents**
non-contractors	57.1%	28
informal contractors	46.4%	84
formal contractors	65.7%	35
land owners	27.6%	29

Methods of Data Analysis

Construction of Investment Index

Firstly, the Investment Index (II) was created. The calculation of II allowed to create a relatively sophisticated tool for expressing the level of investments among farmers while using information easily recalled by farmers. Firstly, the weights were assigned to respective variables by multiple correspondence analysis (MCA). The results of MCA were linearly rescaled (100 points = highest level of investments in the research sample; 0 points = lowest level of investments in the sample). Secondly, two-phase sensitivity analysis was conducted in order to decide on indicators included in the final index. At first, the weights of variables were adjusted. The weights determined by MCA were replaced by equal weights (1 = high level of

investments; 0 = low level of investments). There was a very strong positive correlation (0.98) between original and adjusted index. The second stage of sensitivity analysis was focused on the indicators used in the index. While keeping the equal weights, two modified versions of II were calculated. In the first version, the indicators of advanced tools and equipment were dropped. In the second version, all basic tools and equipment and other indicators were dropped while the group of advanced tools and equipment was kept. The correlation between the first adjusted version and the original II was 0.82, the correlation between the second adjusted version and the original II was 0.95. The high correlation implies that the outcomes of original Investment Index are robust and relatively insensitive to decisions made during its construction process. Table 3 summarize the composition and non-rescaled weights of single components of II. The computation was done with Stata 12 software[67].

Table 29 Components and weights of Investment Index

Investment index (II)				
Indicator				**weights**
Tools and equipment owned	Basic tools and equipment	Cart	yes	-5.814
			no	0.121
		Plough	yes	-3.348
			no	0.325
		Wheel barrow	yes	-0.792
			no	0.871
	Advanced tools and equipment	Food storage	yes	-1.586
			no	0.868
		Greenhouse	yes	-2.520
			no	0.701
		Tunnel	yes	-3.764
			no	0.335
		Composter	yes	-3.502
			no	0.175
		Drip irrigation system	yes	-2.809
			no	0.205
		Sprinkler irrigation system	yes	-2.830
			no	0.552
Others		Use of agrochemicals	yes	-1.812
			no	0.336
		Having labourers	yes	-0.874
			no	0.863

Statistical Data Analysis

The second step in the analysis was to verify five assumptions based on the research framework: (1) legal tenure security is positively associated with perceived tenure security; (2) legal tenure security is positively associated with investments; (3) perceived tenure security is positively associated with investments; (4) de facto tenure security is positively associated with investments; (5) legal tenure security and perceived tenure security are interrelated, and both are important determinants of investments. Two types of tests were done: two-sample proportion z test and Welch's t-test (unequal variances t-test). Also, Spearman's rank coefficient and Cramér's V were calculated for situation where suitable.

[67] https://www.stata.com/

Assumption 1 was tested by using a two-sample proportion z test. Three sub-hypotheses were tested in order to explore the proportion of farmers with perceived tenure security among three land tenure categories (formal contractors, non-formal contractors, and non-contractors). Assumptions 2, 3 and 4 were examining the level of investments, which was represented by II, among different means of tenure security (legal, perceived and de facto tenure security). Assumption 2 was tested by using three sub-hypotheses which were examining the average level of investments among different forms of legal tenure security. In case of assumption 3, the average level of investments between farmers with and without perceived tenure security was analysed. Assumption 4 was focused on the level of investments among farmers who enjoy de facto tenure security. Firstly, Welch's t-test was used for testing the average level of investment among farmers who have or do not have fencing (which represents a physical security). Furthermore, de facto tenure security was proxied by the number of years spent in the garden. Because a linear relation between the II and the number of years spent in the garden was not expected, Spearman's rank coefficient for analysis of the association was used. Finally, validity of assumption 5 was analysed by Cramér's V, and by comparing descriptive statistics for II for various groups respondents created based on their legal and perceived tenure security.

Qualitative Data Analysis

The qualitative data were analysed by using thematic analysis, which allows for interpretation and evaluation of the data content in relation to the research objective. All the interviews were literally transcribed in order to capture all nuances arising from the interviews. Memos were used at points when a particular emotion was appealing for capturing. Data gained within the interviews were sorted and reduced through inductive coding. Subsequently, the codes were organized into particular categories reflecting the themes emerging across the interviews. This procedure enables identification, analysis and interpretations of patterns and relations occurring within the qualitative data. The interviews were proceeded by using MAXQDA[68] software.

4.3 Results

4.3.1 Who are the farmers of Soweto?

An average age of the farmers participating in the study was 45,7 years. The youngest farmer was 21 years old, while the oldest was 78. Out of the 147 respondents, 59% (n = 87) were women. Sixty-six percent of respondents (n = 97) were born in Soweto and those born in other provinces spent on average 24,4 years in Soweto. Only two respondents did not have any formal education while majority of farmers (71%, n = 100) finished at least secondary school. Furthermore, 53 % (n = 78) farmers had also another occupation than farming (56%, n = 43, of them was formally employed as a full-time workers). Nevertheless, it must be noted, that not having any occupation except farming does not generally imply that farmers would not have any other income than the one from agriculture as long as number of respondents were getting some sort of social grants (especially those over 60 years). As suggested by some of the interviewees, farmers of higher age often opt for farming in order to enhance their livelihoods and to earn extra money as well as in order to "keep themselves busy". Fifty-five percent (n =

[68] https://www.maxqda.com/

81) of farmers was doing agriculture for less than 10 years. The proportion of market-oriented and subsistence-oriented farmers was balanced, where 53% (n = 78) of farmers were primarily growing for sale. Nevertheless, farmers mostly combined both strategies.

4.3.2 Land Tenure Arrangements and Access to Land among Farmers of Soweto

More than half (55%, n = 80) of the farmers in the research sample cultivated open space gardens, which were located along roads, power lines, or on the dumpsites. Open space gardens were also found at parks or wetlands. About 35% (n = 51) of farmers were based on institutional land, mostly at schools, health clinics or at community centres. Some of the respondents (10%, n = 14) cultivated backyards of the houses they were renting out.

First land owner category identified in the research sample is represented by individuals (20%, n = 29). Privately owned land mostly referred either to backyard gardens (n = 14) or to open space gardens (n = 14). Roughly 46% (n = 67) of the land cultivated by farmers in the research sample is owned by the municipality, especially the open space gardens. The institutional gardens are mostly managed by the representatives of the respective institution (e.g. school board, etc.). Although nearly 30% (n = 44) of respondents stated, that the land they cultivate is owned by the institution where the garden is located, in fact the ownership can be more complicated especially at public schools which are mostly located on the state-owned land[69].

Majority of farmers (57%, n = 84) had some sort of non-formal agreement, either written or oral (i.e. non-formal contractors). It is surprising, that non-formal agreements are predominant even among farmers located at institutional land. This might be partially explained by the fact, that leasing of institutional land can be quite long process which includes various meetings between the farmers and the representative bodies. Therefore, some of the institutional representatives can rather prefer simple yet extra-legal process of oral agreement over the lease agreement which is formal and legally recognized but the procedure is slower and more complicated. Furthermore, lease represents a long-term liability which cannot be easily cancelled thus it necessarily does not have to be convenient for number of institutional representatives. Additionally, it must be noted that not all informal contractors had an agreement from the land owner. At some cases, farmers obtained an agreement/permission from another person/institution who is enjoying substantial authority in the area but who does not have the legal right to establish such agreements. It especially applies to farmers at open space gardens, who often have oral agreement from ward councillor. Although such agreement guarantees them some sort of legitimacy, it does not provide any legally based relation over the land as long as all the municipal land must be officially leased through Joburg Property Company[70] (JPC). Twenty-four percent (n = 35) of farmers were utilizing their gardens under lease agreement (i.e. formal contractors). Finally, 19% (n = 28) of respondents could be

[69] As explicitly stated in Basic Education Laws Amendment Act 15 of 2011, it is allowed to a governing body, with the approval of the Executive Council to "(i) lease, burden, convert or alter immovable property of the school to provide for school activities or to supplement school fund of that school; and (ii) allow any person to conduct any business on school property to supplement the school fund."

[70] JPC is a city-owned company managing all properties belonging to the City of Johannesburg.

considered as illegal squatters as they did not have any agreement over the land they were using (i.e. non-contractors).

4.3.3 Land Tenure Security for Farmers of Soweto

As explained in the research framework presented above and based on the work of Van Gelder (2010), the analysis distinguished three components of overall tenure security: legal tenure security, perceived tenure security and de facto tenure security, which is encompassed in perceived tenure security. Based on the qualitative analysis together with the relative and absolute frequencies on perception of tenure security, the results hint that the relationship between legal and perceived land tenure security does not necessarily have to be that straightforward as often suggested in the literature review, which mostly proposes that legal tenure security results into perceived tenure security (i.e. that farmers with any sort of agreement should feel more secure on the land they cultivate than non-contractors).

The results of hypotheses testing were not fully in accordance with the expectations drawn on the literature review and rather supported the suggestions arising from the relative and absolute frequencies. As shown in table 4, perceived tenure security was surprisingly high among non-contractors. Fifty-seven percent of non-contractors felt secure compared to 29% of formal contractors and 14% of informal contractors, i.e. the prevalence of perceived tenure security is higher among non-contractors than among both, formal and informal contractors. These unforeseen results were confirmed during the thematic analysis of the interviews as well.

Table 30 Results of hypotheses testing for assumption "legal tenure security is positively associated with perceived tenure security " (H1a-c).

Hypothesis	Results	Notes
H1a: proportion of farmers with perceived tenure security is different among formal contractors (p1) and among informal contractors (p2)	p1 = 28.57% (n= 35)	Perceived tenure security is based on the answer to the statement, "I feel my land tenure is secure." Farmers who answered "agree" are considered secure. Farmers who stated or "I am not sure" or "disagree" are considered insecure. The formality of the farmer's land tenure represents legal tenure security.
	p2 = 14.29% (n = 84)	
p1≠p2	z = -1.83, p = 0.067	
H1b: proportion of farmers with perceived tenure security is different among formal contractors (p1) and among non-contractors (p2)	p1 = 28.57% (n= 35)	
	p2 = 57.14% (n = 28)	
p1 ≠ p2	z = 2.29, p = 0.022*	
H1c: proportion of farmers with perceived tenure security is different among informal contractors (p1) and among non-contractors (p2)	p1 = 14.29% (n = 84)	
	p2 = 57.14% (n = 28)	
p1 ≠ p2	z = 4.54, p = 0.000*	

This paradox on the side of non-contractors can be explained by number of factors, such as the level of trust between the farmer and the land owner, relations within surrounding community, number of years spent in the garden and its location, or by the combination of all of these aspects. Moreover, non-contractors often establish and rely on their own tenure security mechanisms which goes beyond the legal/illegal tenure dichotomy and are more place specific. These might be represented by factors arising from zoning regulations (e.g. non-constructible land, such as land under power lines or land localized in wetlands) or social factors such as local community's recognition of public good benefits (maintenance, public safety) occurring from farmers' work and presence. In case of informal contractors, their relatively week perceived tenure security can be explained by lack of trust between the farmer and the land owner, unclear regulations of informal agreements, rent hike in case of formal contractors

and/or by hidden power-relations within the institution. Furthermore, schools (or institutions in general) often perceive urban agriculture as a temporal activity which is very beneficial once there is no other use of the property but, at the same time, it can be easily replaced when a more appealing utilization of the space emerges. It can be, for example, building of new constructions (e.g. new buildings) or extension of the services provided by the institution.

4.3.4 Investments in Urban Agriculture among Farmers of Soweto

Based on the descriptive statistics of the Investment Index presented in table 5, the overall investment level in urban agriculture in Soweto seems to be low. The mean (19.16) is higher than the median (11.82) which together with a coefficient of skewness (1.84) indicate that only minority of farmers undertake substantial investments into their farming in comparison to the level of investments of the majority of farmers.

Table 31 Descriptive statistics of Investment Index

Descriptive statistics of Investment Index (II)	
No. of observations	147
Minimum value	0
Maximum value	100
Mean	19.16
Median	11.82
Standard deviation	21.99
Skewness	1.84
Kurtosis	6.26

The relatively low level of investments among farmers in Soweto can be caused by a number of factors. Probably the mostly pronounced driver was a lack of financial assets which inhibits farmers to purchase inputs needed for further development of their farming. The issue of limited financial resources is also sustained by the access to and use of credit services. Due to lacking financial capital, farmers in the interviews often agreed that they mostly buy only the most essential inputs for their agriculture. Furthermore, in terms of investments of a larger scale, such as purchase of an irrigation system or a tunnel, farmers also consider the need of a consent for setting up a construction of non-permanent character from the land owner. Nevertheless, probably the most significant factor considered by the farmers is the possibility to receive and external support (in form of some sort of grant or material assistance) from the municipal government. The external support can provide farmers with substantial means important for initial boost of their farming and for sustaining their agriculture practice later on. However, it can also lead toward great dependency on the assistance which can result into production problems.

4.3.5 Land Tenure Security and Investments to Urban Agriculture

Table 6 shows, that the results of hypotheses testing were fully supporting the formulated assumptions, i.e. that each land tenure security dimension is positively associated with investments. Furthermore, third assumption, that *de facto tenure security is positively associated with investments,* was (additionally to Welsh's t-test) verified by correlation between the number of years spent in the garden and the level of investments. The value of Spearman's

rank coefficient ($\rho = 0.223$, $p = 0.006$) suggests clear relation between the level of investment and the number of years spent in the garden. Fifth assumption, that *legal tenure security and perceived tenure security are interrelated and both are important determinants of investments* was verified by Cramér's V and by descriptive statistics of Investment Index. As long as de facto tenure security was considered as the determining component of perceived tenure security, only relation for legal and perceived tenure security were verified. The value of Cramér's V (Cramér's $V = 0.31$, $p = 0.001$) for variables perceived tenure security and land tenure security showed a strong association between these two components of overall tenure security. Consequently, the descriptive statistics for various groups of respondents based on their legal and perceived tenure security and for the Investment Index were compared and summarized in table 7.

Table 32 Results of hypotheses testing for assumptions "legal tenure security is positively associated with investments" (H2a-c); "perceived tenure security is positively associated with investments" (H3); and "de facto tenure security is positively associated with investments" (H5).

Hypothesis	Results	Notes
H2a: Ø II of formal contractors (FC) is different from Ø II of informal contractors (IC)	Ø II of FC = 35.13 (n = 35)	Legal tenure security is represented by the forms of land tenure. While formal contractors are considered as legally secure and informal contractors have semi-legal security, non-contractors do not dispose with any form of legal security.
	Ø II of IC = 15.07 (n = 84)	
Ø II of FC ≠ Ø II of IC	t = -4.09, p = 0.000*	
H2b: Ø II of formal contractors (FC) is different from Ø II of non-contractors (NC)	Ø II of FC = 35.13 (n = 35)	
	Ø II of NC = 8.59 (n = 28)	
Ø II of FC ≠ Ø II of NC	t = -5.5470, p = 0.000*	
H2c: Ø II of informal contractors (IC) is different from Ø II of non-contractors (NC)	Ø II of IC = 15.07 (n = 84)	
	Ø II of NC = 8.59 (n = 28)	
Ø II of IC ≠ Ø II of NC	t = -2.64%, p = 0.010 *	
H3: Ø II of farmers with perceived tenure security (PTS) is different from Ø II of farmers without perceived tenure security (NPTS)	Ø II of PTS = 23.43 (n = 65)	Perceived tenure security is based on the answer to the statement, "I feel my land tenure is secure." Farmers who answered "agree" or "I am not sure" are considered as secure. Farmers who stated "disagree" are considered as insecure.
	Ø II of NPTS = 14.79 (n = 82)	
Ø II of PTS ≠ Ø II of NPTS	t = 2.3872, p = 0.019 *	
H4: II of farmers with de facto (physical) tenure security (DTS) is different from II of farmers with no de facto (physical) tenure security (NDTS)	Ø II of DTS = 23.39 (n = 96)	Physical tenure security is represented by the variable fence, which represents protection against thefts as well as a tenure building strategy.
	Ø II of NDTS = 9.62 (n = 51)	
Ø II of farmers with PTS ≠ Ø II of farmers with NPTS	t = -4.83, p = 0.000*	

Source: Author, based on questionnaire survey

As suggested in table 7, farmers with both, legal and perceived tenure security invest into their farming. Nevertheless, the results show that farmers who dispose with perceived tenure security tend to invest more than those who do not have any perceived tenure security, even when legal tenure security was controlled. However, once the *level* of land tenure is considered (where being formal contractor represent the highest level of land tenure arrangement while being a non-contractor is understood as the lowest level), the average investments are higher among farmers with more advanced levels of land tenure arrangement regardless the level of perceived tenure security. Accordingly, the presented results suggest conclusion that both dimensions of tenure security are substantial, yet legal tenure security seem to be more important driver of investment.

Table 33 Investment index (II) and distribution of farmers according to land tenure category and perceived tenure security.

Investment index (II) and distribution of farmers according to land tenure category and perceived tenure security				
	farmers with perceived tenure security		farmers with no perceived tenure security	
land tenure	Mean of II	no. of respondents	Mean of II	no. of respondents
non-contractors	9.83	16	6.94	12
informal contractors	14.30	12	15.20	72
formal contractors	46.25	25	30.69	10

Even though the results presented in table 6 and table 7 are statistically significant for this respective sub-group of farmers, one must be careful once interpreting them. Firstly, the level of investment is generally low and number of farmers depends on external support. Therefore, the fact that farmers possess some of the tools and equipment included in Investment Index does not have to necessarily imply that farmers bought them by themselves. Based on the qualitative analysis, it is more likely that formal and informal contractors received part of their tools and equipment from grants of Department of Social Development and Department of Agriculture of the City of Johannesburg. As long as non-contractors cannot receive such support, it can partially explain the reason behind lower levels of investments than among formal and informal contractors. Secondly, despite the fact that perceived tenure security is widespread among non-contractors (as suggested by the presented analysis), it can differ in its relative intensity in comparison to informal and formal contractors[71]. Furthermore, if non-contractors are aware that some kind of investments would require an agreement from the officials otherwise it would attract unwelcomed attention, they might feel discouraged to spend their capital in such interventions. Instead, non-contractors can possibly invest in other inputs which were not included in the Investment Index. Hence the results should be dealt with care and must be understood only as one of the possible explanations for the investment behaviour among urban farmers.

5 Discussion

The aim of the dissertation thesis was to contribute to ongoing debate on urban agriculture by provision of empirical evidence on land tenure and investments. At the same time, the ambition of this thesis was to emphasize the need for paradigm shift in urban agriculture literature from land tenure formalization discourse proclaimed by Feder et al. (1988) and de Soto (2000) to more socially-oriented approaches proposed by Hornby et al. (2017) and Ribot & Peluso (2003). In the spirit of de Soto's (2000) key idea that insufficient land rights and lack of legal tenure security are the main inhibitors for further development of marginalized communities, the mainstream urban agriculture researchers (e. g. Bryld, 2003; FAO, 2012; Mubvami & Mushamba, 2006; Ruel et al., 1999; Van Veenhuizen & Danso, 2007) often emphasize the need of land tenure formalization for sake of legal land tenure security. Consequently, the issue of land tenure and land tenure security is viewed as a very narrow concept which is bounded almost exclusively by the recognition of farmers' legal rights over the land they cultivate.

[71] The measurement of perceived tenure security intensity was out of the scope of this research.

However, the results of this case study demonstrate, that land tenure security is rather a multidimensional concept as described by Van Gelder (2010), and that it necessarily does not have to emerge from the legally established land rights.

The research findings highlight the importance of perceived tenure security. Considering the fact that it was more prevalent among farmers with no permission over the land under cultivation than among farmers with informal and formal agreements, it can be concluded that perceived tenure security does not always arise from legal tenure security, as was originally assumed prior the data analysis. While farmers with no permission often established and strengthened their perception of tenure security by alternative means originating from de facto tenure security, such as relations within the community and/or zoning regulations, farmers with formal or informal agreement felt relatively insecure mainly due to mistrust towards the land owners and possible power relations influencing the viability of given agreement. Hence, the findings of the presented case study clearly demonstrate that the conceptual understanding of land tenure security for urban agriculture is often shrank and goes along the economic oriented and legal based schools, as defined by Simbizi et al. (2014). Simultaneously, the recent literature on urban agriculture is widely omitting the importance of the context-related aspects, social relations and hierarchies in land tenure security, as suggested by Hornby et al. (2017), as well as the essence of mutually beneficial relationships established among urban farmers, surrounding communities and land owners as emphasized by McLees (2011) and Ribot & Peluso (2003).

One of the reasons behind the call for formalization of land tenure security for urban farmers is the hypothesis of Feder et al. (1988) who claimed that farmers with secure land tenure tend to invest more into their agriculture thus they increase their productivity. Nevertheless, there is one major flaw in this argumentation emerging from the lack of empirical evidence, as argued by Zezza & Tascioti (2010) and Webb (2011). As suggested in the literature review, the exact studies examining productivity of urban agriculture or exploring the investments to urban agriculture in developing countries are generally missing in both, academic and grey literature, and the same principle applies to land tenure security as discussed above. Furthermore, case studies (in English) researching the relation between land tenure and investments/productivity to urban agriculture are scarce. Consequently, academics and policy makers mostly build on the studies which are based on evidence from rural areas and/or on expert judgement. Therefore, one of the aims of this dissertation was to investigate the relation between three dimensions of land tenure security and their impact on investments to urban agriculture.

The results of the dissertation show that there is a positive association between all three dimensions of land tenure security and investments. However, the factual level of investment among Sowetan farmers is very low and the majority of farmers who cultivate their garden under some sort of agreement (formal or informal) depends on external support from the municipal bodies and other parties. Therefore, it is not clear whether farmers with higher Investment Index purchased the tools and equipment by themselves or it was donated to them. Moreover, although Cabannes (2006) and Lynch et al. (2001) suggest that farmers do not have access to financial services due to informality of their land tenure, the findings suggest that even

those who had access to credit did not intend to use it for urban agriculture. It is especially the high dependency on external support and reluctancy to use credit for farming among farmers with formal and informal agreements which questions the validity of some of the arguments for land tenure formalization. In fact, it seems that farmers cultivating land under no agreement are more proactive in their farming and vice versa – those who were mostly relying on donations showed less enthusiasm for improving their agriculture practise. Undoubtedly, land tenure formalization in order to enhance the provision of and the ability to receive external support based on the land tenure status can boost farmers' enterprise, on the other hand it can hinder their willingness to actively and independently develop their farming. Nevertheless, it must be noted that the research included both, subsistence and market-oriented farmers. As long as the results suggested that the attitudes towards investments are different between these two groups, as the average level of Investment Index was higher among market-oriented farmers, the findings on the investments could diverge if the research would be focused only on them[72].

Furthermore, despite the proclaimed land tenure efforts emphasized in numerous policies on urban agriculture and/or food security (e.g. City of Cape Town, 2006; Cofie et al., 2005; IMWI & RUAF, n.d.; MDP-ESA & RUAF, 2007; MDP-ESA & RUAF, n.d.; RUAF & IMWI, n.d.) as well as in Johannesburg's policy *A City where None Goes Hungry* (2012), the effectivity of the proposed solutions may be insufficient. The dynamics of land access processes described above suggest that the City of Johannesburg's food security policy had only limited impact on farmers participating in the research as only few (whether any) of them benefited from the land allocation and leasing procedures described in the document. Bearing in mind the high level of bureaucratical burden related to leasing of the municipal land through JPC without the assistance of Department of Social Development as elaborated in chapter 4.3.2.1, the high prevalence of informal and extra-legal land tenure arrangements signifies the inflexibility of the statutory tenure systems as described by Veléz-Guerra (2004) and the possible marginalization of farmers outside the zones dedicated to urban agriculture (as discussed by Halloran & Magid (2013)).

5.1 Policy considerations

Much has been said about the productivity of and investments in urban agriculture, even though at the general level. Despite the importance of these two phenomena, the key message of this dissertation does not lie in the examination of investments of Sowetan farmers. Instead, the major contribution of the dissertation translates into the discussion over the land tenure formalization and land tenure security for urban agriculture. As mentioned above, land tenure formalization is often seen as a cornerstone for further development of urban agriculture. Nevertheless, considering the discussion of the results and the literature presented above, an important question arises: *Is it important to farmers to have their land tenure formalized?* Even though the dissertation cannot fully answer this question, the author believes that insisting on

[72] Subsistence-oriented farmers often choose urban agriculture as a complementary element to their livelihood strategy, thus they do not necessarily have to feel the urge to improve their farming practice through investments. On the contrary, urban agriculture for market-oriented farmers more likely represents an income-generation strategy, therefore it is in their best interest to keep their farming practice competitive and to invest into their agriculture.

land tenure formalization does not have to necessarily bring all the good to the farmers as long as it can distract the relations and links enrooted in the communities by introduction of the external actors, who are often represented by institutional authorities. This dissertation indicates that farmers, who are outside of the system of informal and formal agreements (i.e. those who cultivate their land without any permission) are generally more confident in their land tenure security and farming than the others. Surprisingly, the confidence often emerges exactly from the fact that the farmers are out of the system and that they are independent, thus they are prone to any harms which can be caused by the authorities. Of course, the illegal status of their farming can be endangering in its nature but the level of trust in the relations within the community is often far stronger than the level of trust in formal or informal agreement over the land, especially in the context of the apartheid era heritage. Indeed, this is a very simplified narrative of extremely complex phenomenon, nevertheless it demonstrates the need for more holistic approach to the land tenure issue which would recognize the social relations and would reflect the situation on the ground.

Indeed, the land rights formalization is an important process and, from the governance perspective, it is not sustainable nor efficient to preserve the dual system of legal and extra-legal land tenure. However, as suggested by Bromley (2007), Hornby et al. (2017) and Ribot & Peluso (2003), it is important to consider the slow withdrawal of the legally oriented land tenure paradigm and to rather work on its shift towards more socially and place-based approaches, which are even more appealing in Johannesburg, and sub-Saharan African context in general. Consequently, the academia together with policy makers should focus on rethinking the existent mechanisms of land tenure formalization towards less bureaucratical and more farmer-friendly ones than currently rooted in, for instance, Johannesburg's food security policy *A City where None Go Hungry*. The processes of land acquisition and the dynamics behind perceived tenure security suggest, that the perception of urban farmers as food providers is too narrow as long as farmers provide also other services. Nevertheless, these are considered only marginally, hence the farmers' position of valuable community members, who eventually take over services provided traditionally by the municipality, is often overlooked. Therefore, the author proposes more thorough consideration of mutually beneficial relations between the farmers and landowners (as in detailed described by McLees, 2012) as a base for land rights formalizations. In such scenario, municipalities together with institutions located at large land areas can consider allowing farmers on their properties under simplified leasing procedure – while the land owner would provide the land, the farmers can stand for property maintenance and other service provisions. Moreover, it is also important to develop a set of guarantees (such as a possibility of lease agreement negotiation) for the farmers in order to enhance their trust in authorities as well as increase the level of their perceived tenure security.

Undoubtedly, the whole land rights formalization process cannot be done only under this simplified leasing procedure, thus it is of more complementary character. Nevertheless, this proposition is crucial for the recognition of perceived tenure security as equal to legal tenure security, and as a key driver of overall tenure security in general. Nevertheless, if the principle of mutually beneficial relationship will be embedded in the leasing procedures, the level of perceived tenure security can be significantly enhanced as long as it enables to establish more

sound relationship between farmers and land owners with clearly identified needs on both sides. Despite this proposition might seem abstract, it must be emphasized that it is not a new practice – it builds on already widely practiced processes established outside of the legal system that are more respectful to the needs of the farmers. Hence, instead of developing new, and often highly bureaucratic, procedures of land rights formalization which can result into farmers' marginalization, it is more efficient to empower farmers through processes they are already familiar with, but at this time, they will be anchored in the legal system.

Conclusion

The dissertation thesis aimed to explore the relation between land tenure and productivity of urban agriculture based on the provision of empirical evidence from Soweto, South Africa. It addresses the call by Zezza & Tasciotti (2010), who emphasize the need for reliable data in urban agriculture research, and by Webb (2011) who stress the importance of analytical studies for urban agriculture policy making. However, the existing body of literature examining the land tenure and productivity of urban agriculture has been rather lacking or provide insufficient evidence. Therefore, this dissertation fills the identified research gap by thorough exploration of both land tenure and productivity proxied by investments, and their interactions. Furthermore, although Zezza & Tasciotti (2010) advocate for mostly quantitative studies, the methodological approach of this research shows the importance of employment mixed-method research design which combines both, qualitative and quantitative analysis. As results showed, the outcomes of quantitative analysis often provide only limited evidence which requires further explanation of the underlying phenomena by qualitative data.

The results of the literature review in this thesis introduced the concept of urban agriculture and examine the literature on productivity of and investments in urban farming. The reviewed literature suggested that there are significant limits in the literature as only few studies elaborated on the productivity and investments in urban agriculture in depth. Secondly, the literature review focused on land tenure and land tenure security for urban agriculture. As the existent studies on urban agriculture lack a proper theoretical framework for examination of land tenure and land tenure security, the findings of the parts of literature review focused on these phenomena are valuable especially in terms of modification of land tenure theories in a manner that fits to urban farming. Furthermore, the discussion of land tenure and land tenure security for urban farmers from the policy perspective identified flaws in the current policy practice.

The core of the dissertation was presented in the case study focused on land tenure security and its implications for investments to urban agriculture in Soweto, South Africa. The case study utilized the knowledge gained through literature review in terms of empirical research based on quantitative and qualitative data inquired among farmers of Soweto, South Africa. The thorough explanation and discussion of the methodology set a potential research framework for future research intending to deal with the related complex phenomena. Furthermore, the methodology description also underpinned the importance of mixed-method research and the

complementarity of quantitative and qualitative data analysis in urban agriculture and land tenure research.

The results of the quantitative and qualitative analysis conducted within the case study showed that the relationship between legal and perceived tenure security diverges from the traditional conception presented by numerous authors on urban agriculture. The fact, that perceived tenure security does not necessarily have to result from legal tenure security represents a key message of this research, thus significantly enriches the existing literature on urban agriculture. Surprisingly, farmers who cultivated their land without any permission often felt more secure on their land than those who disposed with some sort of formal or informal agreement. These farmers, referred as non-contractors, established their land tenure security by various alternative means (e.g. farming of non-constructible land, strong relations within the community, etc.) which are beyond the scope of conventional understanding of literature on urban agriculture.

Secondly, the case study also contributed to the discussion over the productivity of urban agriculture. Even though the original focus of this dissertation was centred about the productivity of urban agriculture in Soweto, the farmers were not able to provide sufficient data on their yields. Therefore, the productivity was proxied by investments into farming examined by Investment Index developed by the author. The dimensionless Investment Index captured the level of investments among the Sowetan farmers based on a series of questions examining their ownership of productive assets. The constructed Investment Index was valuable not only for the analysis of farmers' investment behaviour, but it also represents a vital tool which can be used by other research who will aim to analyse investments amongst small-scale and urban farmers.

Finally, the case study focused on the relationship between land tenure security and investments to urban agriculture. The analysis revealed that the level of investments among Sowetan farmers was generally very low and most of the farmers with formal or informal agreement depended on the external support. Although the presented findings hinted that all dimensions of tenure security are substantial for investments, it seems that legal tenure security was the most important. Nevertheless, the fact that the mean of Investment Index among farmers with no permission for the land cultivation was lower than among farmers with formal or informal agreement necessarily does not have to imply that the first group of farmers would invest less into their farming. As long as farmers with formal or informal agreement can reach external support, it is expectable that the tools and equipment they possessed were obtained through donation rather than through direct purchase.

The author argues that the results and the discussion presented in this dissertation represent a significant contribution to current literature on urban agriculture. Consequently, the findings should encourage policy makers and other researchers to shift their understanding of the relationship between land tenure and productivity from the one based on the dichotomic view of legal-illegal land tenure towards a more holistic approach which would consider the nuanced structures of various land tenure arrangements.

The Sowetan context is very specific due to historical development of the location, thus the land rights structure in other countries/cities does not have to correspond with the one presented in the case study. Consequently, the transferability of the results can be limited. However, the aim of this dissertation was not to present a universally applicable results to all situations. Therefore, the thesis should not be considered as the end-point of research on land tenure implications for urban agriculture but it should be rather perceived as a cornerstone for further exploration of the phenomena in developing countries. The author believes that the presented methodological framework as well as the results and their discussion will encourage further elaboration of other researchers. These might lead towards various directions. Firstly, it is substantial to unfold the conflicting nature of legal and customary land tenure for urban agriculture and to explore the competing interests of numerous actors, ranging from traditional leaders to urban authorities at all municipal levels. The identification and classification of various land tenure systems' conflicting areas will allow for improved policy formulation which would be able to further elaborate on the considerations presented in this dissertation. Secondly, the relationship between the productivity and (perceived) land tenure security remained under-researched and the future investigation should consider two particular issues. While the exploration of urban agriculture productivity needs a more holistic approach which requires detailed and systematic data on its different aspects, the research on perceived land tenure security calls for a clearer and more nuanced measurement of its intensity. Finally, a crucial factor influencing both, productivity and (perceived) land tenure security, is represented by social relations of urban farmers and by their perception and recognition of legal authorities. Despite the fact that the mentioned drivers are substantial for any policy formulation, these remained insufficiently examined. Although the presented scopes of further research are indeed very complicated and require extensive cooperation among researchers from different disciplines, it is important to note that only more complex knowledge can significantly contribute to comprehensive policy formulation which will allow for further development of urban agriculture.

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Abstrakt

Držba půdy a její bezpečnost jsou často považovány za nejvýznamnější determinanty určující životaschopnost městského zemědělství, zejména pokud jde o jeho produktivitu a potenciální investice ze strany farmářů. Řada autorů však staví své myšlenky na tradiční zemědělské teorii, že pouze legální držba nebo vlastnictví půdy mohou vyústit v bezpečnost jejího využívání a tím zvýšit produktivitu městského zemědělství jako takového. Na základě této argumentace pak autoři zdůrazňují potřebu formalizace vlastnických práv jako základ pro prosperující městské zemědělství. Tato tvrzení však často pochází z nedostatečných anebo neexistujících empirických důkazů. Proto je hlavním cílem této práce obohatit stávající literaturu o případovou studii, která na základě empirického zkoumání přináší tolik potřebné důkazy pro diskusi o formalizaci vlastnických práv pro městské zemědělce. Dizertační práce také přispívá k současné literatuře o produktivitě městského zemědělství prostřednictvím indexu měřícího úroveň investic mezi městskými zemědělci, který je sestrojen na základě nemonetárních a snadno dostupných informací od farmářů. Výsledky této dizertační práce ukazují, že tradiční pojetí držby půdy pro městské zemědělce je příliš úzce zaměřeno na její legální aspekty a je potřeba ho obohatit o další aspekty, zejména o zohlednění sociálních vazeb a kontextuálních informací, které zcela zásadním způsobem ovlivňují jak vnímání bezpečnosti držby půdy, tak produktivitu městského zemědělství jako takového.

Klíčová slova: držba půdy, bezpečnost držby půdy, produktivita, investice, investiční index, městské zemědělství, Soweto

Curriculum Vitae

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Working experience

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Summer Schools and Courses

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Conferences with active participation

ClimRisk 2020 online conference, 8th Annual Conference of Italian Society for Climate Sciences – *Participatory foresight methods as a tool for climate change adaptation planning, the case of the Czech Republic.*

Royal Geographical Society Annual International Conference, London, 2020 (*accepted abstract, postponed to 2021) - Moving beyond legal tenure security for urban agriculture: the case of Soweto, South Africa.*

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