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Urban [Vertical] Agriculture: Prospects of a Food Sovereignty Alternative in Johannesburg?

Masters Research Report

Submitted to the Faculty of Humanities, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Masters in Development Studies

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List of Abbreviations:

AFNs	Alternative Food Networks
COJ	City of Johannesburg
COPAC	Co-Operative and Policy Alternative Centre
CSA	Community Supported Agriculture
CSR	Corporate Social Responsibility
DAFF	Department of Agriculture Forestry and Fisheries
FTFA	Food and Trees For Africa
GADS	Gauteng Agriculture Development Strategy
GARD	Gauteng Agriculture and Rural Development
GCSRI	Global Change and Research Institute
GM	Genetically Modified
NGOs	Non-Governmental Organisations
OFN	Open Food Network
SAFL	Southern Africa Food Lab
SAFSC	South African Food Sovereignty Campaign
UJ	University of Johannesburg
WTO	World Trade Organisation

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1. INTRODUCTION

1.1. Research aims and objectives

The purpose of this study will be to explore perceptions of the socio-economic, socio-political and ecological viability of urban agriculture as an alternative food system within the Gauteng region among key stakeholders. The study seeks to understand how sector stakeholders perceive the issue of food security in the context of climate change and determine their response to the concept of urban agriculture, including a specific type of urban agriculture – vertical farming – as a possible solution to the social problem under study. Vertical farming is the practice of cultivating plants and producing food within tall buildings (skyscrapers) or on vertically inclined surfaces. The modern vertical farm makes use of controlled environment agriculture technology where all environmental factors can be controlled. The study will seek to uncover any barriers and opportunities that impact upon urban agriculture and determine if urban vertical farming will face similar barriers and opportunities. As such, the purpose of this study is to determine and understand whether urban agriculture including vertical farming has a future in South Africa as an alternative food system to achieve food sovereignty.

1.2. Research Question(s)

What is the perceived viability of urban agriculture, as a means of achieving an alternative food system rooted in food sovereignty? A case study of the perceptions of sector stakeholders within the Gauteng region.

1.2.1. Sub-questions:

- What are the perceived barriers and opportunities to the implementation and diffusion of urban agriculture in Gauteng?
- Do stakeholders perceive the vertical farm, as a form of urban agriculture, having a future in South Africa as an alternative food system?

1.3. Rationale

The effects of climate change on food security has sparked debate on how to enhance food security without further conceding social and environmental outcomes. The effects of climate change are real and collectively felt with 2015 being recorded as the hottest year in history; it is thus the most urgent threat facing humanity. South Africa has been in the midst of a drought in 2015/16, with 2015 being recorded as the driest year since 1904. The low rainfall across the country has resulted in low harvesting output in the agricultural sector, which as a result threatens food security nationwide.

Research shows that climate change poses serious challenges to food security, whereby agricultural production will be affected by changes in temperature and rainfall, which will impact land suitability and therefore lower crop yields (Schmidhuber & Tubiello, 2007). Furthermore, a lack of rain in areas of largely rain-fed agriculture will reduce harvesting yields resulting in a general scarcity of food which leads to higher prices – as a result, consumers purchasing power decreases and threatens their accessibility to food. In addition, the altered crop production results in scarcities in the market, which increases the price of certain goods and increases a country's dependence on imports. For instance, South Africa needed to import about five to six million tons of maize in order to mitigate the effects of the current drought on maize production in the country.

As a result, the effects of climate change on food security have brought together state leaders and the international development community who continue to embody a 'productionist' view on food security, through which they formulate policies aimed at increasing the production of food (Pereira, 2014). Countries that experience high levels of food insecurity and hunger exacerbated by climate change have developed strategies that advocate for increased production and trade to mitigate the effects of climate change in order to address food security. The introduction of Genetically Modified (GM) food has been celebrated by big corporations as a solution to the food crisis, whereby GM seeds will not only be able to produce sufficient yields, but they will be able to withstand the effects of climate change. However, this techno-fix is typically a band-aid approach that covers up the symptoms but does nothing to address the root cause of the problem. Research shows that while climate change affects agriculture, the way in which the industrial agro-food system is structured subordinates

environmental and social issues to improving the bottom-line, and further exacerbates the effects of climate change.

In Johannesburg, it is estimated that forty percent of households are food insecure, where it has been suggested that the root of this insecurity lies at the centre of high prices and low wages (Cock, 2013). The need for large amounts of inputs in industrial agriculture increases the cost of production as well as consumption, making it more difficult for poorer consumers to access food through the market. This is exacerbated when climate change leads to scarcities in production. As a result, the dire desperation to feed oneself and one's family leads to social unrest when prices rise above a given threshold. The food sovereignty movement, argues that this can all be avoided, and food security can be attained once a food system that is based on human needs and not corporate profit replaces the existing agro-food system.

Food sovereignty is presented as a sustainable alternative embedded in agroecology. Agroecology has been defined as a way of producing food that "uses ecological concepts and principles for the design and management of sustainable agroecosystems where external inputs are replaced by natural processes such as natural social fertility and biological control" (COPAC, 2014, p.55). The role of small-scale family farmers and urban agriculture are often presented in the food sovereignty approach as a means of achieving this alternative food system. However, research on its viability is limited.

In South Africa, only 13 percent of the land is suitable for crop production, which will decline in the long run if industrial agriculture is allowed to continue using unsustainable farming methods. While South Africa has some "hydroponic systems it is an undervalued practice, and in general, our farmers are scared or sceptic to use it" (Combrink, cited in Davey 2010, p.115). However, the introduction of hydroponics to urban farms is gaining momentum in the city of Johannesburg, for instance, *Green City Farms Jozi* - where produce has been grown vertically with hydroponic systems. Furthermore, *Jamajoco Farming Enterprise* in Tarlton Gauteng produces a range of lettuce and herbs using hydroponics and has formed part of Woolworth's sustainable farming initiative 'Farming for the Future'.

Given the urgent sustainability crisis facing the country, food security will continue to be threatened by climate change. It is therefore necessary to understand how the food system can best adapt to climate change through the introduction of an alternative food system expressed through urban [vertical] agriculture if they prove to be a viable alternative to the existing food system. This research will therefore be useful to determine the extent to which urban agriculture, including urban vertical farming, is perceived to be a viable alternative agricultural option in South Africa.

2. Literature Review

2.1. Introduction

The literature considered in this review locates this research within a sustainable development paradigm using the works of Clapp & Dauvergne (2011), who present four main worldviews on environmental change and its relationship to the political economy namely; the market liberals, institutionalists, bioenvironmentalists and social greens. While discussing these worldviews I discuss how they would align with either a food security or food sovereignty positionalities. Thereafter, the literature review looks at the political economy of food in South Africa in order to highlight the injustices that permeate the industrial agro-food system. This brings to the fore two alternative understandings of the food challenge; the orthodox approach to food security, and food sovereignty an alternative approach to hunger. These are contrasted against each other, where the food sovereignty approach finds food security to be an inadequate approach to reducing hunger. The literature points to the necessity of food sovereignty as a precondition to achieve food security and discusses urban agriculture as a possible means to attain food sovereignty. These bodies of literature make the argument for the need to research the viability of urban agriculture, including vertical farming, as an alternative agriculture system to achieve food sovereignty. While vertical farming appears to be one possible solution to South Africa's agricultural crisis, it is worth investigating why we are not pioneering its development, which could lead one to question whether there is sufficient policy support for urban agriculture in general.

2.2. Four Environmental Paradigms

2.2.1. The Market Liberals

Market Liberals base their analysis on neoclassical economics, where it promises to save the planet from ecological destruction by furthering the expansion of capitalism (Clapp & Dauvergne, 2011). Market liberals believe that for human wellbeing and the safeguarding of sustainable development, economic growth and high per capita incomes are essential. Sustainable development has been defined as "development which meets the needs of the

present without compromising the ability of the future generations to meet their own needs" (World Commission on Environment and Development (WCED), 1987). Market liberals place great faith in modern science, technology, and human ingenuity to overcome any environmental issue (including food shortages) that may be incurred. For example, they "see advances in agricultural biotechnology, as a key answer in providing more food for a growing world population" (Clapp & Dauvergne, 2011, p. 6). By calling something green, and claiming benefits to the environment under the banner of sustainable development, a new green capitalism (economy) has emerged. The green economy is an example of how market liberals have been able to merge orthodox neoliberal economics into something that appears to consider the environment, however as critics argue it is yet another marketing tool to sustain-development (Wanner, 2007) and/or to sustain a growth path (Cock, 2013).

When looking at the different perspectives on understanding the food challenge, namely a food security approach and a food sovereignty approach, one can easily place food security within this paradigm as it aligns with a market oriented worldview. Food security is about ensuring that people have adequate and nutritious food in order to meet their dietary needs. The World Bank and other global institutions have used food security discourse as a means to justify and perpetuate neoliberal trade liberalisation projects in order to allow the market to solve the problem of hunger (Otero, Pechlaner, & Gürcan, 2013). Hence, we find that global leaders and global institutions adopt a discourse of sustainable development (and in this case food security) for the purpose of sustaining a growth path.

2.2.2. The Institutionalists

Institutionalists agree with market liberals on the positive effects of economic growth, globalisation, and technological advancements, however, they differ in terms of the amount of global cooperation needed to direct the global economy (Clapp & Dauvergne, 2011). Institutionalists emphasize the need for stronger global institutions and collective norm regulations, as well as extensive state and local capacity. The institutionalists worldview contradicts the principles of a food sovereignty paradigm, as they believe that sovereignty is at the centre of environmental degradation, and overlook the way in which the global political economy is organised (which is at the core of a food sovereignty approach). Institutionalists,

while they would agree to uphold values of organic production, sustainable development and sustainable production, they would be against having alternative food systems that are not embedded in the global political economy. Essentially, institutionalists advocate for a panoptical effect where global institutions will be able to dictate how the market is run, and how food is produced and distributed, and thereby possibly making it more inaccessible as states will lose the ability to control what happens within their boundaries. This makes the objective of a food sovereignty approach of taking back control of the food system even further to obtain.

2.2.3. Bioenvironmentalists

Advocates within the bioenvironmentalists approach place the natural environment as well as population growth at the centre of concern. Along the lines of the 'ecologic of capitalism' – the natural limits to growth— bioenvironmentalists argue that the earth can only support life up to the point of its "carrying capacity" (Clapp & Dauvergne, 2011). According to bioenvironmentalists the inherent component of consumerism within capitalism, leads humans to consume too much of the earth's resources, such that we are close to, or have already over-stepped the earth's carrying capacity. Bioenvironmentalists argue that:

> A relentless drive to produce ever more in the name of economic growth is exhausting our resources and polluting the planet. Many argue that the drive to pursue ever more economic growth is what has taken the earth beyond its carrying capacity (Clapp & Dauvergne, 2011:10).

Bioenvironmentalists argue that this hyper-consumption together with population growth is draining our limited natural resources. While bioenvironmentalists see the pursuit of economic growth as a threat to sustainable development, they also see that population growth is a threat to sustainable use of resources. The latter aligns to a food security perspective as it is detailed below, the orthodox approach to hunger sees the greatest challenge to food security is meeting a growing demand for food (Cock, 2013; Despommier, 2010). Bioenvironmentalists therefore would agree on curtailing population growth, while not necessarily increasing production of food as they see resources being scarce.

2.2.4. The Social Greens

Social greens believe that environmental degradation is related to the way in which the global economy is organised (Clapp & Dauvergne, 2011). Advocates within this paradigm see how inequality and domination (monopolisation) leads to unequal access to resources (including food) and unequal exposure to environmental harms (including starvation). They see that globalisation is eroding local community autonomy, and call for the need to restore local communities by empowering those who have been marginalised by the unequal system (Clapp & Dauvergne, 2011).

Social Greens argue that physical limits to economic growth exist, whereby they claim that the earth's carrying capacity to provide resources for exploitation as well as to act as a sink for waste produced by capitalisms system of production-consumption is rapidly researching its limit (Clapp & Dauvergne, 2011). This line of thinking is what some would call ecological Marxism (a variant of the social green paradigm), an explanation of the ecologically destructive tendencies of capitalism, also known as the contradictions of capitalism (Pillay, 2013). The first two worldviews did not question the logic of capitalism and its growth path, however, eco-Marxists (social greens) see endless growth as destructive, unequal, and impossible on a finite planet (Pillay, 2013).

This worldview thus takes on an activist position that seeks to challenge the system and therefore aligns itself with the food sovereignty approach. Food sovereignty is about communities taking back control of the food system in terms of what is produced, how it is traded, and consumed (La Via Campesina, 1996). It is a movement based on bottom-up activism bringing awareness and challenging the injustices that are embedded in the global food economy. Furthermore, it brings attention to the unsustainability of current practices and seeks to bring about real change to those who have been marginalised. Accordingly, while market liberals believe that the market will be able to solve the problem of hunger, social greens see the need for activism to challenge a highly unequal system. Thus, both food sovereignty and hence the social green paradigm focus on social justice, where activists seek to challenge a monopoly system, and hence their issue is with the system itself, unlike market liberals and institutionalists who do not see the failings of capitalism.

2.3. The Political Economy of Food in South Africa

The food crisis in South Africa is characterised by the contradictory coexistence of waste and hunger (Cock, 2015). A study conducted by Oxfam reveals that while South Africa produces enough calories to feed the entire population of 54 million people, one out of every four people is food insecure (Tsegay, Masiiwa, & Mistry, 2014). In Johannesburg it is estimated that forty percent of households are classified as food insecure, where it has been suggested that the root of this insecurity lies at the centre of low wages and high food prices (Cock, 2013).

Moreover, it is estimated that we waste up to forty per cent of food along the food chain (Kotze & Rose, 2015). For this reason, it becomes an undeniable fact that food is not evenly distributed in society, and as Cock argues, "the coexistence of waste and the extent of food insecurity illustrate this injustice" (2013, p.9). That is, while we currently produce enough food to feed our population, a vast majority of the population is not being served by the food system in South Africa that is dominated and controlled by a small number of corporations and agribusinesses throughout the food value chain.

For instance, farming inputs are controlled by three seed companies [Monsanto, Pioneer, and Pannar]; about 20% of large commercial farms produce 80% of our food [where the majority of these farms are white owned]; four companies [National Brands, Pioneer Foods, Tiger Brands and Nestle SA] account for 80% of our processed food staples; the formal retail sector is dominated by six supermarket chains [Shoprite, Pick n Pay, Spar, Woolworths, Massmart and Metcash) who together control 94% of the grocery market (COPAC, 2014). The concentration of power in these corporations see food, like other facets of the neoliberal capitalist regime, as another commodity to be traded on the market in their endless pursuit of capital accumulation. However, this has come at the expense of the masses.

When prices are considerably higher than the threshold, as they were in 2007-08 and 2010-11, widespread violence can be expected (Bar-Yam, Lagi, & Bar-Yam, 2015). Analysts have linked the outburst of social unrest in South Africa's informal settlements, the mining sector and among farm workers during the recent years to the rise in the food prices globally (Bormann & Gulati, 2014).

In August 2012, worker riots broke out in the platinum mine, which coincided with record high prices for basic food including maize (Bormann & Gulati, 2014). Poorer consumers depend on maize and wheat as part of their staple diet, and their ability to afford these is more sensitive to price than higher income consumers. Workers' were openly expressing their discontent of their wages, claiming that they were being paid 'hungry wages' that were insufficient to support their family's needs (Bar-Yam et al., 2015). Bar-Yam and associates contend that "this is consistent with the view that when people are unable to feed themselves and their families, desperation leads to social unrest" (2015, p.6). This is not isolated to South Africa, food-related protests have occurred globally, for instance in Haiti, Argentina and the Middle East (often called the Arab Spring in 2010-11). Therefore, these cases of unrest point to the importance of food prices in social conflict worldwide and the suffering of the poor populations.

It is in the context of social unrest that one can identify the social and ecological consequences of the neoliberal food regime. Agricultural growth as means to economic development has resulted in the transformation of the agricultural sector from subsistence farming for communities towards producing for the international market using cash-crops (Crankshaw, 2015).

Cash-crop farming refers to farming crops that are produced to be marketed for profit. In this system value is determined through profitability, and hence viability will be contingent on the profitability of a venture. This understanding of value is based on the classical Marxist concept of value particularly exchange value – which refers to whether commodities can be quantified according to the proportion of other commodities it can be exchanged for (Marx & Engels, 1980).

Cash-crop farming is said to be a means through which developing countries can increase the productivity of their agricultural sector in order to kick-start development (as it was done in previous centuries in now industrialised countries) (Oya, 2010). Before agricultural growth can commence, an agrarian transformation needs to be underway, which refers to a shift towards capitalist agriculture (an increase in production with the sole aim of making a profit).

However, in order to increase production yields, biotechnology has engineered the way in which food is produced through the introduction of Genetically Modified (GM) seeds, that have been modified to resist droughts, attack from pests, and increased amount of herbicides (Despommier, 2010). Genetic modification is the process through which scientists take a gene from another organism and insert it into the seed they want to modify, such as maize (COPAC, 2014) . For instance, maize has been genetically modified to be able to use less water, by inserting a gene that makes the maize plant use less water, and thereby able to resist the climatic effects of severe droughts. In South Africa, seventy per cent of our maize is genetically modified.

The introduction of GM food has been celebrated by big corporations as a solution to the food crisis, whereby GM seeds will not only be able to produce sufficient yields, but they will be able to withstand the effects of climate change. However, this approach to food security is rooted in the industrial food system, whereby the use of GM seeds and other technological and chemical inputs not only increases the cost of production, and consequently consumption, but also emit 25 to 30% of emissions that contribute to climate change (COPAC, 2014).

Furthermore, the declining soil fertility has been attributed to the increased use of chemical fertilisers in industrial agriculture – where over time the use of these inputs removes the natural nutrients of soil, and as a result, farmers need to increase the use of these fertilisers to keep high yields – further increasing the price of production, and consequently consumption (COPAC, 2014). Market oriented practitioners (market liberals) overlook the environmental catastrophe generated through the advancement of agricultural biotechnologies, as they are solely concerned with sustained growth. Consequently, eco-Marxists point out that this is intrinsically linked to the widespread creation of hunger, where the production of food is controlled by a small number of corporations, and by attaching high-price tags on food items, limits an individual's ability to access the food – and thereby causes hunger (COPAC, 2014). This demonstrates how environmental harms are not evenly distributed whereby the poor are at greatest risk.

Furthermore, not only is the food system ecologically unsustainable, but the nutritional value of food is also questionable. The nutritional transition in South Africa is causing malnutrition in

young children under the age of 5, and obesity in older children and adults (Pereira, 2014). The increased prevalence of obesity within the population is raising concern about a coinciding rise in non-communicable diseases, mostly among black women (Shisana et al., 2014). The rise in obesity has been associated with the steady rise in salt and sugar intake, where the latter is also leading to a rising number of diabetes patients (Pereira, 2014). Because fast foods have become so accessible within the country and are easier to obtain than healthier options, as a country we are opting for KFC and other fatty foods, which is leading to a nationwide health epidemic.

By looking at the social and ecological consequences of the industrial food system, one is led to question who this system is actually serving? This demonstrates the need for research into an alternative food system that is more sustainable and equitable. A sustainable development paradigm, particularly, food sovereignty has been chosen to be this research's guiding framework, and is critical of the industrial agriculture system and claims that it is ineffective at reducing hunger. This brings us to different understandings and conceptions of the food challenge that we find ourselves in.

2.4. Understanding the Food Challenge

Polly Ericksen and associates argue "the challenge is significant: enhancing food security without further compromising environmental and social welfare outcomes" (Ericksen et al., 2010, p. 25). Logically, one finds that the way in which different paradigms perceive the cause of the food crisis is operationalised through the approach they take in finding solutions to the crisis. We can therefore identify two distinct approaches to the food challenge, the orthodox (market liberal) approach to food security and the alternative (social greens) approach advocating for food sovereignty.

2.4.1. The Orthodox Approach: Food Security and Population Growth

The orthodox approach to hunger finds the work of Thomas Malthus to be of value as they perceive the biggest challenge to food security is to meet a growing demand for food (Cock, 2013; Despommier, 2010; Gaisie, 1996; Ogola & Sawe, 2013). They assert that overpopulation is the main concern when it comes to food scarcity, and considers hunger to be a natural

disaster due to scarcity (Crankshaw, 2015).

Thomas Malthus formed the principles of population, based on his belief that human behaviour and human nature were not in line with the capacity of the earth. The principles of population have two components, namely the 'natural sexual passions' and 'the limitations of the earth', where the former would lead civilisation down a path of disaster (Ziehl, 2011). Malthus argued that the difference between the rate at which food supplies increase (arithmetically), and the rapid rate at which the population grows (geometrically) would lead to starvation due to the earth's limited capacity to supply food for the growing population (Ziehl, 2011). Although many academics acknowledge that the threats raised by Malthus regarding population growth and cyclical poverty have not been realized in industrialized countries, they also point out that in the 21st century developing countries – especially Africa – are trapped under conditions capable of validating the predictions Malthus raised (Gaisie, 1996; Gould, 2015; Nuscheler, 2012).

Malthus has also been criticized for seeing the production of food as fixed, and not considering how technological advancements would aid food production such as GM foods. GM foods are often cited as a solution to food shortages and hunger (Kotze & Rose, 2015). The World Health Organisation (WHO) defines Genetically Modified food as "foods derived from organisms whose genetic material has been modified in a way that does not occur naturally, e.g. through the introduction of a gene from a different organism" (WHO, 2016) . However, Despommier argues that GM foods will not be able to compete with nature and rapid climate change, whereby the limits to technological advancements will be met; where applying more and more agrochemicals to land will result in lower yields and will not solve the problem of how to feed a growing population (2010).

South Africa's population has grown by 25 per cent between 2000 and 2013. More than half of South Africa's population does not have enough food, and our population is growing. It is estimated that by 2030 South Africa will have a population of 60 million (WWF, 2016) . And as bioenvironmentalists would argue the growing population is putting additional pressure on existing food resources. Rapid population growth combined with weak growth in food

production has resulted in an increase in demand, which has resulted in increased food prices (Ogola & Sawe, 2013).

Rapid urbanisation into Gauteng has also put increasing strain on the province's resources including water and food. The province contributes up to 3 per cent of the total agricultural supplies but accounts for 20 per cent of agricultural demand, and thereby increasing carbon emissions through the transportation of food into the city (Bormann & Gulati, 2014). Therefore, the orthodox approach proposes the need to reduce population growth by reducing fertility, as well as increasing food production by increasing the productivity of agriculture. Essentially, if one adopts the orthodox approach, one notices that population growth leads to an increase in demand for food production whereby conventional agriculture has two options; either the expansion and/or the intensification of agricultural production (Germer et al., 2011).

2.4.1.1. Expansion of production area

Population growth requires the expansion of areas under cultivation to increase agricultural production. This situation is based on extensive cultivation where more land that is less fertile is brought into cultivation (Germer et al., 2011). However, South Africa has limited arable land; only 13 per cent of the land in the country is suitable for crop production, and most of this has only low production potential, where only 3 per cent is high-potential land (Bormann & Gulati, 2014). Furthermore, extensive cultivation has various environmental consequences, for instance, a decline in biodiversity with vast amounts of deforestation. Therefore, one is faced with a trade-off of deciding whether we should cultivate more land for the production of food to address food security (which is the route market oriented practitioners would choose to sustain the growth trajectory), and thus sacrifice the biodiversity of our ecosystems – which questions the path to sustainable development (Germer et al., 2011).

The literature suggests that international agencies such as the World Bank and World Trade Organisation (WTO) have begun to use the discourse around food security as a means to justify and perpetuate neoliberal trade liberalization projects (Otero et al., 2013). The orthodox approach to food security conceptualises the cause of hunger to be the result of limited liberalisation, which is why we see global institutions advocating for neoliberal reforms and cash-crops that will allow the market to 'solve' the problem of hunger. As it was noted

previously, this line of thinking is shared with a market liberal worldview, as the market is seen as a panacea for all issues ranging from sustainable development to food security.

2.4.1.2. Intensification of production

In the twentieth century the world was in a similar situation of dealing with population growth and food security "to feed a growing population, we have no option but to intensify crop production" (FAO, 2011, p. vii). Intensive cultivation refers to increasing cultivation on a single piece of land through additional inputs such as labour, chemical fertilisers, pesticides, and other capital inputs. Agricultural intensification embodied a "paradigm shift from traditional farming systems, based largely on the management of natural resources and ecosystem services, to the application of biochemistry and engineering to crop production" (FAO, 2011, p.3). The intensification of crop production in the developing world began with the Green Revolution beginning in the 1950s through to the 1960s (FAO, 2011) .

The Green Revolution led to a substantial increase in food production and improved food security worldwide. However, in many countries this intensification has led to the exhaustion of agriculture's supply base, threatening future productivity – thus questioning its sustainable development trajectory. Intensive cultivation, although meets the criteria of doing more (increase productivity) with less (land); the increased use of fertilisers, pesticides and other chemicals has a negative impact on the environment, such as; land degradation, erosion of biodiversity and contaminates soil and water supplies (FAO, 2011). Both the expansion and intensification solutions to hunger under the orthodox approach can be seen as 'extensions' to the existing food system. We are therefore faced with an urgent need to consider alternative ways to address the food challenge that is more sustainable and equitable.

2.4.2. Food Sovereignty: An Alternative Approach to Hunger

A sustainable food system is one that takes into consideration economic, social and environmental impacts and that provides nutritious food for all (Pereira, 2014). However, as it has been noted above, the way in which the global industrial food system is structured it has failed to meet this criterion, and it would be a long-shot if we expect it to do so in the

foreseeable future, which is why social greens advocate for active collective action in order to challenge the existing system.

As an alternative to this neoliberal food regime, small-scale farmers, farm workers and indigenous communities organised themselves in the transnational agrarian movement La Via Campesina (Wittman, Desmarais, & Wiebe, 2011). As a response to trade-driven notions of food security, "an international social movement is emerging to promote food sovereignty rather than security" (Lee, 2007, p. 1). The term food sovereignty not only brings attention to the political and economic power dimensions intrinsic in the agro-food system but also takes a pro-active stance to challenge it (Wittman et al., 2011). Supporters of this movement argue that the current crisis is in fact directly linked to the orthodox *solution* to the crisis. By advocating for economic policies based on the globalisation of neoliberal industrial capital-intensive agriculture; communities have lost control over food markets, environment, and land.

Food sovereignty has been defined by the movement as:

> The right of peoples to healthy and culturally appropriate food produced through sustainable methods and their right to define their own food and agriculture systems. It develops a model of small-scale sustainable production benefiting communities and their environment. It puts the aspirations, needs and livelihoods of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations (La Via Campesina, 2016, p. 1).

The United Nations Food and Agricultural Organisation (FAO) state food security exists "when all people, at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 1996, p.6) . By incorporating this definition into policies an emphasis is placed on maximizing food production and enhancing access to food, without considering how, where, and by whom food is produced (Wittman et al., 2011). Furthermore, food security is uncritical of current patterns of food consumption and distribution.

When looking at the relationship between people and food through the lens of food security, many dynamics are overlooked and leaves many questions unanswered. Furthermore, it does not provide a real possibility of changing the existing inequitable structures and policies that

the food sovereignty movement identify as the very cause of the social and environmental destruction (Wittman et al., 2011). Food sovereignty is about power, and reclaiming that power and distributing it equally in society, and refusing to let a monopoly dictate how food is distributed, which is basically linked to who can afford it.

Food sovereignty is essentially opposed to the current policies that advocate for food security, arguing that in the current structure of the industrial agro-food system food security cannot be achieved. Food sovereignty is grounded in the belief that all people have the right to healthy, sustainably produced food, and that control over food and agricultural systems must be in the hands of local producers (COPAC, 2014). Therefore, in this understanding, food sovereignty essentially incorporates food security and is inextricably connected to challenging the current food system. Therefore, before food security can be achieved, the existing food system needs to be challenged and transformed – this is the prospect that food sovereignty holds.

It is argued that food sovereignty is a precondition for food security:

> Long-term food security depends on those who produce food and care for the natural environment. As the stewards of food producing resources we hold the following principles as the necessary foundation for achieving food security… Food is a basic human right. This right can only be realised in a system where food sovereignty is guaranteed… Food sovereignty is a precondition to genuine food security (La Via Campesina, 1996).

Wittman and associates ask critical questions about the potential of food sovereignty as an alternative food system (2011). Can food sovereignty address the multiple crises affecting food and agriculture around the world? Can food sovereignty ensure sufficient, healthy food for everyone? This research project seeks to answer these questions by investigating sector stakeholder's perceptions of the viability of urban [vertical] agriculture, as an alternative food system to achieve food sovereignty in Johannesburg. It is important to note, however, that the concept has undergone many substantial critiques.

2.4.2.1. Critiques of Food Sovereignty

Scholars such as Henry Bernstein is cynical about the productive potential of peasantry farming and considers capitalists production and organisation to be far more efficient at meeting high

demand and ensuring low prices (Bernstein, 2014). This form of logic is based on economic theories of economies of scale, which refers to a situation of producing at a lower cost gained by an increased level of production (Chang, 2014). In addition, Agarwal (2014) claims that food security depends on people's ability to purchase food rather than produce it themselves, and finds that a food sovereignty approach is unconvincing in the times of globalisation and urbanisation. Furthermore, Jansen (2015) describes the food sovereignty approach as being romantically optimistic about employing sustainable farming methods such as agroecology, as it overlooks the importance of expanding production, which is what market oriented scholars prioritise. He argues that food sovereignty practitioners need to respond to three challenges: "the desires of farmers to be incorporated into larger commodity networks, the importance of industrialisation and complex chains for feeding the world population, and the central roles of the state and science" (Jansen, 2015, p. 213). As it will be discussed later, the state's approach to urban agriculture in South Africa has been largely marketised, where cooperatives are encouraged to get their produce into the market, so the assumption that they would prefer to sell their produce in an alternative food network is a far-cry as they have been sold a dream of being able to make money in the market. These critiques will be useful to determine whether stakeholder's align themselves with critics or pioneers of a food sovereignty approach.

2.5. Urban Agriculture and Food Sovereignty

This section of the review considers the views of urban agriculture as a panacea to overcome issues of food security, as well as the more sceptical view of Nigel Webb who questions the potential of urban agriculture to deliver the benefits attributed to it. A global picture is painted using the Cuban model and Dar es Salaam as examples of successful urban agriculture. This section serves as means to locate the social problem of food insecurity to get an initial understanding of urban agriculture in South Africa in order to assess its potential as an alternative food system.

By producing food at the same place of its consumption, the system of urban agriculture reinforces a healthy, sustainable and resource-efficient balance of production and consumption (Despommier, 2010). Rapid urbanisation and the consequential growth in demand for food has brought to light the role of urban agriculture as a strategy to mitigate the

impending urban food crisis. The year 2008 marked a critical event in the history of the world where for the first time the world's urban population outnumbered the rural population (Orsini, Kahane, Nono-Womdim, & Gianquinto, 2013). This urbanisation is often marked by increasing poverty and pollution, growing food insecurity and malnutrition. Urban agriculture presented itself as an opportunity for improving food security, health conditions, local economy, social integration and environmental sustainability (Orsini et al., 2013).

Urban agriculture is commonly cited in state policies and research as a means of addressing food security (Cock, 2013; Cockrall-King, 2012; Department of Economic Development (DED), 2011; Ziervogel & Frayne, 2011). Urban agriculture is essentially any form of agricultural activity that happens within the boundaries of the urban environment, some examples include; horticulture, floriculture, forestry aquaculture, and livestock production (Ruysenaar, 2013). Research on urban agriculture has gained momentum over the recent decades, and has shown that apart from its intended purpose of improving the plight of the urban poor through improved food security, various unintended consequences have emerged and, as a result, leads those to advocate for more widespread implementation in developing countries (Webb, 2011). Some of the unintended consequences include increased economic efficiency, greater social cohesion on a community level, more sustainable use of resources, and improved nutrition for households engaged in food gardens (Binns & Lynch, 1998; Mougeot, 2000; Nugent, 2000).

Urban agriculture brings production of food into the city, therefore reducing food miles (the distance food travels from producer to consumer) thus lowering carbon emissions from the transportation of food into the cities. Furthermore, urban agriculture is a potential source of employment for urban dwellers. These alternative food systems in cities around the world are shortening their food chains, growing food within their city limits, and are essentially taking their food sovereignty [security] into their own hands (Cockrall-King, 2012). There are various urban farms around the world that have been successful in supplying fresh produce to residents living in urban areas, Cuba, Toronto, Paris, and Detroit to name a few. It is thus necessary to consider examples of successful urban agriculture and see how they made them economically viable to feed the hungry.

2.5.1. Urban agriculture across the globe

Cuban urban agriculture is said to be one of the most successful stories insofar as it was a response to the food security crisis that existed after the collapse of the Soviet Union (Cockrall-King, 2012). Cuba was isolated from outside assistance, and the most immediate concern was food security and mass hunger, "the daily calorie intake dropped by 30 per cent, and the average Cuban lost thirty pounds [13.6kg] in the three long years following the collapse of the Soviet Union" (Cockrall-King, 2012:286). The Cuban government declared a state of emergency and focused their attention on revamping the Cuban food system. What started out as an emergency measure – urban agriculture – "emerged as a critical cornerstone of Cuba's decentralised, deindustrialised food system, or what came to be called the Cuban Model in food security circles" (Cockrall-King, 2012:287).

The Little Radish farm in Cuba is a farmer owner and operated cooperative, with thirteen farmers who produce twenty kilograms of produce to supply local schools, hospitals, old-age homes, and daycare facilities as part of their social contribution. Production above that goal is sold at a kiosk at the entrance to the farm (Cockrall-King, 2012). In one year, the farm made R194 201 of produce, leaving the co-op a profit of R82 881, where half the profit is reinvested in infrastructure, and the remaining profit is shared among the thirteen workers. The state provides the land to the farm rent-free, and farmers in Cuba are at the top level of state salaries, above doctors and lawyers (Cockrall-King, 2012).

Cuba emerged as a global leader in establishing ecologically sound, extremely productive, locally managed food systems driven by nutritional need and not profit for corporations. The Cuban Model demonstrates the ideals of the ecological footprint of the food the population consumes and a transparent and secure food supply.

In the city of Dar es Salaam in Tanzania, the ninth fastest growing urban centre in the world is another example of how small-scale farmers (including urban farmers) have managed to produce food and get it to "urban eaters at a city feeding scale without large vertically -or-horizontally-integrated corporate structures" (Wegerif & Hebinck, 2016, p. 1). The authors trace how the food system in Dar es Salaam functions, where the collaboration between different stakeholders makes the system fruitful for all those involved. There is a mutual

understanding between traders, for instance they will sit together and will tend to sell produce at the same price, they will ensure their quality *appears* to be uniform – where stalls are arranged similarly, wash and spray vegetables with water to look fresh – this ensures that no trader out does another trader. Therefore, instead of competing with one another, people help each other which consequently sustains the operation over time. For example,

> A women trader having to go and care for her child who is sick is being economically inefficient, and this could be a business opportunity for another trader able to take over some customers and grow. Instead of taking advantage of the situation, however, the neighbour, who is selling the same products, sells the goods belonging to the mother of the sick child on her behalf, and gives her the money when she comes back (Wegerif & Hebinck, 2016, p. 15).

The study demonstrates how the cultural repertoires and internal norms shape market relations and the food system as a whole; it describes a system that delivers food on a city feeding scale, which responds to the needs of the poor who purchase food as well as the interests of the food producers. The ability to produce to scale is not achieved through scaling-up, but rather replicability, traders will help another get into the market, they pool resources together for the hiring of a truck for collections, and essentially work together for the betterment of society, and not the individual. Dar es Salaam has the food-based infrastructure and social practices needed for a sustainable world, and they're already working at scale, we however see different outcomes within urban agriculture in South Africa.

2.5.2. Urban Agriculture in Johannesburg South Africa

Research into urban agricultural initiatives within South Africa are not new and have been used to advocate the need for and importance of urban agriculture in the country since the early 1990s (Webb, 2011). As compared to the apartheid period, where urban agriculture was discouraged, and the policy environment towards cultivation was extremely unsympathetic, the transition to a democracy accompanied major policy advances towards the support of cultivation within cities across the country (Rogerson, 2011). Research on urban agriculture in South Africa is concerned with how it can be used to obtain food security; this opens the need for research into how urban agriculture can be used as an expression of food sovereignty.

Through the identification of the food security programmes in Johannesburg, Warshawsky (2011) analyses the effectiveness of the state's approach to urban food security. In

Johannesburg, ten departments operate six different programmes to address the issue of food security, including direct food assistance, social grants, urban agriculture, job creation, food price monitoring, and funding support for civil society organisations. The Gauteng province spent almost nine million rands on these programmes in the 2007-8 financial year, of which 1.81 per cent [R172,500,000] was spent on urban agriculture programmes (Warshawsky, 2011). He finds that urban agriculture remains small when considered from a broader perspective, as of 2009 only 9 per cent of residents in Johannesburg utilised urban agriculture as a primary or secondary means of subsistence. This is largely due to the lack of land, social stigma and inadequate cultivation knowledge and skills.

The Gauteng Department of Agriculture and Rural Development (GDARD) supplies potential urban farmers with a 'starter pack' with gardening tools and seeds, without adequate training and the follow up is poor. Therefore, he argues that it is not surprising to find that within eighteen months, 95 per cent of these urban food garden projects had failed (Warshawsky, 2011).

Within Gauteng, sustainable urban food gardens have been on the agenda of a number of programmes including; the Household Food Security Programme, Homestead Food Garden Project, Gauteng Agriculture Development Strategy (GADS) as well as the School Garden Programme – which all promote urban agriculture in households, communities, and schools (Warshawsky, 2011). In the 2014 Gauteng Department of Agriculture and Rural Development (GDARD) budget vote the MEC. Faith Mazibuko proposed a food security programme that would be rolled out over a five year period, which would facilitate access to affordable and diverse food through the delivery of agricultural projects at a communal and household level (2014) . Under the motto of one-household-one garden – the department committed itself to developing 60 000 homestead gardens, 325 school gardens, 325 community gardens, and 10 food security awareness campaigns – to encourage domestic production of food.

However, while state departments are rolling out urban gardens, they fail to consider whether gardening is a chosen activity, or whether it is a forced livelihood strategy, which could potentially add to the high failure rates. If the latter is true, urbanites are likely to desert their projects if better opportunities are presented, as Joubert (2012) found that urban dwellers in Khayelitsha in fact preferred to buy their food instead of growing it themselves. This aligns to

the critique offered by Agarwal, who claims that food security rests on people's ability to buy food.

The failure of urban agriculture in South Africa has also been attributed to the state's uneven and inadequate support for urban agriculture projects. Furthermore, the state's "approach is top-down, hierarchical and marketised, meaning trying to break into the existing supply chains of the large retailers" (Satgar & Williams, cited in Cock, 2013, p. 18). However, because of the monopolisation of the food chain, it has been increasingly difficult for small-farmers to break into these supply chains. Accordingly, one finds that this approach is not about creating alternative spaces of production and consumption in which alternative food systems that will benefit the community can be attained (Cock, 2013). Rather, one finds that the market-based approach of the state reinforces and strengthens the existing system.

Nigel Webb (2011) questions the significance of urban agriculture and asks when is enough, enough? In his article, he states his scepticism of the advocacy of urban agriculture as a panacea for social ills, noting that in South Africa the benefits derived from urban agriculture have been modest. Webb argues that in Van Averbeke's study on "*Urban farming in the informal settlements of Atteridgeville Pretoria"* in which he [Van Averbeke] notes that cultivators view urban farming as a response to poverty, food security, and unemployment and that urban agriculture provided a meaningful socialisation process for the cultivators (Van Averbeke 2007, cited in Webb 2011, p.199). Webb (2011) argues that on the basis of these statements, Van Averbeke reaches a conclusion that advocates the importance of urban farming in South Africa without giving any information regarding the number of informants who shared these views, the strength of their expression or their credibility. It is for this reason that Webb questions the evidence used to advocate for urban agriculture in South Africa where the use of successful case studies that are based on statements that have already been generalised (as noted above), and the continued overuse of these studies in the literature (2011). Therefore, Webb finds that insufficient ground exists for promoting urban agriculture in South Africa, and recommends the need for more empirical data before urban agriculture could be recommended as a major development path.

While Webb is sceptical of those who advocate the need for and importance of urban agriculture in South Africa because the evidence suggests that in South Africa urban agriculture is not as productive as anticipated, nor does it provide the benefits attributed to it, I think it would be impulsive to throw the baby out with the bathwater. Other studies, while they indicate that there is a high failure rate in both household and communal urban projects – it reflects a broader issue other than the lack of evidence to support its implementation in the South African context. And while certain projects have failed, which brings one to question the sustainability and efficiency of urban agriculture in South Africa – it should not be taken as a poor reflection of the potential of urban agriculture as an alternative food system. This study therefore seeks to understand whether urban agriculture if rooted in food sovereignty not food security per se, will be a viable way of making urban agriculture more sustainable and accessible to the community at large.

Therefore, research is needed to investigate further what issues challenge the development and implementation of urban agriculture in Gauteng from the perceptions of key stakeholders. And while studies have investigated the policy dynamics of urban agriculture in South Africa (Ngcamphalala, 2013; Rogerson, 2011; Ruysenaar, 2013; Warshawsky, 2011) they have not investigated it through a lens of food sovereignty and climate change, nor have they considered the perceptions of the socio-economic, socio-political and ecological viability of urban [vertical] agriculture within the Gauteng region amongst sector stakeholders. Such a study would be able to determine whether urban agriculture including urban vertical farming can become an alternative food system – and thus achieve food sovereignty – from the perceptions of the key stakeholders.

A recently new innovation of urban agriculture has been the vertical farm, where a few pilot projects have taken-off, and we are now seeing the introduction of commercial urban vertical farms in cities around the world – Sky Farms in Singapore, Farmedhere in Chicago, Local Garden in Canada, and Nuvege in Japan to name a few. However, the concept of vertical farming has had limited research in South Africa, with one known study based on the architectural aspects of transforming an existing building into a vertical farm (Davey, 2010). And another study that considers the enabling and inhibiting factors of vertical farms in Johannesburg (Lowry, 2015). This study can be conceived as a more business approach to the

concept of vertical farming, and therefore there is still a need for further investigation into urban [vertical] agriculture in Johannesburg, that appeals to a sociological approach that is embedded in food sovereignty.

2.5.3. Urban Vertical Farming

Vertical farming is a form of urban agriculture, where vertical farming is the concept of cultivating plants within skyscrapers or on vertically inclined surfaces (Despommier, 2010). However, it was shown in an experiment conducted by Dickson Despommier and his students in 1999 that there is simply not enough horizontal space in cities to have efficient crop production to feed a growing population. Furthermore, soil-based urban agriculture like traditional rural agriculture is vulnerable to climate change – droughts, floods, hail, high-temperatures etc. and it also requires irrigation. So while soil-based urban agriculture can bring production and consumption into the same space, it is also limiting insofar as it requires a sufficient amount of land within the city and is vulnerable to the elements and conditions of weather.

While studies on vertical farming are very limited given that there are not many commercial vertical farms globally, it has become an interesting topic among academics, states and others (Despommier, 2010; Germer et al., 2011). The Vertical Farm Project was based on an experiment to determine how much food could be produced in New York to supply a daily calorie intake of 2200 calories to 50 000 people using land- or soil-based urban agriculture (Cooper, 2009). With only 13 acres of usable rooftops, the students could only produce enough food to feed 2 per cent of the 50 000 inhabitants (Cooper, 2009). The experiment demonstrated that there is not enough horizontal land in cities for efficient crop production to feed a growing population. By going up – growing crops vertically – you can increase output substantially for instance, “half a hectare of vertical farming can be an equivalent of traditional soil-based hectares by factors ranging from four to twenty, depending on crop type” (Despommier 2008, cited in Davey, 2010, p. 32). This is an important economic factor to consider when looking at whether urban agriculture can be viable as an alternative food system.

The vertical farm has numerous advantages: year-round crop production; no weather-related crop failures; agricultural run-off is minimised; allows for farmlands to return to its original ecological function; no use of pesticides, herbicides, or fertilisers; less use of water (70- 80 per cent); reduction in food miles; more control of food safety and security and new employment opportunities (Despommier, 2010). And while urban vertical farming is not the only possible solution to the food crisis it certainly does present itself as a possible alternative to industrial agriculture and requires further investigation to determine its viability as a sustainable urban agriculture initiative in South Africa.

A study conducted by Calayde Davey (2010) proposed to transform a coal bunker at the old Pretoria West Power Station into a vertical hydroponic facility for agricultural production, thus modifying features of a former polluting facility [the power station] into a purifying structure that continues to be an instrument that confers to the needs of the city. The vertical agriculture project "is a catalyst for a greater continuous productive urban landscape. This involves a network of urban landscapes and open spaces that are environmentally and economically productive" (Davey, 2010, p. 82). Her project was conceived as a venture for private investment or as a joint venture with the municipality – as the program aims to deliver a product for profit. This type of venture would be considered by eco-Marxists as a form of green capitalism that is hiding behind a sustainable development rhetoric, but it continues to perpetuate a sustained growth trajectory. Thus, this study did not look at how vertical farming can challenge the current industrial agro-food system but rather sought for it to be integrated into current production systems. Therefore, further investigation is required to uncover the social dynamics of urban [vertical] agriculture in South Africa, to determine its viability as an alternative food system.

The study conducted by Joanne Lowry (2015) sought to identify the enabling and inhibiting factors that influence the decision to farm vertically in urban Johannesburg. It was found that "institutional structures that provide a framework of rules and social norms as well as legal structures within an environment" constitute an enabling factor in decisions to farm vertically (Pearson, Pearson & Pearson, 2010, cited in Lowry 2015, p. 48). The institutional factors include the policy environment where the Zero Hunger Policy and the Green Strategic Programme were found to have created an enabling environment that supports the

development of urban agriculture (Lowry, 2015). However, it was also noted that the implementation and execution of policy, as well as the lack of financial resources and skills, are still major areas of concern. She concludes by arguing "there are no legally inhibiting regulations, frameworks or social norms that would prevent the development of vertical farming in urban Johannesburg" (Lowry, 2015, p.50). However, because the study was limited to interviews with industry specific expertise that directly relate to vertical farming, where participants were largely from the business sector, and only two academics who specialise in urban agriculture – it can be argued that this study overlooks important socio-political dynamics that are important to consider when considering the viability of urban [vertical] agriculture. This study will therefore be useful to fill the gaps in these important areas.

Another enabling factor identified was the technical requirements pertaining to space and special technology (Lowry, 2015). It was concluded that there are a number of farming methods and infrastructure solutions available to enable the development of vertical farms that would allow a vertical farm business to meet local demand. The study found that with the City of Johannesburg's 'Bad Building' programme whereby the council purchases rundown buildings and sells them to a developer for a reasonable price – confirming that there is space available for the development of vertical farms in Johannesburg (Lowry, 2015). Presented itself as an enabling factor for vertical farming.

Inhibiting factors include knowledge gaps in "understanding the social, economic, and environmental attributes of urban agriculture… and the gap in governmental and institutional knowledge" (Lowry, 2015, p.56). Another inhibiting factor pertains to the risks associated with urban agriculture, one of which is the change in the investment and support for urban agriculture may reduce investment in rural agriculture (Lowry, 2015). Furthermore, it was identified that people are sceptical of change, and they prefer to do things in ways that they have always been done. This was perceived to be one of the greatest inhibitors to vertical farming in Johannesburg (Lowry, 2015).

This study will therefore be able to bridge the gaps found within the existing studies on vertical farming in South Africa – by offering a wide-range of opinions from a variety of sector stakeholders. While in the study conducted by Lowry (2015) the economic and specialist

aspects were prominent, this study will therefore, uncover not only the socio-economic aspects but also the socio-political and ecological aspects pertaining to the viability of urban [vertical] agriculture. Furthermore, this study is concerned with how urban [vertical] farming can become an expression of food sovereignty in Johannesburg, and therefore differentiates it from other studies that are concerned with embedding vertical farming within the industrial agro-food system in South Africa.

2.6. Conclusion

The literature has highlighted the injustices that characterise the political economy of food in South Africa. The concentration of power in the food chain has allowed food to be commoditised in an endless pursuit of capital accumulation, however, this has come at the expense of the masses. By utilising an orthodox approach to food security, state policies aimed at urban agriculture have been market-based and therefore do not challenge the existing system. A sustainable development paradigm, particularly a food sovereignty approach has been adopted in this research to demonstrate the possibility of attaining an alternative food system. It is therefore necessary to understand how the food system can best adapt to climate change through the introduction of an alternative food system expressed through urban [vertical] agriculture if proven to be a viable alternative to the existing food system. The role of small-scale family farmers and urban agriculture are often presented in the food sovereignty approach as a means of achieving this alternative food system. However, research on its viability is limited. This research will therefore be useful to determine the extent to which urban agriculture, including urban vertical farming, is perceived to be a viable alternative agricultural option in South Africa. And while vertical farming is one innovative alternative solution to the food crisis it will also have an unquestionable socio-political impact, which is worth recognising. Thus, this research project will seek to answer "what is the perceived viability of urban agriculture, as a means of achieving a food system rooted in food sovereignty? A case study of the perceptions of sector stakeholders in Gauteng". This will consider all three dimensions of sustainable development in order to determine a comprehensive understanding of the prospects of urban [vertical] agriculture as an alternative food system in Johannesburg.

2.7. Conceptual framework

This research has developed working definitions for the concepts it seeks to evaluate in the stakeholder's responses. The viability of urban agriculture will be assessed on its socio-economic, socio-political and ecological dimensions.

Socio-economic viability: Stakeholders perceptions of whether urban agriculture, including urban vertical farming, can have a significant impact on food security in urban areas by determining whether it can produce enough food, which in turn will establish if it can become an alternative food system. Consequently, this will impact upon the projects ability to secure the necessary capital financing.

Socio-Political viability: Stakeholders perceptions of whether local production will increase access to healthy food in the community. In turn, the social acceptance of urban [vertical] agriculture as an alternative food system among powerful groups in society; including, decision makers, policy makers, communities, and unions.

Ecological viability: From the onset, ecological viability will refer to produce that is sustainably grown using the principles of agroecology as a baseline, and will look at stakeholders perceptions of whether South African's will change their consumption patterns to buy and consume sustainably grown and locally produced food. This is seen as a precondition for the success of urban agriculture as a viable alternative food system rooted in food sovereignty.

Interviews were used to gauge stakeholder's perspectives on the viability of urban agriculture including urban vertical farming, where different questions will gain access into the socio-economic, socio-political and ecological aspects of urban [vertical] agriculture. For instance, questions in the interview that ask whether there are capital opportunities for urban agriculture in general and urban vertical farming in particular will speak to its socio-economic viability. Whereas, questions that ask about interest groups that may be affected by the implementation of urban vertical farming, as well as questions that relate to support for innovation in urban agriculture will gauge stakeholder's perspectives on the socio-political viability of urban [vertical] farming.

While food sovereignty is not a concept that needs to be measured in the strict sense, it is a useful to understand what this project means when it refers to it. Therefore, it will be adopting a conceptual definition of food sovereignty provided by COPAC (2014, p.38).

Food sovereignty: Food sovereignty is about, first challenging the structures of the food system that produce injustice and hunger and, secondly, it is about building a new, human-centred, community-controlled and just food system.

By using this conceptual definition, the researcher will be able to identify stakeholder's perceptions of whether urban [vertical] agriculture, is able to challenge to dominant food system in order to see a real transformation into an alternative food system that is based on a human-centred and community-controlled food system (rooted in food sovereignty).

Urban Agriculture: Any form of agricultural activity that happens within the boundaries of the urban environment, some examples include; horticulture, floriculture, forestry aquaculture, and livestock production.

Urban Vertical Farming: Vertical farming is a form of urban agriculture, where vertical farming is the practice of cultivating plants and producing food within tall buildings (skyscrapers) or on vertically inclined surfaces. The modern vertical farm makes use of controlled environment agriculture technology where all environmental factors can be controlled.

3. METHODOLOGICAL CONSIDERATIONS

3.1. Methodology

According to David de Vaus, the purpose of research design is "to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible" (2001, p.9). As such, the research design was used to help identify the data was required and how to best collect and analyse the data (de Vaus, 2001). De Vaus suggests that issues of sampling, data collection (interviews for the purpose of this research study) and the designing of the interview questions for the interview schedule are essentially informed by the research objectives and the research question (2001).

Qualitative research seeks to capture a broader understanding of participant's perspectives, through which the researcher can explore and understand the meanings individuals or groups attribute to a social problem (Creswell, 2013). By reviewing the literature, it became apparent that the existing food system is not serving the masses, and that there is a need to transform and challenge the system through a proposed alternative. This study therefore sought to understand stakeholder's perceptions of the viability of urban [vertical] agriculture as a plausible means of establishing an alternative food system rooted in food sovereignty in order to redress the social problem.

Research that employs a qualitative methodological approach yields textual data from the interviews, from which the researcher conducted a thematic analysis in order to identify key themes in the research (Creswell, 2013).

The strength of qualitative research lies in its ability to generate an in-depth contextual perspective on the perceived viability of urban agriculture as a possible alternative to the dominant food system. This allowed the researcher to identify contextual factors that were directly relevant for the social acceptance of urban vertical farming in Gauteng and not simply transplant ideas from research in other locations. Qualitative research allows the researcher to gauge responses from a variety of stakeholders in different sectors, therefore capturing a more nuanced contextual picture of the viability of urban agriculture in Gauteng.

However, the research was limited by the weaknesses of qualitative methodology, such as a lack of generalizability (Creswell, 2013). The study is focused on the perceived viability of urban vertical farming in Gauteng [Johannesburg] and therefore it may not be able to be generalised to other cities. Furthermore, it is important for the researcher to accept their role in the research process, as various authors have accepted a theory of 'the researcher as research instrument' ((Janesick, 2000; Piantanida & Garman, 1999). Piantanida and Garman write "the researcher is as much a part of the inquiry as the intent of the study and the inquiry process. In fact, the researcher's thinking lies at the heart of the inquiry" (1999, p.24). Therefore, the researcher needed to ensure that they suspend their pre-existing views and expectations of the advantages of urban [vertical] farming and rather listen and learn from the perspectives of the stakeholders.

3.2. Research Methods

This research benefited from employing qualitative research methods that aim to describe and determine a good understanding of a social problem from the insider's perspective, which was useful as the study aims to generate an understanding of the potential barriers and opportunities of urban [vertical] agriculture from the perspective of key stakeholders in society through interviews.

Interviews are essentially a conversation that emphasise the art of asking questions and listening (Greenstein, Roberts, & Sitas, 2003). The interview took the form of an in-depth semi-structured interview, which involves a predetermined set of open questions with the opportunity for the researcher to explore further themes or particular responses. Data collection in the interview is interactive, and it therefore allowed the researcher to confirm their understanding and interpretation of the responses of participants throughout the interview (Majchrzak & Markus, 2013). Interviews permitted the researcher to gain a detailed investigation of stakeholder's personal perspectives. Furthermore, they provided an in-depth understanding of the context within which the research phenomenon is located, making them useful for understanding the context of urban agriculture in Gauteng, which will bring to the fore the socio-economic, socio-political and ecological aspects of the viability of urban [vertical] agriculture.

However, interviews largely depend on the skills of the researcher, and the data obtained may be limited by the information stakeholders are willing to provide (Greenstein et al., 2003). Furthermore, data obtained may be limited by the knowledge and expertise of stakeholders on the concept of vertical farming. Since vertical farming is a relatively new concept, the researcher decided to structure the interview schedule around both urban agriculture in general and urban vertical farming in particular. This allowed the researcher to gain the best understanding ofu the problem of urban food insecurity, and determine their perceptions of whether urban agriculture can redress this, where the dominant food system has failed.

Therefore, the researcher will be able to overcome limited knowledge on urban vertical farming by considering the context of urban agriculture in Johannesburg in general. The interview schedule was tailored to suit the knowledge of the stakeholders that were interviewed, where the topics were divided to fit the expertise of the different kinds of respondents. For instance, the researcher chose to ask more detailed questions regarding the social viability of urban [vertical] farming to stakeholders from Non-government organisations (NGOs) and urban farmers, and more detailed questions relating to the socio-economic viability of vertical farming were addressed to the commercial sector, the Department of Agriculture and Rural Development as well as city planners/municipalities. It is also important to note that the transcribing and analysis of interviews was time-consuming (Greenstein et al., 2003), and required several hours per interview, making the research process longer than anticipated.

3.3. Research Instrument

An interview schedule was used to guide all interviews conducted with the relevant stakeholders. An interview schedule is a set of questions with structured answers to guide the researcher through the interview, it serves as a guide to the investigation and while it takes the form of a list of questions, the researcher was not restricted to it in the sense that questions do not need to be asked in a particular order, and the researcher can probe for further depth and insight (Greenstein et al., 2003). The interview schedule was structured around seven key sets of themes that served to gain access into different aspects of the social problem.

The first set of questions considered the current state of urban agriculture and the particular role of policy-makers in the context of urban agriculture development and growth in South Africa. This part of the interview highlighted the policy context in which urban [vertical] farming will need to be implemented into. The next set of questions sought to identify the support for innovations in urban agriculture and the stakeholders understanding and perceptions of urban vertical farming. This will lay the foundation on which the researcher was able to determine whether innovations like urban vertical farming will gain the support necessary for its implementation – its socio-political viability. The third set of questions sought to identify the barriers and opportunities for urban agriculture in Gauteng, as well as the potential barriers and opportunities for urban vertical farming from the perspectives of key stakeholders.

The questions relating to capital opportunities determined the socio-economic viability of urban vertical farming to determine if the state would have any interest in subsidising such a project. The next set of questions sought to identify different interest groups that may be affected by the introduction and implementation of urban vertical farming in order to determine the socio-political viability thereof. Subsequent questions consider the ecological viability of urban agriculture by asking questions relating to South African's consumption patterns. Finally, the last set of questions looked at whether stakeholders perceive urban agriculture and urban vertical farming to be a beneficial and viable means of addressing food security in Gauteng (its socio-economic viability), as well as any conceivable risks associated with the implementation and diffusion of urban vertical farming. From the interviews, the researcher was able to determine the socio-economic, socio-political and ecological viability of urban agriculture (including urban vertical farming) in Gauteng from the perspective of key stakeholders.

3.4. Sampling

Sampling is defined as the process of selecting the required number of individuals with the necessary characteristics of a given population to be included in the research study (Neuman, 2006). Neuman asserts that the best informant is an expert individual who is actively involved in the field. Therefore, I identified eight key 'sectors' from which I was able to gather a sample of stakeholders (participants) to partake in the study. These sectors included: The Gauteng Department of Agriculture and Rural Development, Urban farmers, Market Agents from the

Joburg Market, Non-governmental Organisations (NGOs), the Commercial sector, Agricultural colleges, City planners/municipalities and academics. These various stakeholders who because of their interest in the social problem (urban food insecurity in the context of climate change) were able to provide the relevant information about the possibility of redressing the social problem through an alternative food system. It is for this reason that the study employed purposive sampling techniques, particularly expert purposive sampling.

Purposive sampling is used when the researcher decides what needs to be known and sets out to find people who are able and willing to provide the necessary information by virtue of knowledge or experience (Neuman, 2006). Therefore, stakeholders were selected on the basis of their involvement, experience and knowledge in urban agriculture and urban vertical farming, as the researcher decided that purposive sampling was the most applicable as participants would require certain knowledge regarding agriculture in general, and urban agriculture in particular in order to participate in the study.

By ensuring that the stakeholders are drawn from these various sectors, the research offers a balanced texture of experience, views and information in answering the research question (Ngcamphalala, 2013). That is, the diversity of the stakeholders allowed the socio-economic, socio-political and ecological viability of urban [vertical] agriculture to have an equal weighting in the responses, and therefore offers a more wide range of perspectives of its sustainability and viability in Johannesburg.

It is important to note, that while initially 15-20 participants were anticipated to participate in the study, in the end, the research had a sample size of 12 participants, with at least one participant from each identified sector (Appendix 1).

3.5. Ethical Considerations

To be ethical in social research means conducting one's research procedures and oneself in a manner which does not discredit both the researcher and the participants involved in the study (Olgetree & Kawulich, 2012). Although the research was not sensitive, the researcher ensured that ethical guidelines for conducting social research were followed. The following ethical

issues were considered for this study: voluntary participation, informed consent, and anonymity and confidentiality.

3.5.1. Voluntary participation

The research study was based on the principle of voluntary participation which is based on the notion that participants should not be forced or obligated to participate in the study (Babbie, 1998). However, because the researcher requires the participation of stakeholders from specific sectors, it could not be guaranteed that they did not feel obligated because of their position- for instance, somebody in the Department of Agriculture and Rural Development. Therefore, the researcher ensured that informed consent was obtained from all participants before proceeding with the interview.

3.5.2. Informed consent

Informed consent refers to informing participants fully about the research project and what their role as participants will be (Olgetree & Kawulich, 2012). Informed consent also means that participants understand the conditions of participation and agree to them if they decide to participate. To obtain informed consent, the researcher handed out the Participant Information Sheet (PIS) which was used to inform participants about the nature of the research, what participation involves, benefits and risks associated with participation, and measures that will be used to mitigate ethical risks such as anonymity and confidentiality. The researcher also ensured that participants are comfortable and gave their consent to having the interview recorded on tape.

3.5.3. Anonymity and Confidentiality

Making data anonymous means removing the contributor's name as well as other identifiable information (job title, place of work, etc.) (Wiles, Crow, Heath, & Charles, 2006). Whereas confidentiality refers to the protection of data collected and that data will not be repeated without permission. Confidentiality of data means ensuring the separation of data from the contributor's identity, and ensuring those who have access to the data maintain confidentiality, such as not disclosing what an individual said in an interview (Wiles et al., 2006). However, some have argued that it may be possible that participants want their authorship to be

acknowledged, and therefore suggest as a guiding principle to allow participants to be in control of the disclosure of their identity and contribution (Grinyer, 2009). Furthermore, it is important to note that this research involved interviewing participants in their official capacity as experts, therefore measures were made and discussed with participants beforehand in order to work out any conditions that they may have had to using their name and therefore meeting these conditions – such as seeing what they will be quoted on before publishing.

By ensuring these principles were followed, the research was able to avoid harming participants and was conducted in an ethical manner.

4. Presentation of Data

Interviews were used to capture data in order to gauge stakeholder's perceptions regarding the viability of urban agriculture as an alternative food system in the city. I was able to interview at least one person from each sector (Appendix 1), and was able to capture diverse responses to the research understudy. In total twelve interviews were conducted, and will be used to present an argument for this research, and will be analysed in the next chapter to draw conclusions in line with the research question. To present the data, I will use my key variables namely; barriers and opportunities to urban agriculture, socio-economic viability, socio-political viability, and ecological viability. Furthermore, alternative food networks will be presented using the Munching Mongoose and the Open Food Network as case-studies of existing alternative food networks in the city.

4.1. Barriers and Opportunities to urban agriculture

Throughout the interviews participants identified similar barriers and opportunities for urban agriculture in Johannesburg. A leading barrier that most stakeholders identified was the lack of capital to either start a project (particularly a vertical farm which is capital intensive) but also government officials noted that the budget set for food security through urban agriculture has declined in recent years (contrary to them saying that the department sees it as an important sector). Athanasopoulos from Greencity farms owns three vertical farms across the country (two in Johannesburg, and one in Nelspruit). Starting these projects is costly, and while they are not the most aesthetically appealing systems "but they work, they do the job, they produce the produce" (Athanasopoulos, 2016). Furthermore, he notes "it's definitely directed to high-end investors to invest in these systems" (Athanasopoulos, 2016). Similarly, Nciizah from ARC institute, (2016) commented on the high capital inputs needed to start a vertical farm.

Matthews from the Gauteng Department of Agriculture and Rural Development (GDARD) described how it is difficult to follow through with programmes in the Department due to a

decline in funding, arguing that “we are not properly funded. If you look at the amount of money that we used to receive for projects a few years ago and what we get now… it’s actually… it's quite disturbing. It's a serious decline” (Matthews, 2016).

In addition, stakeholders noted the construction barriers to urban agriculture in the city. Stakeholders do not believe buildings within the city have been designed to cater for farming in-doors and/or roof-top gardens. Mazibuko from Joburg Market (2016) stated “I think our buildings are not designed… just look at this building where we are now, with the roofs like this [tiled not flat] you can’t optimise that space”. Erasmus from Global Change and Research Institute (GCSRI) (2016) similarly explained “I think the vertical farms (if it's just on rooftops) drainage and retrofitting buildings to cope with the drainage and weight might be an issue”. So utilising buildings for urban agriculture will face the barrier of ensuring the building can support the structure. This is a similar finding to Lowry (2015).

While stakeholders did not identify any particular policies that have inhibited the advancement of urban agriculture in the city, two stakeholders showed concern for how local municipal laws could in fact present a potential barrier for vertical farming in the future. Pienaar (2016) argued “I mean if you look at the building regulation of some of the municipalities it will not allow it. It's just how it is, so one must engage with the local authorities”. Comparably, Mazibuko from Joburg Market (2016) argued “I think municipal laws actually need to change, because currently for instance most urban spaces are used purely for residential use, and they proclaimed as such. Now imagine if the whole neighbourhood… is to substitute our lawn with produce now and it may have certain implications on the bylaws.”

Another finding which poses a barrier to urban agriculture becoming an alternative food system is the volumes which it can produce (which links to this papers conceptual definition of socio-economic viability). The Joburg market serves about five thousand farmers from across South Africa who send their fresh produce to the market for a large buyer base, approximating a daily inflow of ten thousand buyers. According to Mazibuko from Joburg Market, urban farms would not be able to supply him with the volumes he needs “let me give you a scenario, Pick n Pay comes to our floors and buys potatoes for R2 million, four times a week”. However, while they are concerned about the volumes that an individual farmer can supply, while not being

overly-optimistic they do suggest that the collaboration of farmers within the city could potentially help compensate for low individual volumes, claiming that "it is probably best the smaller the smallholder farmer is, to group them together so that they kind of balance out the quantity and consistency issues" (Manderson, 2016).

A final barrier worth noting is the issue of crop variety, which poses a serious challenge to its potential of becoming an alternative food system. Farming in the city requires sufficient hectares of land to feed the population. So while space is notably an issue, different crops require different amounts of space. For instance, fruit will not necessarily be able to be grown within the city limits due to the limited space for fruit trees. In justification for a continued reliance on big farms on the outskirts of the city Anthasopoulos (2016) explained, "they can produce cabbage heads that need acres. They can produce long crops like mealies. They can produce fruit… we don't have space for, we would need one hundred properties for a little apple farm." Furthermore, the types of crops that can be grown within a vertical farm are also limited, "you won't replace a carrot, potato and beetroot and maize and soya beans. But you can do green beans, peas and all the leaf, and most of the berries that will work" (Pienaar, 2016). This is more concerning given that a vertical farm "is only suitable for greens and not the staple grains" (Nciizah, 2016), making it increasingly difficult to overcome the crop variety issue.

Participants had a much easier time identifying barriers than they did opportunities for urban agriculture growth and development. All participants noted the necessity of growing food within city limits, suggesting that this is the direction we should be heading towards (however it should be noted that while they were agreeable to the idea of urban agriculture, they were not advocating for the replacement of commercial farms across the country, but rather sought to supplement food supply in the city using urban agricultural methods). For instance, Pienaar from Woolworths argued "I think it will form a bigger part of the food system" (2016).

Urbanisation (and limited job opportunities within the city) was identified as an opportunity for urban agriculture growth in the city, where participants explained that it can be used as a safety net for those who are currently being excluded and not served by the dominant food system, where the departments food security programme "exists basically to encourage food

production for home consumption" (Matthews, 2016). Urban agriculture can therefore be utilised to compensate for a lack of income that can be used to purchase food, Loabile from COJ suggested using urban agriculture as a means to "ensure that those people's right to food are still safeguarded" (2016).

The expansion of urban agriculture growth and development is an important consideration, where some argued that people will only change when they absolutely have to (Manderson, 2016), while others suggested that its time has already come "I think it's an absolute necessity given the climate change world we are in. I think whether we like it or not, we are going to have to build urban food systems to survive climate change" (Satgar, 2016). Another participant remarked on the economic hardship that is leading to opportunities to urban agricultural growth

> Urban agriculture was a process of producing food that was utilised when economic times was not so good, maybe when a country has just gone out of war and you know when things are really quite rocky. Or when they can't afford ploughing huge pieces of land using hundreds and thousands of dollars, so when I read it I looked at South Africa I thought we are probably at that stage. And ja it is predicated that by 2020 no 2030 that we could be a food insecure country if we continue this way. So therefore there should be other mediating measures of producing food and urban agriculture is definitely one of them (Nyamakazi, 2016).

Participants also identified the opportunity for innovative farming methods to feed people in the city, "in terms of food security, we need technology to support whatever solutions we going to have… it's just about being smart about it" (van Rensburg, 2016). Similarly, Loabile from COJ (2016) remarked, "if we can invest more on other technologically advanced methods of production then we would be able to have enough produce to feed and supply the markets in the city" demonstrating the increased yield one can get through more advanced methods of food production. However, participants are careful in advocating for fully-fledged technology for food production "I think we are scared anything genetically modified or technology. You know technology and food we are trying to keep a bit separate" (van Rensburg, 2016).

In addition, while Woolworths Food currently has some food that comes from a type of hydroponic system "we don't really support the full hydroponic system where there is no

medium because the quality of the produce and the nutrition of the produce we felt is still suspect" (Pienaar, 2016). Furthermore, while vertical farms overseas have been technologically-intensive, participants in South Africa feel they should rather incorporate low-tech solutions which can be hand-crafted by the lay man, "so what Food and Trees For Africa is keen on is what we call low-tech. These mechanisms that are not necessarily terribly sophisticated, they are very simple, they are replicable they are easy to create without expensive inputs" (Hills, 2016). Likewise, van Rensburg (2016) argued "it shouldn't be this expensive thing that I have to buy, so it must be basic plumbing". And this solution seems to be working, since Athanasopoulos from Greencity Farms, has been able to create a low-tech (less sophisticated systems) by making tweaks where necessary, and has been able to create fully functional hydroponic vertical farms across the city.

Through the information obtained in the interviews, it appears that the barriers at this stage out-weigh the opportunities identified by stakeholders. While a need for utilising urban space for food production was identified, stakeholders see various barriers that would need to be overcome before the city has a booming urban agricultural sector.

4.2. Socio-Economic viability

The working definition of socio-economic viability was "stakeholder's perceptions of whether urban agriculture, including urban vertical farming, can have a significant impact on food security in urban areas by determining whether it can produce enough food, which in turn will establish if it can become an alternative food system."

From the twelve interviews, seven participants were not convinced that urban agriculture can produce enough food to feed the city's population. Some answered a straight out no, "will we be able to feed the entire city with vertical farming? I doubt it" (Manderson, 2016). While others elaborated more by suggesting that it can feed a good portion of the population,

> I think the population is too high in the cities. But it can definitely feed a big percentage, over 50-60 per cent of the requirement of the city. But I don't think it will feed the total thing, I think the demand is just too high (Pienaar, 2016).

Similarly, Hills argued "I think we should start at community levels, and say 'can Alex feed itself?'" (2016). This demonstrates the necessity of starting in suburbs first, and then look at the collective.

One participant, felt that urban agriculture can feed people in the cities

> Well it's proven. So in countries where you have not a lot of space we seeing more and more of these vertical farms going up in Asia and Europe…. I think it's in France that they changed all the policy that all rooftops either have to have solar panels or gardens on top of them in the city. And it makes sense, it's about sustainable development" (van Rensburg, 2016).

Three participants, while reluctant to claim that it produces enough currently, however they are optimistic about the future capacity of urban agriculture in the city, "it would, but not soon enough… it would take a long time to get there to that point" (Nyamakazi, 2016). Comparably, Loabile from COJ (2016) advocated for the necessity of using technology to increase yield, "so if we can invest more on other technologically advanced methods of production then we would be able to have enough produce to feed and supply the markets in the city."

Mazibuko, from Joburg Market, also recognised the impact that a successful urban agricultural project would have on the commercial sector, however this is contingent on the fact that farmers across the city collaborate and increase their volumes (2016). This is a means through which the socio-economic viability of urban agriculture can be enhanced.

Therefore, the majority of stakeholders interviewed are not convinced about the socio-economic viability of urban agriculture becoming an alternative food system – not only looking at volumes, but as noted in the barriers to urban agriculture the crop varieties are also limited, which consequently limits the socio-economic viability of urban agriculture.

4.3. Socio-political viability

The working definition of socio-political viability for this research was "stakeholder's perceptions of whether local production will increase access to healthy food in the community. In turn, the social acceptance of urban [vertical] agriculture as an alternative food system among powerful groups in society; including, decision makers, policy makers, communities,

corporations and unions." Socio-political viability is not a simple yes/no response, and different remarks were made throughout the interview, therefore in order to present the data each stakeholders interview response that relates to the socio-political viability of urban agriculture will be presented in furtherance of a more holistic depiction.

In the interview, Manderson from Southern Africa Food Lab (SAFL), felt that an urban agriculture based on food sovereignty (with direct producer and consumer links) is both necessary and viable to improve the food security for South Africans. However, the participant does not believe it would be able to compete with large-scale commercial farms, "I don't think that should be the aim" (Manderson, 2016). So while food sovereignty is about challenging the corporate controlled food system, the participant does not feel that should be prioritised over and above meeting food security needs, demonstrating that the participant sees food sovereignty and food security as separate issues and not as one in the same goals.

Furthermore, she felt that urban agriculture can play a positive role for food security in Johannesburg, "I think what we should do is use urban agriculture to increase food security of the most vulnerable populations in urban areas" (Manderson, 2016). She also believes that government is biased towards conventional agriculture, which may pose a threat to urban agricultures socio-political viability, as this will affect food politics in the city.

Pienaar, from Woolworths, explained how there could potentially be resistance to the introduction of a vertical farm, particularly if it is state funded and people can get cheaper food, in terms of resistance to the introduction of a vertical farm, Pienaar, noted

> If you can buy that stuff that you know is grown around the corner and you can get it cheaper than at Woolworths itself – I don't think there will be resistance from the public, maybe resistance from us but not the public. I mean it's a no brainer (Pienaar, 2016).

Furthermore, while denying the existence of a dominant retailer in South Africa, he recognised that a flourishing urban agricultural sector will create competition in the food system, "ja, I think there will be a degree of competition which is a good thing because retail is very powerful at the moment… And they sell directly to the public ja it will hurt Woollies turnover – definitely" (Pienaar, 2016). When considering if urban agriculture will increase access to healthy food in

the city, the participant remarked on differentiating between producing for yield versus survival,

> That's where my point comes into who's growing it? And how are they growing it? I mean I can take the same system to someone who is chasing yield – you'll have poor nutritional value and where someone is growing a crop to feed their own family will have better nutrition systems (Pienaar, 2016).

This is important because if urban agriculture just becomes an appendage to the already broken system, access to nutritional foods will continue to be limited, therefore limiting its social viability.

Mazibuko from Joburg Market, touched on the idea that urban agriculture is a fairly novel idea whereby people in the city are still warming up to it, "people are still trying to wrap their heads around it" (this is also noted in the statements made by Matthews (from GDARD) who says the school feeding schemes have the trouble of getting children to see that the food grown in the gardens is safe to eat. And people in the communities are slightly sceptical of purchasing local products). This puts a damper on its socio-political viability as scepticism limits its success, and he therefore recognised the need for cultural change in the cities (Mazibuko, 2016) .

Various participants also touched on this point, that we need to change perceptions and mind-sets for something like this to flourish, for instance, "I think slowly but surely people are realising that the stuff that's produced locally is fine, there is nothing wrong with it" (Matthews, 2016). This links to Satgar's (from COPAC) statement regarding the advertising industry that "makes us feel that if we are not gobbling down a burger then you are not modern and sophisticated" (2016). We thus need to overcome this bias in order to improve the socio-political viability of urban agriculture. Furthermore. Mazibuko, from Joburg Market, noted the positive impact it will have on food security "I mean it's a new way, a new approach and my view is that it would actually enhance rather than inhibit food security" (2016).

Hills, from Food and Trees for Africa (FTFA) noted a possible unintended consequences of vertical farming that would impact its socio-political viability is how beneficiaries may become reluctant to engage in soil-based agriculture as they could potentially see it as an old-fashioned

way of farming, whereby “it's actually going to detract from sustainable farming methods that do use soil” (Hills, 2016).

Furthermore, she explained how more urban agriculture could become an appendage to the food system through commercial retailers (and therefore not pose a risk, but rather an opportunity), “I think there is a wonderful opportunity for retailers to source niche market crops from urban producers such as microgreens, more intensive crops like fresh coriander” (Hills, 2016). She thus does not see the risk urban farms to the commercial sector, as she explains

> It's going to take a really long time before people realise, probably will experience some kind of catastrophic urban disaster before urban agriculture threatens commercial markets. Sadly, I mean realistically. But I think, in terms of high-income earners buying from the Bryanston Organic Market – I mean that’s huge, a robust market. So ja, it is happening in pockets all over the place, but I wouldn’t say, I mean it's not a revolution (Hills, 2016).

The above quotation not only links to the socio-political viability but also the ecological viability which will be detailed in the next subsection. However, in terms of the former, we can see that while it is not a complete transformation of the food system from buying from these organic markets, we are starting to see communal support for local initiatives (however this strongly links to class). On a final note, Hills acknowledged the increase in nutrition since Food and Trees for Africa has started these gardens “there has been an increase in nutrition, and there has been an increase in people knowing what nutritious vegetables are… so yes in the working class definitely” (2016).

Van Rensburg, from the University of Johannesburg (UJ), brought attention to the buy-in from the community and other stakeholders on containerised farming (an innovative way for farming in the city). While the project has been put on hold in the meantime as there is now a question of need as the participant feels there is a lot of infrastructure available that is not being utilised fully, however, there was a general excitement among farmers at the farm school who were excited about the idea of containerised farming. While “we were a bit nervous of introducing anything that is not organic because there is this whole organic movement, but there was no push back that we picked up yet and we have talked about it a lot and people are quite excited about it (van Rensburg, 2016).This shows how there is buy-in from the

community for innovative farming methods, and therefore increases its socio-political viability through social acceptance.

The participant is sceptical about the potential of urban agriculture being able to competitively challenge the existing food economy, not only because she felt that there is not enough food to go around, which is an orthodox conception of the food crisis, (and therefore we need additional producers) but looking at the volumes that commercial farms can produce, urban farms will not be able to "kill that economy… it's just going to be local food that is grown locally, sold locally and it's going to be cheaper because it's not travelling as far (van Rensburg, 2016).

This addresses the fact that while urban agriculture can translate into more affordable produce for consumers, it may have a limited impact on transforming the existing food system. Furthermore, the participant argues that the market that is being created with urban agriculture is a new market, it will be feeding communities that are not connected to the existing system, "the communities that we are hoping to help are the ones not eating fresh produce… it's just people who didn't necessarily have access to that kind of food will also have access to cheaper healthier food" (van Rensburg, 2016). Therefore, by increasing access to nutritious food to those who are not currently being served by the food system, consequently improves the socio-political viability of urban agriculture.

Nciizah (from ARC-Institute,) believes that retailers would prefer produce from vertical farms due to their high quality, opening a possible space for tension in the agricultural sector. This indicates his perception of the movement to urban agriculture as an extension of the existing food system, and not a break-away. This, therefore challenges its ability to become an alternative (if it is to go in this direction), however he further explained "I think retail prices of most fresh produce may decrease due to high supply. In addition, retailers may incur less expenses in getting produce to their shops which translates to affordability for consumers" (Nciizah, 2016). This will therefore increase access to food, which will positively impact food security – which will improve the social viability of urban agriculture. However, he also brought attention to competition for water between domestic use and agriculture within the city, which can pose a risk to urban agriculture, this may in turn negatively impact its socio-political viability as residents may resist the use of water in the city for agricultural purposes.

Erasmus (from GCSRI) brought attention to the distinction between using urban agriculture as a survival mechanism or as a development mechanism which links to his distinction between luxury food and development food (2016). The way in which the participant spoke about the distinction between survival and developmental urban agriculture links to its socio-economic viability as it relates to yields, "I think Siyakhana is a survival strategy, and I think many of the others is poor people trying to make a living on limited land. Important, but I don't think it has, I don't think it is easily scalable. You have to sort of get into the aquaponics game for development" (Erasmus, 2016).

Furthermore, the distinction between luxury food and development food highlights the accessibility of urban agriculture, and hence it's social viability as well as the ecological viability. Erasmus argued, "… I think you can produce a lot of that stuff that you get from Bryanston organic market… but that's luxury food, it's not development food. So maybe there is development in the sense that you are providing a job, but the food itself is not the medium for prosperity – it's income derived from selling it to rich people that can afford it in any case" (2016). This underlines the limited impact urban agriculture will have on food security if they aim for niche markets (while it may also be an unintended consequence due to the limited crop variety), as it will continue to perpetuate the hunger suffered by millions of South Africans and hence it corresponds to the affordability of food.

Erasmus is not optimistic of the survival of urban agriculture initiatives against commercial retailers; he explains how when big retailers move into towns that previously had locally run Spaza shops, the Spaza shops do not survive the competition.

> They don't make it. And I don't know if that's a price thing, or an availability thing or a diversity of produce thing or just a behavioural thing, but I don't know of examples of where you have supermarkets coexisting with Spaza shops. I think the moment you get a Pick n Pay or a Spar, that the death and hell for the local guys (Erasmus, 2016).

While this links to the ecological viability in terms of buying from local entrepreneurs, it also influences its socio-political viability regarding being able to withstand competition in the field. And in the above quotation, the inability to survive (what was termed 'super-marketization') reflects poorly on its socio-political viability, "normally the small scale guys disappear when

super-marketization starts" (Erasmus, 2016). However, he is slightly more optimistic to a point with regard to the impact of urban agriculture on food security

> I think where it has been successful and by successful I mean where it's been sustained and productive, I think where that has happened there has been impact. But the impact is very local. So I don't want to say the impact has been small, if you had ten people that would have died of hunger is now not dead – the impact is massive. But in terms of numbers I don't think it's, you don't get the stuff produced at Siyakhana being sold at the organic Bryanston market. I don't think it has that big impact. High local impact – and because of that impact is limited (Erasmus, 2016).

Therefore, even if ten people have been helped through these programmes we cannot think of this as an insignificant number, rather it sees every person as individually important and should hence not be overlooked by inhumane numbers.

According to Nyamakazi from GDARD, urban agriculture is considered to be an important sector by the Department of Agriculture and Rural Development, "the fact that they appointed someone in the position specifically to be looking at urban agriculture. And there was obviously no funds attached to it, but special provision was made for it to source funds in another directorate in the department" (Nyamakazi, 2016). This demonstrates a buy-in from the department (and hence social acceptance) and therefore is positive for its socio-political viability.

Furthermore, the participant does not think urban agriculture will pose a threat to supermarkets and does not see any risks or resistance to the diffusion and growth of the sector in the city. Finally, Nyamakazi (COJ) felt that urban agriculture increases access to healthy food in the city, she noted "yes it would, if we were to really go big on it" (Nyamakazi, 2016). This participant therefore sees the need to increase the socio-economic viability in order to improve access, consequently making socio-political viability dependent on production capacity, aligning herself with an orthodox conception of food security.

Similarly, Loabile (from COJ) discusses how the city has created vacancies for urban agricultural managers, which shows a buy-in from the City of Johannesburg, strengthening its socio-political viability through social acceptance on the part of the City. These managers,

> They are like assistant directors, they playing a very crucial role, because they are responsible for establishing forums, agricultural forums. They have to engage all the relevant stakeholders; they facilitate development within their regions. They like do the training the developmental needs assessment of all people who are interested in agriculture. So they are like the face of urban agriculture (Loabile, 2016).

Furthermore, there are agri-resource centres within each region of Johannesburg that offer services such as technical and advisory support. They also provide inputs like seeds and loan out tools (including big equipment like tractors) to members of the community that are interested in agriculture. The centres also provide training and facilitate the process of access to land, "so if the community members identify a piece of land they will go through to the urban agriculture manager in the region to help them [the community] fast-track the process" (Loabile, 2016).

We therefore can see the City has taken great strides towards improving the urban agriculture sector within the city. When asked what effect urban agriculture will have on commercial retailers if an alternative food system were to be created, "the supply it will obviously increase, and then the prices will go down. Food will be more affordable to the needy. There will be more competition obviously" (Loabile, 2016). So by creating more competition in the food system, urban agriculture will result in more affordable produce and therefore make it more affordable for consumers. She noted that perhaps the introduction of more urban agriculture within the city might be met with resistance by conservationists which negatively affects its socio-political viability,

> Areas like when I mentioned some of our sites are on wetlands, so obviously there must be buffer zones. So if you have to intensify your production and also start planting on those lands, we would have our environmental activists coming. So we try as hard as possible to comply with all legislations when we implement our programmes (Loabile, 2016).

Finally, Loabile's interview demonstrated a buy-in from the community to start urban agricultural projects establishing a social acceptance that will positively impact its viability,

> …for other regions where we don't have space, we identify open spaces and use them for food production. Like if it's a dumping area, we always have requests from the community members to say "please let's talk to PIKITUP or City Parks so that this area is being used by communities for

> dumping that we clear it and rather use it for food production." So there is a lot of interest from community members to start the vegetable gardens (Loabile, 2016).

Similarly, Matthews from GDARD, notes the buy-in from the community to start agricultural projects,

> It's the same way, it's not everybody that wants to do agriculture, and we cannot force everybody as a way of producing food to use urban agriculture. So through the work that we do, it's through word of mouth and maybe awareness meetings that people become aware that we are there and therefore then approach the department, because I think it would be defeatist if we go out and look for people to do the work. We have never run short of people who need assistance, they always come to us. We get calls from schools, we get calls from individuals we get calls from communities, we get calls from other departments, NGOs, community-based organisations, we get approached by private companies that want to assist certain communities, so we don't go out and look (Matthews, 2016).

In line with this, she explained how through social responsibility programmes there has been a buy-in from companies to support these initiatives, which is how the programme has been able to continue despite a lack of funding from the department's side. Matthews noted, "so we decided that we will see what we can do, we can't just abandon people just because there is no money so we've had to be innovative, we've had to be creative tried to find ways of saving money to keep the projects going because they really assist" (2016). She explained how project members look for partners to assist with funding to sustain their projects. Therefore, companies as part of their social responsibility programmes will sponsor gardens allowing them to continue despite lack of government funding.

> Like I can give you an example, last year 2015/2016 the officials managed to work with partners enter competitions internal and external, and managed to get up to about R8 Million just on the work that they do, because every little chance that we get to expose ourselves and the work that we do – we take that chance (Matthews, 2016).

This is similar to how Food and Trees for Africa work in finding partners to join them in securing food for those currently excluded from the food system and demonstrates strong social viability as there is a buy-in from the business sector. However, as noted by Hills (FTFA) "I think there is a huge amount of interest in it, and I think it is seen as a solution for so many people,

whether its funders who want a project to look good and feel good and be a happy story" (2016).

Therefore, social responsibility programmes may not necessarily be a step in the direction of an alternative, but rather the result of the existing capitalist system, and should be considered with caution in terms of strong viability in forming an alternative.

The Department also tries to encourage the community to support these local initiatives, which links to ecological viability but it also establishes that there is communal buy-in and therefore strengthens its socio-political viability. Matthews (from GDARD) explained "what we encourage in the community projects that we've got is for the local community to buy directly from the project," this is the communities way of forming an alternative food system whether a conscious or unconscious attempt, it is a step in the right direction.

Athanasopoulos from Green City Farms notes that there is a large amount of secrecy between entrepreneurs in the urban agriculture sector, because of patent rights "there are a few guys doing it in our country, but they are very secretive. Even if you find their farms they won't let you on them and that type of thing… because of patent rights, you can't really get them. It is farming, if you look at all the patents people don't really get it. If you look at the structure, and then somebody just tweaks it a little bit and then it's null and void" (Athanasopoulos, 2016). The lack of knowledge sharing and patents are all part of the capitalist system and are negative for the socio-political viability of urban agriculture as patents prevent market access. This not only affects entrepreneurs but also consumers who have to buy from dominant suppliers who can manipulate prices – thereby affecting affordability and access to food, as well as the ability to form an alternative.

However, with his system he has managed to tweak and produce food, he believes that the poor will be able to afford produce from his vertical farms as it is not directed to high-end consumers. Resistance and competition in the sector arise because "it's always competition when you producing for someone's clients with anything" (Athanasopoulos, 2016). However, he shares a story of meeting up with a well-known supplier of Pick n Pay and Checkers when he was first trying to enter the market

> I went to meet with the guys there about five years ago. I said "howzit I am also trying to become a lettuce farmer," he said "oh good luck man" "is their space for me in the market?" he said "there's always space." And I was chatting to the owner of the company, saying there is always space. Which means what? There is always a demand for food, why because people are hungry and there is always waste. So there is a demand for food constantly (Athanasopoulos, 2016).

The conversation between my participant and a well-known supplier does not necessarily reflect the true nature of the capitalist system we have come to know. In one sentence we are told that when you are producing for someone else's clients you are creating competition, but in another statement one is led to believe that it is welcomed competition – all within the same system. However, as argued by Satgar (COPAC), "that is because they see it as creating appendages, they want to incorporate these people into their value chain on their terms. And that's a problem." So while it may not be met with immediate resistance, in totality creating appendages to an already broken system has a negative impact on the viability of creating an alternative if it is to be absorbed into the existing system.

Contrary to what most participants shared, Satgar explained how the creation of an alternative food system would be resisted, calling it 'basic economics'

> Oh yes, because in their eyes it would be taking away market share. In their eyes it's competition. So when people have an alternative food choice, go to my community market get my organic veg, get my milk and blah blah – that's a rival, it's taking away market share, profits, so it will be a threat. The inputs that go into this farming – you not dependent on corporate controlled seed system – so it will be a threat. You are creating an alternative market where people are spending their money, you are defying mono-culture diets, fast-food culture, you keeping the resilience of indigenous culture – that's going to create a problem. People spend billions advertising this crap (Satgar, 2016).

Through the interviews, there have been a mixture of responses regarding the socio-political viability of urban agriculture. In general, most participants do see the positive role it can play in increasing access to healthy food within the city. It has been found that there is there is a buy-in from the community at large with regards to urban agriculture [social acceptance]. However, as it will be discussed in the next section, this buy-in is closely linked to class, and therefore means different things for different people (which relates to Erasmus (GCSRI) distinction of luxury and development food). Regarding resistance from the dominant sector, most participants feel it is too soon to say yes, because the true impact of urban agriculture is

yet to be seen. However, most participants seem to have had positive feedback on this dimension, thus in terms of the social acceptance amongst relevant stakeholders and the ability to increase access to food (based on this research papers working definition of socio-political viability) there is a firm case for the socio-political viability of urban agriculture.

4.4. Ecological viability

The working definition of ecological viability was: "From the onset, ecological viability will refer to produce that is sustainably grown, and will look at stakeholders' perceptions of whether South African's will change their consumption patterns to buy and consume locally produced food. This is seen as a precondition for the success of urban agriculture as a viable alternative food system rooted in food sovereignty."

Through the interview process, it was discovered that the ecological viability of urban agriculture is closely linked to the socio-economic status of the population, and is therefore not just a matter of supporting locally produced goods, but is rather about the price and hence the affordability of locally produced goods over other goods. When asking whether South Africans are conscious consumers, participants responded, "it's a socio-economic thing" (Hills, 2016), "…we don't have the luxury of being concerned about a carbon footprint if we are hungry" (van Rensburg, 2016), "like I said we've got two worlds; we've got the first world customer that cares about it. Then you've got the bigger portion of the population that only cares about the price, they don't care about the quality, they don't care about the footprint – nothing, as long as it's cheap and it's available" (Pienaar, 2016), "I think there is a sector of consumers that is conscious about what they eat and how it was produced, especially those from the high-income group. Other consumers' choice is influenced by affordability" (Nciizah, 2016), and Mazibuko (from Joburg Market) remarked,

> …but particularly you know South Africa is an economic society, the higher you are the more are aware of these things, the lower you are the more it's actually about sustenance, if you get veggies for your kids for as long as they can eat then you're fine. If you go high up there in the food chain, they say 'I only buy from Woollies because they guarantee that this is actually organic.' So there is actually an awareness, but the awareness seems to be within certain class groups. Because this is a class issue, it's not about black or white, it's actually a class thing. It's differentiating itself more on a class basis than anything else (Mazibuko, 2016) .

The most striking of these statements is that of Erasmus "people who can afford it are… where they can afford a conscious!" (Erasmus, 2016), as this exhibits the truth of the South African society – you need to be of a certain socio-economic status to be concerned about these issues. Otherwise, it is about mere survival.

Another issue that was discussed by participants is affordability versus convenience. Loabile (from COJ) explained "we are operating in a global market, so as South Africa our agriculture sector is not as protected like in other countries, so we still having lots of imports coming into the country. So obviously whatever is imported and the price is low people will go for it, because it's more an issue of affordability" (2016). However, sometimes convenience overrides affordability, "so if they know they can get kale at the corner, they will because it is convenient, but if it's more expensive they still might get it if it's *sooo* convenient" (Hills, 2016). Society today has become very fast paced, and in order to sustain our hunger throughout the day, fast food has become more accessible (and hence convenient) therefore buying our food (as we lack the time to grow it ourselves) has become the norm. As a result, we are losing our connection with our food, this closely links to the critique offered by Agarwal (2014) on food sovereignty, where producing food is unrealistic in times of globalisation and urbanisation.

Pienaar (from Woolworths) stated "the higher-income LSM 6 and higher they not interested to work for their food, they want to buy it off the shelf. So then it comes down to the guys that cannot afford food that need to produce for themselves" (2016). Manderson (from SAFL) argued

> No, I don't think so. I don't think urbanites don't farm because they believe it's supposed to be a rural thing. I think urbanites don't farm because they are very busy people that wake up very early to go to work and join the rat race and then go home and you know don't have time to do all of this so pop into a shop because there is a lot of convenience around. But I don't think it's because there is this, well there is this conception that farming belongs in rural areas, but I don't think it prevents them (Manderson, 2016).

Furthermore, she claims that it is convenient to shop at retailers, which is why South Africans prefer them "it's convenient. I mean where are you going to find a farmers' market at 9 o'clock on a Friday, or 8 o'clock on a Wednesday? So where you going to go then?" (Manderson, 2016).

We therefore see that the ability to buy produce on a shelf is very appealing to those who have been engrossed into city life, making convenience a very important factor when deciding what products to buy.

Another factor that is closely linked to convenience is the lifestyle of city dwellers. We have been brought up into modern culture, where it's all about being modern and sophisticated, again being closely linked to class, lifestyle choices will impact the ecological viability of urban agriculture as it will determine whether the community will support initiatives aimed at creating an alternative food system. However, Satgar (COPAC) questioned the authenticity of people's choices to buy from alternative markets,

> Where there is an awareness, particularly more middle class about healthier eating options and so on, they see it as a lifestyle political choice. They don't see it in terms of, so they would go to the Bryanston market, and buy a packet of organically grown tomatoes and take it home. But they don't see it in terms of development of an alternative system, they not seeing the social relations behind the market of small-scale farmers and so on. They just want to feel as an individual 'I am eating healthy tomatoes.' There isn't a deeper consciousness about their food politics… so there is an awareness of eating healthy, but it is a lifestyle based middle-class disposition, not radical, and not thinking in terms of an alternative food system (Satgar, 2016).

So we see that while this is happening in pockets of society, it's not as Hills (FTFA) noted 'a revolution' people are doing it keep up with trends,

> So I think we are going to see a lot more of it, and I think there is a bit of a movement of people wanting to be more self-sustainable growing food, so I think there's across the board so not just from vulnerable communities wanting to grow food, but more people have vegetable gardens again, it's sort of became trendy with 'brew your own beer'. So there is that whole culture again, so it will definitely sort of peak again – and maybe that will change the way food moves around, and if it's cheaper- it's all market driven. If it's cheaper people will buy it, it's as simple as that. If the quality is better – even better (van Rensburg, 2016).

So one can anticipate that as this becomes more fashionable more people may change their buying patterns, which gives would strengthen the ecological viability. However, it is often more expensive to buy local when more affluent people are targeted, making it inaccessible for the poor, and thereby defeating the whole reason to form an alternative food system. As one participant explained

> It has to be competitively priced as well or much much better than I can get anywhere else. Even the much much better, it's always a small crowd that can afford the much much better. It's not just about food, it's where our clothes are made. I mean it's very expensive to buy South African made things, it's just so much cheaper to import it (van Rensburg, 2016).

Matthews described how the Department is encouraging people to support local projects "what we encourage in the community projects is for the local community to buy directly from the project" (2016). This will strengthen the ecological viability, as more people will be buying local goods and local markets as opposed to supporting dominant retailers. Furthermore, to increase the awareness of these community projects she suggested having market days within the community in order to get more sellers under one roof making it more convenient and accessible.

So while there is an effort to get communities to buy local, as South Africans "we have a very globalised diet" (Satgar, 2016), Loabile argued "whatever is imported and the price is low people will go for it, because it is more an issue of affordability" (2016). This gives weight to the critique offered by Bernstein (2014) who argued that large commercial farms are better able to produce at scale in order to ensure lower prices. So we therefore notice that the ecological viability (buying sustainable and locally produced goods) will continue to be constrained by affordability (price) in a socio-economic society like South Africa, because when the trade-off is between feeding your family and where your food was produced the latter will always be undermined by the former. Demonstrating that sustainable development is undermined by economic forces.

4.5. Alternative Food Networks

Alternative Food Networks (AFNs) have been defined by four main characteristics:

> (1)by shorter distances between producers and consumers; (2) by small farms size and scale and organic or holistic farming methods, which are contrasted with large scale, industrial agribusiness; (3) by the existence of food purchasing venues such as food cooperatives, farmers markets and CSA [community supported agriculture] and local food-to-school linkages; (4) by commitment to the social, economic and environmental dimensions of sustainable food production, distribution and consumption (Jarosz, 2008).

Throughout the interviews, respondents expressed their views regarding alternative food networks in South Africa. The interviews revealed that the future of alternatives in South Africa may not be too distant as some are already taking off, and some participants seemed confident in the potential of alternative food networks (imagined or existing). However, it should be noted that some participants were not as optimistic about alternative food systems, as it was discovered that participants often spoke about urban agriculture as an appendage to the existing system and do not see it creating an alternative.

Pienaar (from Woolworths) explained how an alternative system could work

> Us South Africans we love our gardens, if every garden in Johannesburg had let's say 10x10 of veggies, the one household grows carrots, and the other beetroot, you can exchange. You can have quite a big network of food… and then I think urban agriculture can will play a role, where a poor community gets assistance and infrastructure from municipalities and assistance to show them how to grow it and they don't sell the product – they share it because they don't have money to buy it or market it, but they share it among themselves (Pienaar, 2016).

From his description he then explained that this is how the Woolworths Edu-plant programme at schools functions, as a feeding scheme "we don't allow them to make money out of the produce, they must cook it and give it to people that don't have food" (Pienaar, 2016). We therefore notice how this stakeholder can imagine the possibility of how an alternative system could work, based on a system that he knows of.

Many participants recognised the potentiality of forming cooperatives in urban agriculture, this would help farmers increase their volumes, and thereby increase their capacity to feed more people in the city, "you can network relationships. And you can build capacities" (Satgar, 2016), "you might need to create a network such that their outputs or their throughput is significant" (Mazibuko, 2016) , similarly, Athanasopoulos from Greencity Farms explained how he has in fact tried this approach and has found it beneficial where agreements are made with different farmers

> I speak to a lot of guys and ask where you guys are selling your stuff, and they say "we sold it here here, we struggle here…" then I say "listen man 'I've got these guys that want this much a month, let's put our stuff together and let's produce it." It's all about networking, there is always competition, it's life. But this is food we talking about. People need to eat. And the people

> responsible for producing foods should knock heads together to produce the food that caters for a population (Athanasopoulos, 2016).

Hills (FTFA) described a community garden that has been set up with both sales and exchanges, whether it be time, labour or whatever they have available such as material (bricks, zinc etc.) and they exchange it for vegetables that are grown in the community gardens. They have also formed a partnership with PETCO (a recycling company), where people will come and exchange their recyclable goods for vegetables.

> This is in Senwabarwana – in a small town north of Polokwane… the people use donkey carts to transport all their recyclables. And then the donkeys stay at the depo during the day and take them back at night and load them up in the morning, so there is a time of the day where the donkeys are at the depo. So it makes sense then they have a paddock, they have manure they have a garden and then that closes the circle. And then in Alex, there are six community gardens where people are working in the garden as a cooperative for their own subsistence and then they'll share or sell the surplus (Hills, 2016).

Furthermore, van Rensburg (UJ) explained how alternative markets are not something foreign, and they more popular than what we know,

> I think that we have a lot more of that than what we realise. I saw some stats that 80% of South Africans households buy their food from sort of not retail, more informal markets. Because remember there are more poor people than rich people, so buying your veggies on the side of the road and at a street corner, if you go out of the city you see a lot more of that. South Africans are quite comfortable buying food from the street corner, so the idea of local markets works really well. So I don't think it is a foreign concept to us (van Rensburg, 2016).

However, Satgar (COPAC) argued that most South Africans buy their food from supermarkets, which is supported by other research (Hayson, 2016). Notwithstanding we are seeing certain projects like this mushroom throughout the country,

> It is happening in pockets; it's happening around community food markets – these are alternative food networks that are available. So there's community food markets in communities in urban spaces, and that brings together consumers and producers… Then you have online marketing – like ethical cooperative in Cape Town, and there's a couple here in Joburg where you can source fresh produce on either a weekly, bi-weekly or monthly basis from farmers that do organic permaculture agroecology… that's another alternative food network, it exists, it's under researched. The third food network that exists is what I call informal traders.

> They move massive amounts of food particularly in township communities… All very close to food sovereignty if you like – they may not be conscious that they are doing it, but they are. Then you have more institutionalised cooperatives – that are doing food production both on the production and consumption side. So Ivory Park – has a few cooperatives in food production… So that's another food network if you like that comes very close to food sovereignty, I would call it food sovereignty. So there is all these networks out there that overlap with this urban space… And they are already doing food production (Satgar, 2016).

Loabile revealed that the City is in fact trying to create an alternative food system, and have even started making their own bread with mango flour. Through the cities mushroom projects

> Because we encourage our farmers to form cooperatives because there are benefits if they are registered as a business entity… so what we do is link the very same farmers to our food bank programme the one that we saying we give vegetable packs to the beneficiaries. So the very mushroom project will supply the food bank (Loabile, 2016).

And she explained that it is through this initiative that they are attempting to create an alternative food system, where production will not only be for the food bank but for all residents in the city. Similarly, the GDARD encourages residents to support these local initiatives by buying from community projects (Matthews, 2016). Satgar (COPAC) explained how the support for community gardens allows farmers to connect with demand and sell directly to the community where relationships can be built between producer and consumer. However, in very low-income areas, farmers may not be able to sell all their produce "the logical next step would be well you sold to people in 2-3 streets that's around your site – you would build a community market... And the community market would be such that food is priced reasonably so households can buy it, and that's how you can embed the food sovereignty economy in an urban space" (Satgar, 2016). He argued that the time has come for localised alternatives.

While Erasmus (GCSRI) claimed the highly probably demise of local markets like Spaza shops due to supermarketization, he also stated that "if you want to be a local guy coexisting with a Spar you need to have a different edge" (2016). He then gives an example of an organisation called 'The Munching Mongoose'. This will be used as a case study to provide substance to

the claims that there are successful alternatives establishing themselves in the city. Another example that will be used is 'The Open Food Network' which was described in the interview with van Rensburg (UJ), and it will also be used to show how society is starting to take strides towards alternative food networks. The data used for these case-studies is from what participants said in the interview, as well as off both organisations' websites.

4.5.1. The Munching Mongoose

The Munching Mongoose was born out of a simple idea "source and gather great food and make it convenient for others" (The Munching Mongoose, 2016). Munching Mongoose delivers seasonally available fresh fruit and vegetables, as well as a wide range of other artisanal organic goods (such as bread and milk). The produce is mostly locally produced from a number of small-scale suppliers.

The organisation embodies a sustainability ethos trying to minimise their carbon-footprint therefore they reuse the packaging for delivery – so with a small deposit for your crate and milk bottle, thereafter at each delivery they arrive with a "bulging box of healthy and delicious goodness for you… we will collect the now-empty crate and bottles and take them back with us. These are then thoroughly cleaned and sterilised and are re-used for the following week's deliveries" (The Munching Mongoose, 2016). It is perceivable that the organisation's target market is for the consumer who is concerned with how their food is produced and sourced, and therefore it is for the consumers who can afford to deliberate about their food choices.

The produce they deliver alters weekly, and is seasonally dependent, subscriptions can be done on a weekly, fortnightly, or monthly basis. Boxes prices range from R429.00 (no veg bag) to R779 (maxi box) per week (per order), and include varied amounts of the following: Farm-fresh, free-range, grass-fed milk; Locally made organic and gourmet cheese; Free-range, pasture-fed eggs; Fresh and seasonal fruit and vegetables from ethical farms; Artisan bread; A surprise product or two (The Munching Mongoose, 2016).

It is important to note that this alternative food network has grown out of a middle-class lifestyle that looks for convenience above affordability. It is not necessarily aimed at the poor

and working-class. But it serves as an example to show that despite the dominance of super-markets in these affluent areas, there has been a shift in the communities buying behaviour to these home-deliveries supporting local entrepreneurs over dominant retailers. And therefore, serves to show that community markets with a different edge can create alternative markets in the city.

4.5.2. The Open Food Network

The declaration on the Open Food Network (OFN) website states: Food, unincorporated

> Sometimes the best way to fix the system is to start a new one… We begin from the ground up. With farmers and growers ready to tell their stories proudly and truly. With distributors ready to connect people with products fairly and honestly. With buyers who believe that better weekly shopping decisions can seriously change the world. Then we need a way to make it real. A way to empower everyone who grows, sells, and buys food. A way to tell all the stories, to handle all the logistics. A way to turn transaction into transformation every day. So we build an online marketplace that levels the playing field. It's transparent, so it creates real relationships. It's open source, so it's owned by everyone. It scales to regions and nations, so people start versions across the world. It works everywhere. It changes everything. We call it Open Food Network. We all love food. Now we can love our food system too (The Open Food Network, 2016).

The OFN is a global initiative by the Australian Food Foundation aimed at linking direct producers and consumers, by using an online platform which allows producers and food-hubs to sells their products directly to consumers. By eliminating the middle-man in the supply chain, consumers get better prices, and producers are able to make higher profits (The Open Food Network, 2016). The organisation aims to recreate the food system by making trade fair, affordable, organic, slow food the norm by merging technology with sustainable agriculture. As a result, there is better value, waste is eliminated, carbon emissions are lowered and food security is promoted. The best way to think of it is 'as a collection of virtual farmers selling real produce' (The Open Food Network, 2016).

The platform allows buyers to buy produce online (either for delivery or collection). The process starts with the search – where you search the diverse and independent 'suppliers' (farmers) for seasonal local food. Upon searching you can choose your closest neighbourhood

hub, as well as whether you prefer delivery or collection. The next step is to shop – you now start your transaction buying affordable local food from diverse producers and hubs, they also allow you to know the 'story' behind your food – bringing to life the social relations that are hidden in your mainstream food system. Finally, you await your delivery or visit your local producer or hub – where you can establish a more personal connection with your food [producer]. This is an interpersonal system, which sees food as more than a commodity, it sees it as your sustenance, and gives life to the food system.

The OFN claims to be making a new food system, currently across the Western Cape, Kwa-Zulu Natal, and Gauteng – there are 16 food producers, 13 food shops (which supply value-added products) 3 food shoppers, and 5 food orders (The Open Food Network, 2016). The producers in Gauteng include: Heavenly Harmony Ormus Gold, Ivory Park Agri-Hub, Art of Craft and Sugar Bush Valley.

While the OFN is just taking off, it has the potential to form part of an alternative food system that will make our food system an interpersonal one, one that has a connection with nature, with food and with people. This is all part of forming our community markets, our alternative food networks – and therefore represent something very close to food sovereignty in the city. However, as noted by Satgar (2016), "you will never have a pure food sovereignty system" so perhaps not being able to transform the entire food system does not necessarily translate into the inability to form an alternative that can give the existing food system 'a run for its money' and when there is an alternative, it means consumers have more choice and therefore more accessibility.

4.6. Conclusion

Through careful analysis of the interview transcripts, data was presented relating to the key themes in this research paper. By interviewing stakeholders who are experts in their field, the researcher was able to collect a diverse range of perspectives regarding the viability of urban agriculture as an alternative food network in the city.

On a shallow level, the data presented points to a relatively low viability of urban agriculture. The barriers outweigh opportunities; socio-economic viability appears to be low as it has limited crop variety, but more importantly it cannot produce sufficient yields; notwithstanding the potential resistance to its presence, based on the social acceptance and increased access to food, it would appear that there could be a case to be made about the socio-political viability of urban agriculture; and finally, the ecological viability (produce that is sustainably grown) is linked to the population's socio-economic status and therefore in a society like South Africa affordability is more important than worrying about one's carbon footprint. So while the presence of existing alternative is undeniable as a collective there is not a movement towards alternative networks. Therefore, although stakeholders see it as a necessary project, they do not seem convinced of its ability to form an alternative. I will be able to look at a more detailed analysis of this data in the forthcoming chapter.

5. Discussion of Data

This chapter seeks to analyse the data obtained in the interviews by using a theoretical lens of ecological Marxism that critiques the workings of neoliberal capitalism. This chapter will present the analysis by utilising this research's key variables of viability (socio-economic, socio-political, and ecological), however these are not isolated variables but are interconnected. It is worthy to note that the responses obtained in the interviews represent the particular opinions of the interviewees and therefore should be understood as a specific segment of reality.

5.1. Socio-Economic viability

5.1.1. Exchange value and use value

The majority of participants affirmed that urban agriculture would not be able to produce enough food to feed people in the city. They therefore argued against the idea that urban agriculture would be able to compete with commercial agriculture and suggested that there would always be a need for commercial farms. That is, the insufficient yield was the basis on which some participants justified the continued reliance on commercial farms to feed the people – consequently, the need for markets to solve the problem of hunger. This an orthodox understanding of the food challenge that sees the biggest challenge to food security is to meet a growing demand for food (Cock, 2013). According to the literature, agriculture can increase productivity through the expansion or intensification of agricultural production (Germer et al., 2011), therefore seeing urban agriculture as an appendage to the existing system can be viewed as the expansion of agriculture into urban spaces.

Participants argued that urbanisation is an opportunity for urban agricultural growth. However, this is not to the demise of conventional agriculture, as they assert the demand would be too high to rely solely on urban agriculture. They therefore recognise the need to expand the areas under cultivation, however as it was noted in the literature South Africa has limited arable land; consequently, participants felt that urban agriculture would be able to compensate and increase production of food through expanding production areas by growing produce within the city. Thus, some participants attribute the cause of food insecurity to insufficient supply to

match demand and deem it repairable through the integration of urban agriculture into capital markets.

Some of the participants interviewed therefore conceive socio-economic viability in terms of its exchange value – a classical Marxist concept that refers to whether commodities can be quantified according to what proportion of other commodities it will be exchanged for – if traded (Marx & Engels, 1980). Therefore, it suggests that production in urban agriculture would not be as profitable as commercial agriculture since it has a lower productive capacity. Consequently, lower yields are a justification for seeing urban agriculture as an appendage rather than an alternative. Therefore, from the perceptions of several participants, for urban agriculture to make substantial changes, it should form part of the wider economy and hence be able to create value in terms of exchange (Viljoen & Bohn, 2014).

However, commodities have both exchange value and use-value, which is to an extent overlooked by certain participants. Use value refers to the usefulness or utility of an object or activity to an individual (Viljoen & Bohn, 2014). It is not surprising then that urban agriculture has a use-value that is distinct to its exchange value. The use-value of urban agriculture is the ability to feed hungry people, thus if people can grow their own food and feed themselves a garden has high use-value (irrespective of its productive capacity to supply external markets). Overlooking the utility of urban agriculture takes away the social aspect of these gardens and only seeks to evaluate them against their productive commercial potential. Thus the production of commodities takes precedence over all other types of (re)production, including the reproduction of livelihoods, where we see a shift away from use value to exchange value through the mainstreaming of urban agriculture under capitalism (Viljoen & Bohn, 2014). What emanated from the data was the separation of use-value and exchange value, whereby participants agreed that urban agriculture has been able to increase access to healthy food in the city (use value) however, there was the tendency to see this as a separate issue to its ability to produce enough food. That is, participants are in one instance confident in the capacity of urban agriculture to feed the hungry (as a social issue and hence as a safety-net for the marginalised). However, a majority of the participants interviewed were less confident in its ability to supply the market (its exchange value) and therefore would not see it as a real threat to the existing system but rather as a safety net.

Under capitalism, if a system/activity does not supply commercial purposes then its usefulness is questioned, which is why certain participants questioned its ability to cater for the whole market. Value is imparted through being "affiliated to the capital growth project rather than recognising the power of specific grassroots initiatives" (Viljoen & Bohn, 2014, p. 111). Therefore, we need to stop employing capitals benchmarks to measure the utility of something as it removes the social aspect, by merely considering the value of urban agriculture in terms of economies of scale, surplus value and the creation of commodities – we overlook the very people these projects are intended to help.

Furthermore, as it was noted in the literature review, the issue to food security is not the productivity of agriculture as the orthodox approach would suggest, but rather the process of redistributing produce under capitalism. The socio-economic viability of urban agriculture should therefore not be judged against its productivity but its ability to redistribute to the hungry, the marginalised, the excluded. We therefore need to determine how accessible produce is to the poor.

5.1.2. Urban agriculture across the globe

The examples of urban agriculture in Cuba and Dar es Salaam cited in the literature review showed how urban agriculture (and small-holder farming) had been made economically viable by looking at the use value and not just the exchange value. The Cuban case, while it emerged out of necessity, shows how when people work together for the betterment of society and become agents of change, a system of urban agriculture can be made viable. When a system is driven by nutritional needs (use-value) and not profit, it will be able to achieve the socio-economic viability that is necessary for its sustainability in the long-term.

It is also worth noting that the turn to urban agriculture in Cuba was due to necessity at a state level and not championed by revolutionaries as an act of rebellion against the corporate controlled food system. This coincides with participants who argued that unless people have no other choice they will not change, showing that change needs to be linked to necessity (Manderson, 2016). As a country, there is a tendency to only implement diversions when already faced with a problem rather than as preventive measures, for instance water

restrictions were only firmly implemented when the Vaal Dam had reached dangerously low levels.

The city of Dar es Salaam in Tanzania, the ninth fastest growing urban centre in the world is another example of how small-scale farmers (including urban farmers) have managed to produce food at a sufficient scale without large corporate structures (Wegerif & Hebinck, 2016). In Dar es Salaam, a trader was not concerned with outdoing his fellow traders, was not concerned with advancing his own interest, and this led to the resilience (viability) of the system as a whole. It describes a system that delivers food on a city feeding scale, which responds to the needs of the poor who purchase food as well as the interests of the food producers.

5.1.3. Sourcing Capital

Participants noted the different avenues to use when sourcing capital to start a project. One of the most striking was the use of private investment. The literature on vertical farms alluded to the initial investment costs necessary to start a vertical farm (which deterred this research from the beginning). It is therefore not surprising that participants mentioned the lack of financial investment as a barrier to the implementation of vertical farms in the city. In her research, Davey (2010) conceived her project as a venture for private investment or as a joint venture with the municipality – as the programme aims to deliver the product for profit. She names Richard Branson as a 'typical' private client, as well as dominant retailers in the food chain such as Woolworths, Fruit & Veg, or Spar. This is indicative of the high investment costs, and would therefore do little to challenge the existing system if these are the targeted clients.

In the interviews, Pienaar (from Woolworths) noted the possibility of Woolworths owning a percentage of a hydroponic farm in the future, he mentioned "I think Woollies would be foolish in the future not to invest in some way in that type of farms" (Pienaar, 2016). Similarly, Athanasopoulos (from Greencity Farms) affirmed that high-end investors are targeted to invest in these systems. When private investment is involved, investors would want a return on their investment (profit), however in a food sovereignty system, while profit may be made, it should not be the aim. An alternative food system rooted in food sovereignty would thus be incompatible with private investment funding these projects – which is consistent with the vast

majority of participants thinking of urban agriculture not as an alternative but an appendage, that will continue to sell produce for profit.

The majority of participants [with the exception of Satgar] saw urban agriculture as an expansion of the existing system – as capital tends to find new markets for its own accumulation – which is how participants perceive urban agriculture in South Africa. The literature points to a marketised approach regarding urban agriculture, whereby projects aim to get produce into the existing market due to their orientation around the profit motive – to make projects sustainable in the long-run. Similarly, certain participants also referred to getting produce into markets by increasing market access. Loabile (from COJ) for instance comments on how more technologically advanced methods (such as hydroponics) would increase supply to "have enough produce to feed and supply the markets in the city" where she indicates how this would help maximise profits. Furthermore, Athanasopoulos (from Greencity farms) justifies his profit motive through 'giving back' to the community, where he explains that to give back you need to be making money that one may sustain giving back. Most participants thus see the need for projects to be financially sustainable for them to be economically viable, which in turn means getting produce into the market – thus not creating an alternative market but extending market access to urban farmers so that they can make money conducive to sustain their livelihoods.

Furthermore, the way in which participants spoke about vertical farming and hydroponic systems – while it may potentially be healthier than genetically modified food – it is a biotechnological solution to increase yield. Therefore, as noted by Pienaar (from Woolworths) it depends on who is growing produce, as this would impact the extent to which access to healthy food would increase, as he explained "the same system [with] someone chasing yield – you'll have a poor nutrition value and where someone is growing a crop to feed their own family will have better nutrition systems" (Pienaar, 2016). This demonstrates how nutritional value is contingent on whether produce is for increasing yields or to feed people in more sustainable ways, where people are at the centre as opposed to profit. In the former case, hydroponics will be another mechanism for cash-crop farming (farming crops to be marketed for profit) a mechanism to use agricultural growth as a means of economic development.

Erasmus (from GCSRI) makes the distinction between using urban agriculture as a survival mechanism and as a developmental mechanism. The former is utilised to feed the hungry, and the latter is used as means for local economic development, growth and job creation, where he made explicit the need to increase yield in order to have scalability, he asserted "you have to sort of get into the aquaponics game for development" (Erasmus, 2016).

The importance of agriculture for economic growth is widely noted in literature on paths to development (Oya, 2010; World Bank, 2007). The World Bank Report explains how growth generated from agriculture was twice as effective in reducing poverty than GDP growth originating from other sectors (industry or services), describing how rapid agricultural growth in India resulting from technological innovations was followed by major declines in rural poverty (2007). Furthermore, development theorists trace the development trajectory of now-industrialised countries through agricultural growth, claiming that agricultural growth was the precursor to industrial revolutions (or the rise of industry in general). However, before agricultural growth can commence, there needs to be a transformation of the agricultural sector, that is an agrarian transformation (Oya, 2010). This refers to a shift towards capitalist agriculture, which is primarily concerned with making profit (producing for sale), whereby the majority of people do not depend on the production on their own plots of land, but depend on selling their own labour power in order to get a wage and then buy from the market – the reproduction of livelihoods by acquiring our means of sustenance through the market. Thus, for agriculture to be an engine of development, there needs to be an increase in productivity, profitability and sustainability of smallholder farming (World Bank, 2007).

In the Strategic Plan 2012/13-2016/17 The Department of Agriculture, Forestry and Fisheries (DAFF) highlights the increased contribution of the sector to economic growth and development as one of its six strategic goals (SGs), which includes: increase growth, income and sustainable opportunities in the value chain; increase the level of public and private investment in the sector; increase market access for South African products; and increase production of feedstock for the manufacturing sector (Department of Agriculture Forestry and Fisheries (DAFF), 2012, p. 21). Furthermore, the Provincial Government, as well as the City of Johannesburg, substantiate their support for urban agriculture to stimulate the local economy by creating jobs, and bringing in revenue. This is consistent with participants who see urban

agriculture growing in the future, arguing that "it can also contribute towards the economic development of the province" (Loabile, 2016). This is also the participant who made frequent reference to the need to increase the productivity of urban agriculture through hydroponic systems. We can therefore see that some participants see urban agriculture as a mechanism to stimulate the local economy and is consistent with the literature on paths to development.

Therefore, what emanates from the data is that the way in which urban agriculture is structured in the city is for the extension of the existing system and not geared to challenge it. For the most part, most participants perceive socio-economic viability in terms of volumes, and its exchange value, consequently, the inability to supply a growing demand in markets can be understood as the majority of participants' justification for the continued reliance on the industrial agro-food system. While the use-value of urban agriculture cannot be ignored, participants do not see the ability to challenge a highly productive system with a system that cannot generate the yields necessary to supply the shelves, despite its ability to feed the hungry who are not being served by this industrial agro-food system. Therefore, although participants are confident of the ability of urban agriculture to be used as a safety net for the excluded (its use value) most participants were not confident about its capacity to supply the market (exchange value) resulting in them being sceptical about its long-term socio-economic viability.

Although urban agriculture has been a successful venture in other regions, where it has been able to cater for a large portion of food requirements in a country like Cuba whose markets had been closed off, unless there is a real necessity to utilise urban agriculture in this way, urban agriculture will continue to be structured as a safety net (for the poor) but its ability to challenge the existing system continues to be questionable. For the most part, urban agriculture is being structured around bringing local development, providing job opportunities, and as it continues to grow – I believe it's a new market capital will seek to co-opt (which I will discuss in the subsequent sections of this chapter).

Using urban agriculture as a developmental mechanism means it will be structured around the same principles as industrial agriculture, as it undergoes an agrarian transformation towards capitalist agriculture – to increase yield and make a profit, thus making it incompatible with an

alternative food system rooted in food sovereignty. Therefore, the way in which urban agriculture is being organised and utilised for the most part is not promising an alternative, but rather seeking to increase productivity, however, as it was averted to in the literature – the food crisis is not the production of food – but it's equitable redistribution. Consequently, most of the participants are not talking about an alternative system, but are talking about extending the existing system into urban markets, making the socio-economic viability of an alternative impossible as we continue to link it to capitalist principles.

5.2. Socio-Political Viability

The data presented in this research reflects participants positive attitude towards the ability of urban agriculture to increase access to healthy food within the city. As it was suggested in the previous section, this denotes the use-value of urban agriculture. Some participants thus in one sense see the value outside of its productive capacity. However, they also see this as having little impact outside the ability to provide a safety-net or a compromise to the marginalised. As Erasmus (2016) (from GCSRI) explained, "the impact is very local. So I don't want to say the impact has been small if you had ten people that would have died of hunger is now not dead – the impact is massive". He adds how its inability to sell produce at organic markets makes its impact limited, making a distinction between productive impact and local impact (as a safety net). Accordingly, while in one instance the participant makes a noteworthy claim about not only looking at numbers (ten people who have been helped is a project well-done) but in another instance, he still goes back to thinking about the need to produce for bigger markets for it to make a substantial impact.

While Webb (2011) is sceptical of advocating for the advancement of urban agriculture due to the insufficient evidence to support its widespread implementation and suggests that the impact has been modest. The participants interviewed were more confident in its ability to feed the hungry, suggesting that "we should use urban agriculture to increase the food security of the most vulnerable populations in urban areas" (Manderson, 2016).

What emanated from the data regarding the socio-political viability is the social acceptance of urban agriculture regarding a communal buy-in and a government (corporate) buy-in. Participants suggested that the differential buy-ins are evidence towards the support for urban agriculture and hence would indicate the possibility of its success within the city. However, the researcher is cautious to read this at face-value and argues that we need to go beyond the surface level to understand the socio-political viability of urban agriculture in Johannesburg.

5.2.1. Communal buy-in: Choice or necessity

Participants made a distinction between the middle class and the working class who in their eyes are supportive to urban agriculture in the city. According to the perceptions of the participants, urban agriculture is beginning to receive the support from the middle class as it is emerging as a trendy thing to do, arguing that "it's sort of become trendy with brew your own beer. So there is that whole culture again… it's all market driven" (van Rensburg, 2016).

To sustain its growth path capitalism has been able to infiltrate our lives and created a culture of consumerism – you are what you buy. In modern society, one's success is evaluated from a material perspective and in terms of the potential for consumption (Janisz, 2014). As one of the stakeholders argued it is the advertising industry that tells us what is modern and sophisticated (Satgar, 2016). Therefore, there is a tendency to push and promote a culture of consumerism, which is needed "to sustain sufficient buoyancy of demand in consumer markets to keep capitalist production profitable" (Harvey, 1990, p. 61). Thus, in modern culture, we are surrounded with images that tell us what is fashionable, new trends etc., where we are encouraged to keep up or miss out. Thus, consumption functions as a discourse, where the consumer communicates to others where they fit in and belong within the social structure through their purchasing practices.

Therefore, the trends emerging around 'going organic' 'clean eating' 'growing your own veggie garden' are all part and parcel of a new and emerging consumerism, *Eco-Chic* (Barendregt & Jaffe, 2014), that the middle-class are buying into. Consequently, this continues to perpetuate the system and hence not challenge it by creating a real alternative. Eco-chic is one of the many identities and lifestyle choices offered by (green) capitalism and is defined as "a combination

of lifestyle politics, environmentalism, beauty and health, combined with a call to return to simple living" (Barendregt & Jaffe, 2014, p. 1). Thus, the middle-class disposition on urban agriculture is part and parcel of 'green capitalism' which has been described as a 'wolf in sheep's clothing' whereby the 'greening' of capitalism is yet another marketing tool to sustain its growth path (Cock, 2013).

Green capitalism has managed to transform consumption from problem to solution, whereby excessive consumption that caused environmental problems is now painted as green consumption that sees consumption as the solution to many problems. For instance, spending your money on 'green products' is socially acceptable, or buying a branded item with a clear conscience because the company is helping to safeguard the environment by using recycled material for packaging. As a result, green consumerism allows the growth of these alleged eco-friendly transnational corporations, because you can use your money to help save the planet from environmental disaster by buying green. The consumer market today offers us every kind of ethical, ecological, and healthy option we can imagine, where we are led to believe that justice and sustainability can be purchased in the market. Consequently, green consumerism assures that we can have our cake and eat it too, that we can change the world by merely making smarter shopping choices.

The second aspect participants spoke of was the buy-in from the poor working class who arguably approach the city, government departments, or NGOs to start gardening projects within the city (Hills, 2016; Loabile, 2016; Matthews, 2016; van Rensburg, 2016). One needs to ask whether the buy-in from the poor is genuine enthusiasm or as a survivalist mechanism to feed oneself and one's family. In his research on the stories of street traders, Sello (2012) argues that street traders participate in street trading because they have no choice and if better opportunities arise they would leave street trading. Individuals who engage in these survivalist occupations have been called necessity entrepreneurs, defined as individuals who have no other viable option for income than to start a small, income-generating activity (Brewer, 2014). Accordingly, opportunity and necessity entrepreneurs are two types of entrepreneurs based on the motivation to start the enterprise. The former involves individuals who start a business to pursue an opportunity, while the latter are more need-based (Brewer, 2014). Furthermore, it is found that when the macroeconomic infrastructure of a country does

not provide sufficient jobs for the population, citizens are forced to rely on their own ingenuity and talents to sustain their livelihoods, whereby they become necessity entrepreneurs, where the goal is survival and not to create wealth. In short, the enterprise is started just so that they can survive.

This is an important factor to consider when using the alleged buy-in for urban agriculture from the working class as an indicator for their enthusiasm to produce their own food. That is, we need to be asking whether urbanites have turned to urban agriculture because they see the value of it beyond mere survival, or whether they would give it up if presented with better opportunities. Furthermore, Joubert (2012) argues that urban dwellers in Khayelitsha participate in communal gardening to sustain themselves when they have no alternative and thus prefer to buy their food with an income instead of growing it themselves, and the majority leave the gardens once they find another source of revenue. Therefore, it is important to consider the survival of urban gardens when it is not out of necessity, and more research is needed to investigate the continuation of urban gardens once other employment opportunities are presented.

Additionally, the example of Cuba shows how urban agriculture was employed out of necessity when there was no other way to feed the population, and Pienaar (from Woolworths) questions the survival of urban agriculture in Cuba now that embargoes have been lifted, arguing that "it will be interesting to see the moment Cuba slots into the normal economic stream of the international community… Cuba is going to get smaller, you'll see!" (2016). Moreover, Nyamakazi (from GDARD) referred to documents on urban agriculture which states that urban agriculture was a process of producing food in times of economic hardship. However, the participant does not believe urban agriculture would subside when the economic climate improves but sees the sector growing as innovative ways for producing food [like hydroponics] are employed (2016).

Urban agriculture appears to be one solution to the food insecurity crisis in the city, however, what is more concerning is that only three per cent of households in poor areas in Johannesburg grow their own food (Rudolf et al, 2008, cited in Cock 2013). This is further supported by research that finds that most households purchase food from supermarkets

(Hayson, 2016) which is why urbanites prefer to have income in order to buy their own food. From the perceptions of participants, higher-income earners prefer to purchase their food than growing it themselves. However, research shows that this may be true for people of a lower economic status as well. That is, we cannot isolate the desire to purchase food as something the rich can afford to do, as it has been argued, that if presented with other options, the urban poor themselves would also prefer to buy their food as farming is seen to be the antithesis to city living

> It is not modern; it is old-fashioned, backward, it is not what you do when you leave the provinces. You came here to leave behind the life of a peasant – why would you want to return to the soil (Joubert, 2012, p. 173).

So while there is a middle-class disposition to grow their own food as it has becomes a new trend, the difference lies in whether there is a choice in the matter or if it is forced. The middle class are sufficiently removed from the necessity of engaging in urban agriculture, therefore what emerges out of necessity for some, takes on the glamour of eco-chic for the few wealthy. The poor participate in urban agriculture out of necessity; however, the middle and upper classes can imitate this activity for its glamour without fearing the stigma of poverty and exclusion associated with it (Barendregt & Jaffe, 2014). That is, through a process of eco-branding we overlook the injustices of the system and the middle class get to enjoy the trends of simplicity and celebrate going local, for instance, a home-grown vegetable stew is a necessity for the poor, but it becomes eco-chic when sold in upmarket restaurants and coded with food-mile information. Consequently, the way in which urban agriculture is structured and utilised reinforces class divisions and reinforces the boundaries between the rich and poor.

Thus, the middle class choose to do it, whereas the poor are forced to do it out of necessity, which is why this research brings into question the extent to which participants confuse the buy-in from the community to start these gardens with enthusiasm when it may, in fact, be driven by desperation (necessity) resulting from the need to feed oneself and family because of the current economic conditions created by the system. In this case, urban agriculture could be a consequence of the system and not structured to be an alternative. Rather it is structured around a neoliberal ideology of self-help, where it is a self-evident solution to feed the poor and unemployed who have nothing but time to grow their own food, if they need to feed their

families “just give them some seeds, spades, and watering cans and let them get on with it” (Joubert, 2012, p. 173). And when the poor do not take charge of feeding themselves they are blamed and said to be unwilling, and we blame the victims (Cock, 2013; Joubert, 2012). Therefore, as it will be discussed in the following section, the buy-in from the government and city officials is a way to meet basic human rights in a neoliberal framework and thus is not structured around forming an alternative but used as a safety-net for the shortfalls of the system.

The difference between choice and necessity is closely related to the mind-set of society, which is a potential barrier to the success of urban agriculture. While urban agriculture may be a trend among the middle class which would result in increased produce for niche markets (as many of the participants noted) it would create isolated initiatives which are not substantial enough to create a real alternative food system. It would create a niche market for those who can already afford to purchase their food and would thus continue as an extension of the existing system, and it holds no potential to challenge it and form an alternative. Furthermore, when urban gardening is done out of necessity people are uncomfortable with growing food to feed their families because they cannot afford to purchase it along with the rest of society; while not having access to water is a service delivery issue, whose problem is it when we do not have access to food “there is an element of shame in not being able to feed your family” (Battersby, 2011, p. 13).

Therefore, we need to look deeper than the face value of people utilising these gardens, more needs to be done to increase the acceptability among the working class – so they can see they are part of something bigger than putting food on the table, that they are part of the movement to create an alternative food system that would break the existing monopolies. The middle-class also need to join the movement and see beyond the ‘trendiness’ of local organic markets; to become an alternative, stigma needs to change, and people need to see that they are part of something bigger than themselves.

It is noteworthy that in Cuba the drive towards urban agriculture due to necessity resulted in its diffusion and success, while in South Africa the utilisation of urban agriculture due to necessity could hinder its success. The difference could be attributed to how in Cuba necessity

was on a state level, the country as a whole pioneered the development of urban agriculture and there was unity to make urban agriculture viable for the long-term. In South African, urban agriculture is out of necessity on an individual level, and thus the onus is on the individual. It is also 'sold' to the individual as a short-term solution to their hunger; they are won over with the idea that they can make it into a business opportunity and get their produce into the market. While both cases are due to the shortfalls of a system, however in Cuba the whole country is cut-off, whereas in South Africa the individual is cut-off. In the former, the mind-set was different, they were part of something bigger than themselves, whereas in the latter agriculture is seen as backward and leads to the shortfalls of necessity driven projects; that is, when only some are doing it, there is an isolation and stigmatisation associated with it. This shows how unity, being part of a movement would help drive the successful diffusion of urban agriculture.

5.2.2. Government (Corporate) buy-in

From the perceptions of some of the participants' the implementation of programmes; the appointment of personnel to direct urban agriculture initiatives; and the availability of resources for urban farmers are said to be indicative of a buy-in from government and city officials. Participants felt that it is regarded as an important sector in the province, and would substantiate their position with all that is being done across the region with urban agriculture.

However, Matthews (from GDARD) noted the drastic decline in funding for her work in food security and urban agriculture, and to compensate for the lack of funding, government employees have turned to get funding via other creative mechanisms, one of which is Corporate Social Responsibility (CSR) Programmes. This is not isolated to state-sponsored urban agriculture projects but also for those run by NGOs like Food and Trees for Africa. Furthermore, another participant noted how money talks when it comes to seeing whether officials are genuinely interested in supporting a proposition, she claimed "they will entertain the idea, and they will have discussions about it, and they will support it verbally. But when it comes to putting money where your mouth is – I don't think government would support vertical farming" (Manderson, 2016). We thus need to be critical of where money is directed

to see the importance of things, and therefore the lack of funds is a barrier to the socio-political viability of urban agriculture.

The decline in funding is a result of the global economic system of neoliberalism which calls for a rollback of government and a rollout of privatisation. The authenticity of CSR programmes is often questioned, where scholars have suggested that CSR is nothing more than an embodiment of neoliberalism. For instance, CSR is seen to represent "a further embedding of capital social relations and a deeper opening up of social life to the dictates of the market place" (Hanlon, 2008, p. 157). With the roll-back of the state and a roll-out of privatisation dictated by neoliberal ideology, CSR is often seen as a potential mechanism for achieving social policy objectives. We therefore need to be cautious when seeing the buy-in from corporations as necessarily their good intentions in support of communal gardens, and rather consider the deeper agendas of CSR programmes.

CSR is something that can be taught, 'how to be a good corporate citizen' for example, a good corporate citizen sponsors community organisations, donates to charities etc. where it is associated with a voluntary and altruistic spirit – all of which enhance the businesses image. CSR involves business practices that benefit communities at large, where it ties doing good to profits (Shamir, 2004). Thus, to overcome strategies of corporate shaming, consumer boycotts, and widespread protests corporations have become active players in the area of CSR (Shamir, 2004). Furthermore, charitable campaigns coincide with some image crisis, whereby CSR strategies are employed to counter public pressures and to divert attention away from the 'tragedy' and thereby maintain the business image. Accordingly, CSR strategies become embedded in the impression management strategy to improve not only their public image but also improve their market competitiveness (Shamir, 2004).

Furthermore, the bureaucratisation and standardisation of social responsibility has resulted in its measurability that allows a set of indicators to provide information to shareholders which add (or subtract) value to a business when it performs its socially responsible task. Consequently, the community "becomes a commodity that can be sold to the world as proof of responsible behaviour on the side of the company" (Shamir, 2004, p. 681). CSR programmes have allowed corporations to fill the void created by the shrinking states from the supply of

public services, where corporations can come in 'and save the day' giving communities access to services that were once provided by governments – all part and parcel of neoliberal policies.

A study found that as structural adjustment led to increased unemployment and declining incomes. As a result, NGOs tailored their education programmes and managed to swop a "rhetoric of political empowerment for a rhetoric of socioeconomic empowerment by educating and equipping people with the skills and organisational tools for coping with the harsh realities of contemporary capitalism" (Taylor, 1999, p. 289). Similarly, urban agriculture is being used as a safety-net, whereby people are being educated on how to grow their own food because of the harsh realities of not being served by the current food system. A food system which can continue unchallenged because the marginalised are being '*compensated*' with programmes that teach them how to cope in these circumstances. Thus, CSR closes the gaps left by the retreating of government turns social responsibility into a marketing gimmick and a commodity that "conceals the power relations that underlie the relationship between global capitalism and social inequality, social harm and social wrongs" (Shamir, 2004, p. 684).

Therefore, when participants note that government sees urban agriculture as an important sector, but then explain the lack of funding which is compensated through CSR programmes one needs to be cautious in endorsing it as socio-political viability. That is, these programmes are used to divert attention away from governments lack of provision, they divert us away from the power relations embedded in big corporations, and they divert our attention away from how the system is failing us – all ways in which capitalism can accommodate its challenges to reproduce itself. Therefore, corporate sponsored gardens are part of the existing system and do not serve to challenge it, rather reproduce it.

Therefore, while there are urban gardens within and around Johannesburg, they are not geared towards creating an alternative food system, rather they are there to provide a safety-net to the poor – they feed the poor because the system in its current form cannot. Thus, there are isolated projects running food gardens, but it's not as one participant put it "a revolution" (van Rensburg, 2016). Therefore, for urban agriculture to become a viable alternative it needs to be structured differently, that is, it needs to change from being a symptom of capitalism and a movement needs to be created – where its value goes beyond meeting food needs and make

it viable as an alternative. When food gardens are geared towards creating an alternative, when those who are involved in urban food gardens form part of a movement, mindsets can change, and the motives for establishing these gardens will go beyond putting food on the table.

While participants perceive urban agriculture to have the buy-in and support from both the community and the government (corporations), this research attempts to break into these perceptions and find the underlying logic behind the acceptance of urban agriculture among different groups in society. Participants noted there is a buy-in from the community at large, but it is closely linked to class, and therefore means different things to different people. This research problematizes the differential support for urban agriculture among the middle-class and the working class, where the middle-class is sufficiently removed from the necessity of engaging in urban agriculture and therefore participate due to the eco-chic culture associated with it. Some participants noted how they have had increasing numbers of people asking to set up these gardens, but this research is cautious in reading that as social acceptance and hence its socio-political viability in forming an alternative, as their buy-in could quite possibly be influenced by the fact that they have no other means of survival.

Furthermore, the government buy-in is structured around neoliberal ideals of the retreating of government from the provision of social services, consequently, urban agriculture is obstructed by a lack of funding. As a result, corporations get to 'save the day' and fund these programmes. As a result, urban agriculture is shaped into being a bandage approach, and thus the cause of the problem is not addressed but rather covered up. Hence, to say in one breath that government supports urban agriculture, but in another say the private sector is the one funding these programmes is problematic, and symptomatic of a system functioning along business-as-usual ideals, and therefore not geared to form an alternative, but to be used as a safety-net allowing the system in its current form to perpetuate.

5.3. Ecological Viability

From the onset, the ecological viability of urban agriculture would mean that the farming practices utilised would be environmentally sustainable. Thus, the clearest expression of

ecological viability is whether it is sustainably grown. While this research did not investigate the extent to which gardens are adopting sustainable methods, literature around agroecology will lay the foundation of sustainable production. Thereafter, data obtained in some of the interviews will be extrapolated to determine whether they satisfy the principles of agroecology. This will demonstrate the starting point of ecological viability, from which the environmental consciousness of South Africans will be analysed from the perceptions of participants with the aid of literature.

5.3.1. Principles of Agroecology

Agroecology is a practice of growing food in a sustainable way that benefits farmers, society, and the environment. A system based on the principles of agroecology will work with nature rather than against it, thereby it sustains the environment. By using agroecology – natural systems work together as they should, and there will be no need for external inputs. On that account, the costs to the farmer are reduced, the price of food will also decline for the consumer demonstrating how the system will benefit the environment, the farmer, as well as the consumer. These five principles of agroecology have been adopted from those laid out in COPAC's Guide for Grassroots Activism (COPAC, 2014, p.59) .

Increase the recycling of organic material – organic material refers to things formed by living organisms, such as plants, insects, worms, animal manure and so forth. In a system based on agroecology, one would have no waste; everything is reused and recycled from weeds to manure. By creating our own compost, we can put the nutrients back into the soil, and so the cycle will continue: plants/manure → into soil → feeds plants and animals → plants and manure produced → back into the soil.

Strengthen the resistance of the agricultural system to disease and pests – pests and diseases are a real threat to agricultural production, however, in industrial agriculture these are controlled using pesticides. Whereas, in an agroecology system, by planting plants that repel pests, thereby building the soil so crops can become resistant (naturally), nature is used to fight disease and pests.

Make soil conditions good for plant growth – when the soil is healthy it can better withstand threats posed by pests and disease. Ways in which soil can be kept nutritious and healthy is

through crop-rotation (as opposed to mono-cropping in industrial agriculture), intercropping, composting, increasing life in the soil like earthworms and so forth. Crop-rotation is the practice of growing different types of crops together, which allows the soil to be used for different nutrients, it reduces soil erosion and increases the fertility of the soil as well as increase crop yield.

Minimise loss of energy, water, and nutrients – when the soil is conserved we are also able to gather and conserve water and biodiversity.

Increase the number of plants, animals, and good insects in the agricultural system – this builds and strengthens natural systems.

Athanasopoulos (from Greencity Farms) described how he limits waste, claiming "I don't have waste… everything we throw away we put in a compost heap… I use leaves in my worm tanks, and they make compost." Furthermore, he explained a natural way to repel pests, "I plant things in between like thyme and sage and spring onions and things like that – they detour bugs" (Athanasopoulos, 2016). In addition, Greencity Farms by using a looping system to circulate the water thereby minimises water usage, and by doing so, he asserted "we use less water than a bathtub to grow 5000 vegetables" (Athanasopoulos, 2016). Similarly, Hills (from FATFA) explained how the earthworm farm is a low-tech solution to keep soil arable, whereby they make use of permaculture methods to keep soil healthy, she noted "using permaculture ensures that you are always building your soil by using nitrogenous vegetables and intercropping, rotational planting and not using any chemical fertilisers" (2016).

The Woolworths Farming for the Future initiative is a programme set up to ensure sustainable farming, whereby farmers are made accountable for their impact on the environment and are encouraged to continuously minimise their impact by making improvements through soil management (Pienaar, 2016). Therefore, from the perception of stakeholders, urban farms (if adopting and implementing these principles) are producing food that is sustainably grown and would thereby be ecologically sustainable beyond food miles. However, as it was also noted in the interviews, it depends on who is growing the food. Therefore, the ecological sustainability is contingent on whether produce is for increasing yields or to feed people in more sustainable ways.

5.3.2. South Africans' Environmental Consciousness

By producing food at the same place of consumption, the system of urban agriculture reinforces a healthy, sustainable and resource-efficient balance of production and consumption (Despommier, 2010). Urban agriculture brings production of food into the city, therefore reducing your carbon footprint and food miles (the distance food travels from producer to consumer) thus lowering carbon emissions from the transportation of food into the city. This research sought to identify whether participants perceived South Africans to be conscious consumers in terms of them buying local goods (thus lower food miles and a smaller carbon footprint) over globally imported goods. This would determine whether local production would succeed as it would determine the extent to which society accepts social responsibility for the environment. What emanated from the data was that South Africans are more price conscious than they are environmentally conscious, and therefore if something is produced locally but is more expensive the majority of South Africans would not be able to afford it.

To determine the ecological viability of urban agriculture in forming an alternative food system rooted in food sovereignty we need to consider two things, first whether produce is sustainably grown, and second whether South Africans are conscious consumers who would prefer produce that is sustainably grown. From the perceptions of participants, the way in which produce is grown is not a concern for the majority of South Africans as they are more concerned about price. So while in practice farms may implement these principles, the extent to which South Africans would choose locally/sustainably produced food over food grown globally and in industrial agriculture is contingent on the price attached to the item.

If products are sustainably and locally grown they often have a higher price tag, so while transportation costs may be lowered it does not necessarily mean the item itself will cost the consumer less. Price is a limitation to sustainable practices, and unless a significant number of people of all income levels have access to local and sustainably grown food, sustainable agriculture will never take hold and have a considerable impact on the environment and our health to make a difference. According to the literature, sustainable products usually cost 30 per cent more than traditional products (Sloan, Legrand, & Hindley, 2015), and the reason for

this is often attributed to the inability for organic and local farms to reach economies of scale because they are too small. Economies of scale refers to the situation of producing at a lower cost gained by an increased level of production (Chang, 2014), whereby small local farms would not be able to achieve those scales that can drive prices down. In addition to the smaller productive potential, they are also time intensive, they use more expensive inputs and pay a fair wage. These are all elements that contribute to the higher costs on sustainable farms, and therefore the higher costs to consumers. This is in line with the critique offered by Bernstein (2014), who considers capitalists production and organisation to be far more efficient at meeting high demand and ensuring low prices.

Therefore, someone who eats a local organic diet has the income sufficient to afford to deliberate about food choices, because the more expensive option will not break the bank. Accordingly, this is not the reality of most South Africans. The higher costs of sustainable production gives weight to economic theories of comparative advantage and trade liberalisation. Trade liberalisation encourages countries to open their border for trade with other countries which allows a country to specialise in their comparative advantage (production at a lower opportunity cost) (Chang, 2014). Therefore, from the perception of participants if products are cheaper when they are produced through unsustainable methods, and higher food miles, South Africans will buy them as they are not environmentally conscious, but price conscious. Only if a consumer can afford a conscious, can they choose to buy food that is produced in more sustainable ways.

Furthermore, as it was noted in the subsections above, capitalism has the ability to co-opt markets in order to reproduce and expand itself. Environmental issues are big business for capital, whereby nature becomes an accumulation strategy (Harvey, 2014). As Harvey explains, when new medications are developed, new illnesses need to be created. Similarly, environmental technologies require environmental issues to resolve, thereby creating a new loop of potential markets for capitalism to expand. Therefore, it is becoming a frequent venture for capital to respond to discontent within the system by appropriating social movement demands "choosing those demands that best fit with expanding market opportunities for profits" (Friedmann, 2005, p. 231). We are now experiencing a restructuring of capitalism in response to green issues, and this response coincides with the rise of green

consumerism – whereby it is argued that capital markets provide opportunities for responsible consumers to 'vote' with their money and have a proactive role in solving environmental problems (Allen & Kovach, 2000). Therefore, what starts out as resistance to the status quo, capitalism tends to appease movements by going 'green', and therefore end up reproducing the capitalist industrial system rather than challenge it (Miller, 2011).

Co-optation stems from Gramsci's concept of *transformismo* "the process of incorporation and/or pacification of political opponents" (Gramsci, 1971, cited in Miller, 2011, p. 26). Co-optation attempts to neutralise the effectiveness of movements for social change. Therefore, what can start out as a radical initiative, if it can be made into a profitable venture capital will enter these markets and reproduce itself. Consequently, when urban agriculture is incorporated into the existing food system, "the dynamics of the marketplace will tend to steer it the direction of farming systems that are technologically expedient and economically efficient in order to maximise productivity and profit" (Allen & Kovach, 2000, p. 225), an antithesis to food sovereignty.

The increasing corporatisation of new markets in the agri-food sector has been well documented in literature particularly organics (Allen & Kovach, 2000; Jaffee & Howard, 2010), whereby many growers enter the business to capture the price premium of organic produce. The way in which corporations respond to social movements that attempt to curtail the negative social and environmental consequences of business-as-usual, by "weakening the threats posed by such alternatives, while simultaneously exploiting their potential for profits" (Jaffee & Howard, 2010, p. 288). Accordingly, the increasing success of alternative niche markets creates new spaces that are attractive to corporations as they are suitable for capital accumulation, hence the motive for accumulation drives efforts to co-opt these alternative food markets.

Social movements sought to create alternative markets that would reclaim the ethical values that are eroded in the dominant system in their accumulation strategies. Notwithstanding the size of the market, small successes motivate corporate interests in these alternative markets as a strategy of accumulation as they have the potential to foster economic growth (Jaffee & Howard, 2010). As a result, corporations may amend their practices (or at least claim to do so)

in order to participate. The motivation behind participation remains the goal of profit rather than a commitment to ideals that shape these alternatives, Harvey (2014) describes this as a process of greenwashing, whereby corporations will accommodate some of the challenges presented by social movements and use them as a new method of accumulation. That is, they disguise a profit-driven project as a project that will enhance environmental sustainability. For example, during the 1990s, when the market for the organic sector began approaching 1% of total food sales in the United States, corporate participation significantly increased (Jaffee & Howard, 2010; Obach, 2007). Meanwhile, the appropriation of the discourse of "local" food is occurring even faster.

One mechanism through which co-optation occurs is the weakening of standards, whereby standards are weakened to facilitate the continuation of capital accumulation and divert resistance to the status quo (Jaffee & Howard, 2010). While it was not disclosed in the interview with the stakeholder from Woolworths, another participant who previously spoke with a spokesperson from Woolworths shared insight into the Woolworths Farming for the Future initiative. The participant mentioned that while the initiative does not make direct claims about being organic, they just claim that it is farming for the future, and customers make their own links. Furthermore, the participant explains that because it is too expensive to farm organically on a large scale, instead of insisting that their farmers go organic, Woolworths formed their own standards called 'Farming for the Future'. So while this is an initiative that aims to farm sustainable, the creation of individual standards will allow the 'finish-line' to be moved haphazardly. Consequently, standards are lowered and entering becomes easier, where previously corporations would not have been allowed to participate due to their non-conformity, whereas weakening the standards brings the 'alternative' methods closer to the status quo (Jaffee & Howard, 2010).

Most participants do not perceive urban agriculture to be a real threat and do not consider it to have the potential to challenge the existing system, largely because they already perceive it to be an extension of the existing dominant system. However, Satgar (from COPAC) recognises the potential of urban agriculture to bring about real competition as an alternative food system, and when there is a threat to the dominant system, one cannot ignore the potential for co-optation. Therefore, the very alternatives that are emerging such as the Munching

Mongoose, and The Open Food Network, and as more and more examples emerge capital will see it as a new space for extracting profit. Furthermore, the market-based structure of urban agriculture is a way for dominant retailers to sell local and appropriate the discourse of selling local without necessarily abiding by other ethical values upheld in the food sovereignty movement. Consequently, the growth imperative for capital has facilitated co-optation of these movements, and to think urban agriculture will be any different is long shot.

Therefore, from the perceptions of most participants, the way in which urban agriculture is structured as an appendage, and therefore will replicate the system it sought to replace. Consequently, the co-optation of urban agriculture is an obstacle to the ecological viability of urban agriculture, as it will mean produce will not necessarily be cheaper for reasons noted above, and therefore one will have to be of a certain economic standing to be able to afford products produced on these farms.

5.4. Conclusion

The main arguments that can be observed in this chapter are that the obstacles that challenge the successful implementation of urban agriculture limit the viability of a successful alternative food system rooted in food sovereignty. Rather than forming an alternative, urban agriculture is shaped into forming an appendage to the existing system and consequently leaves room for the rise of a capitalist urban agriculture. This chapter will conclude by making this link clearer.

From the perceptions of most participants, low productivity is a barrier to urban agriculture and was used as a justification for the continued reliance on commercial farms to feed people in the cities. However, urbanisation was perceived as an opportunity for urban agriculture growth, as participants argued that the biggest challenge to food security is to meet a growing demand for food, and therefore would seek ways to make urban agriculture more productive. Hence, participants spoke about hydroponics and vertical farms as biotechnical solutions to increase yield which would also stimulate local economic development. However, this means that urban agriculture would be structured in the same way as industrial agriculture and will therefore do little to change the system. Furthermore, low funds and the high cost of starting

up these hydroponic farms is alluded to by participants, and hence they spoke about the need for private investment to fund these farms. Consequently, these urban farms would be structured around the same profit motives that commoditise food that underlies the existing system.

The way in which participants spoke about urban agriculture is as a safety-net to feed the most vulnerable populations, thus, from the onset, the way they are structured already stigmatises those it intends to help. The middle class are sufficiently removed from the necessity of engaging in urban agriculture, therefore what emerges out of necessity for some, takes on the glamour of eco-chic for the wealthy few. Thus, the poor participate out of necessity while the middle-class can imitate this activity for its glamour without the stigma associated with it. As a result, the boundaries between rich and poor are further reinforced. Government supports urban agriculture as a means of feeding the poor because it fits well with neoliberal ideals of self-help. However, along with neoliberal ideals comes the rollback of government and hence funding of social projects like this. As a result, there is a rollout of privatisation. The lack of funding (a barrier) leaves room for Corporate Social Responsibility programmes that help businesses paint a picture of themselves as doing good for the community, and giving back. Ultimately, the safety-net approach allows business to continue as usual without addressing the cause of the problems, and urban agriculture becomes a bandage solution to cover up the symptoms.

From the onset, urban agriculture is about farming more sustainably within the city, and as it was argued it meets the principles of agroecology. Therefore, because capitalism is continually under scrutiny from movements to go green, we see the emergence of green capitalism. Because green issues have become big business for corporations, and they see the potential of new spaces for profit extraction, it is of little doubt that they will attempt to co-opt these markets. However, as it was repeatedly argued by participants, consumers only demand sustainable produce if they can afford to deliberate about their food choices. Again we see the distinction between classes reinforced, as the price of these goods will be more costly as capitalism seeks to capture the higher price premium attached to sustainably sourced food, as ‘green consumers’ do not mind paying more for an item if it was sourced responsibly, while the rest of consumers need to buy what is cheaper – whether produced sustainably or not. As

a result, capital will see these as new spaces for profit extraction, rather than challenging the system, urban agriculture will continue to reproduce the industrial agro-food system.

Therefore, while food sovereignty is about creating an alternative food system to the capitalistic one controlled by a minority, the way in which urban agriculture is structured is giving rise to a capitalist urban agriculture. Hence, from the perceptions of participants, the viability of urban agriculture in creating an alternative is not in the foreseeable future. The way it is currently structured leaves room for the expansion of capital. So while alternative food systems are emerging in pockets around the city, they are mostly geared for middle-class consumption, it's not substantial enough to be considered a revolution. For the working class, it is not an alternative, but a sign of capitalism's shortfalls and capitalism is known to absolve itself in order to reproduce and expand itself.

6. Conclusion and Recommendations

6.1. Introduction

This study explored stakeholders' perceptions of the socio-economic, socio-political, and ecological viability of urban agriculture, including urban vertical farming, as an alternative food system, within the Gauteng region. This chapter concludes the study by providing a brief outline of what has been discussed so far, thereafter this chapter will highlight possible ways to move forward in the direction of food sovereignty and areas for future research.

By incorporating the works of Clapp and Dauvergne (2011) this research was located and framed within a sustainable development paradigm. In understanding the food challenge, the market liberal perspective could be associated with a food security approach, while the social greens align with a food sovereignty approach. Market liberals fail to see how the workings of capitalism contribute to the issue of food insecurity, and as a result, they see the expansion of capitalism (and food production) as part of the solution and not the problem. Consequently, market liberals believe if more food is produced, while technically there will be more food to be distributed, however, they do not consider how this food is produced or how (or to whom) it is distributed, leaving an ever-widening gap between the 'haves' and the 'have-nots.'

Contrary to the high regard market liberals have for capitalism, social greens do not doubt that capitalism is the main cause of environmental catastrophe, including food insecurity. They would argue that by expanding capitalist production into urban areas through urban agriculture, we would be deepening the crisis and not resolving it. One variation of the social green paradigm is ecological Marxism which brings our attention to various contradictions of capitalism – one being the endless productive motive which will result in its eventual demise due to the destructive tendencies of endless growth (Pillay, 2013).

Food sovereignty falls within this paradigm, which argues against the expansion of capitalism, particularly into food, as food should not be considered a mere commodity as it is linked to life itself. The food sovereignty approach emerged as an attempt to promote food sovereignty not

food security per se. Food sovereignty is when people and communities control their own food systems, rather than markets and corporations (COPAC, 2014; Lee, 2007). In a broader framework, this means that society takes back control of the food system by challenging the profit-hungry corporations and challenge the perceptions of seeing food as a commodity that can be bought and sold in the marketplace. Both producers and consumers are placed at the centre of the food system. And while this approach sees food security approaches as inefficient at reducing hunger, it sees food sovereignty as a precondition for food security. That is, for people to be food secure (have sufficient food to meet their dietary requirements) corporations need to lose their grip on the food system, and communal ownership is established, social relations around food are founded, and sustainable production is practised. Thus, for food security we cannot blindly produce food to increase volumes, we need to ensure that the food produced reaches everyone and not just those who can afford it.

The tying together of the empirical findings and the theoretical framework brings to the fore a distinction between participants namely, the market oriented and the social oriented, where the former aligns to the market liberal perspective, and the latter the social greens perspective (Appendix 2). However, it is important to note, the arguments of the participants may not always fit neatly into one of these categories. This demonstrates the complexity and diversity of individual views on the issues.

What is found is when participants align themselves to a market oriented perspective one finds a hegemonic discourse that produces a story of urban agriculture which is in line with neoclassical economics. That is, for urban agriculture to reduce hunger and to be a profitable venture, neoliberal (market-friendly) ideologies ought to be embedded in policies surrounding it, and we find this in the thinking of the participants in the field. Consequently, these stakeholders are not acting as agents of change, but are perpetuating the system with their narrow neoclassical economic thinking. As a result, stakeholders in the field are continuing to hide behind a sustainable development rhetoric, what Wanner (2007) refers to as sustaindevelopment, where urban agriculture is a new venture that allows capitals development to continue despite its shortfalls.

6.2. Summary of key findings

In summary, the research found that while there is a relatively large presence of urban agriculture across the city, they have been structured as a safety net for the poor, and as a result are associated with stigma from the onset. Furthermore, for the working class affordability of produce takes precedence over sustainability, as one participant put it, "we don't have the luxury of being concerned about a carbon footprint if we are hungry" (van Rensburg, 2016). Furthermore, the market oriented approach that is being incorporated into these gardens is gearing them into the bigger system, and some are even targeting niche markets, making produce expensive and hence inaccessible to those who need them most. Furthermore, the presence of a united movement trying to challenge the status quo is not sufficiently in your face about the issue, unless you are at university you hardly hear about South African Food Sovereignty Campaign (SAFSC) or COPAC. These issues are affecting the lay-man, and therefore a movement needs to be geared around helping and incorporating both the educated and lay-man alike. This research therefore found that insufficient change agents are trying to form alternative food markets, and as a result, there is a tendency for urban agriculture to be used as an extension of the existing system.

The study sought to understand how sector stakeholders perceived the issue of food security in the context of climate change, and determine their response to the concept of urban agriculture, including urban vertical farming, as a possible alternative to the social problem under study. The research question investigated in the study was: "what is the perceived viability of urban agriculture, as a means of achieving an alternative food system rooted in food sovereignty?" Using the perceptions of sector stakeholders within the Gauteng region as a case study.

By reviewing extensive literature, the food crisis in South Africa was attributed to the contradictory coexistence of waste and hunger (Cock, 2013). This means that the issue is one of distribution and not production. This research sought to determine the extent to which urban agriculture would be able to change the dynamics of production and distribution of food within the city.

The literature estimates that in Johannesburg 40% of households are food insecure, which was attributed to high prices and low wages (Cock, 2013). Trade liberalisation and increased production are mechanisms employed to address high levels of food insecurity. Furthermore, GM food has been celebrated by big corporations as a solution to the food crisis, whereby GM seeds will not only be able to produce sufficient yields, but they will be able to withstand the effects of climate change. However, this approach to food security is rooted in the industrial food system, whereby the introduction of GM seeds and other technological and chemical inputs not only increases the cost of production, and consequently consumption, but also emit 25 to 30% of emissions that contribute to climate change (COPAC, 2014) .

The route to increased production and trade liberalisation is championed by market oriented thinkers who align with a food security approach. However, a food sovereignty perspective believes that food security is not enough, and as social greens argue, production is a cause of the problem and therefore not part of the solution. Food sovereignty prioritises locally produced food and consumption and directly challenges the current industrial agro-food system. By adopting a food sovereignty approach the research was able to determine whether the call for small-scale farmers and urban agriculture as an alternative food system is viable in Johannesburg. It sought to determine whether food sovereignty expressed through urban agriculture, including urban vertical farming, can address the multiple crises affecting food and agriculture in the city.

The literature attributed the failure of urban agriculture in Gauteng to the state's uneven and inadequate support for such projects. It was found that the state has adopted a market oriented approach of trying to get produce into the markets, however, because of the monopolisation of the food chain, it has been increasingly difficult to do so. This approach, is not geared to create alternative spaces of production and consumption, but rather seeks to extend the existing system into urban areas, which is consistent with this research findings, where market oriented participants would perceive urban agriculture as an appendage to the existing system.

The literature review demonstrated that while the roles of small-scale family farmers and urban agriculture are often presented as a means of achieving an alternative food system, research on its viability is limited, which presented a gap on which this research commenced. By investigating sector stakeholders' perceptions on urban agriculture, the study was able to determine the extent to which it is viable to advocate an alternative agricultural option in Johannesburg.

The methodology employed in this research was qualitative and employed interviews as a research instrument to capture stakeholder's perceptions of the socio-economic, socio-political, and ecological viability of urban agriculture, as an alternative food system rooted in food sovereignty. Interviews allowed a detailed investigation of stakeholder's personal perspectives. They also provided an in-depth understanding of the context within which the research is located, making them useful for understanding the context of urban agriculture in Johannesburg, which brought to the fore the three aspects of viability under study.

Experts who are actively involved in the field were recruited for this study as they could provide the relevant information about the possibility of redressing the social problem through an alternative food system, and were aware of the current developments in the field. While many participants were contacted through purposive sampling techniques, 12 participants were able and willing to participate in the study and while that was lower than the intended sample size, the participants could give insightful and diverse opinions from their positions in the field. Notwithstanding the smaller sample size, I was able to have an interview with at least one participant from each identified sector, namely: The Gauteng Department of Agriculture and Rural Development, Urban farmers, Market Agents from the Joburg Market, NGOs, the Commercial sector, Agricultural Colleges, City Planners/Municipalities, and Academics. The diversity of stakeholders delivered a wide range of perspectives in answering the research question and was used to determine the viability of whether there is a future for an alternative food system that is expressed through urban agriculture, including urban vertical farming in Johannesburg.

The key variables (barriers and opportunities to urban agriculture, socio-economic viability, socio-political viability, and ecological viability) were used to present the data in chapter 4.

Furthermore, alternative food networks were presented using the Munching Mongoose and the Open Food Network as case-studies of existing alternative food networks in the city. The data presented revealed that urban agriculture has a relatively low viability on all three variables, where market oriented participants were not convinced of its ability to produce an alternative food system, but rather (as was discussed in the subsequent chapter) perceived it as an appendage and extension of the existing system. The research found that most participants could easily identify barriers to the implementation and diffusion of urban agriculture in the city and while they felt urban agriculture was an important sector, they had a difficult time identifying other opportunities for urban agriculture in the city. Market oriented participants perceived the food crisis to be the result of insufficient production and therefore identified the inability to produce sufficient volumes to be a leading barrier to the success of urban agriculture in the city. However, it is argued that this is a narrow conception of the food crisis as it only considers the production of food and not the distribution.

In addition, all participants felt that urban agriculture is welcomed within the city among residents, and from this perspective, the research could have validated the socio-political viability of urban agriculture, however, as it was discussed in chapter 5, when you dig deeper into reasons for cultivating one's own food, it becomes more inconclusive.

To determine the ecological viability of urban agriculture in forming an alternative food system rooted in food sovereignty, two things needed to be considered; first whether produce is sustainably grown, and second, whether South Africans are conscious consumers who would prefer produce that is sustainably grown. The first requirement was discussed in more detail in chapter 5, but from the perceptions of both market oriented and social oriented participants the ecological viability was linked to the population's socio-economic status and therefore affordability is more important than sustainability. Therefore, while the presence of existing alternatives is undeniable, as a collective there is no existing movement that is working towards building viable alternative networks. Accordingly, although market oriented participants see it as a necessary project, they do not seem convinced of its ability to form an alternative, however Satgar (2016) who aligns with a social oriented perspective is still confident for future endeavours in the field.

The existence of Alternative Food Networks (AFNs) in the city was perceived by some participants as the step in the right direction, while others were not as optimistic about alternative food systems as it was discovered that market oriented participants often spoke about urban agriculture as an appendage to the existing system and did not see it creating an alternative. The two case studies discussed in chapter 4, Munching Mongoose and the Open Food Network, demonstrate how there is a move towards some initiatives beginning to form, however, whether they see themselves as part of a movement towards food sovereignty requires further research, and was beyond the scope of this research paper. The sustainability ethos embodied by both organisations demonstrates that they are targeting consumers who are concerned with how their food is produced and sourced, and therefore they target consumers who can afford to deliberate about their food choices, and as it was noted in this research paper, this is therefore not aimed at the majority of South Africans.

Chapter 4 deduced from the data that urban agriculture has a relatively low viability on all three dimensions, and therefore the prospects of forming a food sovereignty alternative in Johannesburg in its current form is a long shot. Food sovereignty is about forming a movement, and therefore more needs to be done than these isolated projects mushrooming around the city, they are not strong in isolation and would be better for them to form part of a broader movement. Not only would a movement mean a strength of numbers, but they will also keep projects accountable, where you cannot charge a customer a higher price for a sustainably grown lettuce just because it is sustainably grown, and if more people can afford it the greater the success of the movement. When there is an alternative that is affordable, it means consumers have more choice and therefore means more accessibility.

Chapter 5 sought to analyse the data obtained in the interviews and systematically presented the analysis by discussing the key variables. However, it was noted that while for the sake of simplicity the variables were discussed separately, as it emanated from the research they are not isolated variables but are interconnected.

From the onset, from the perceptions of most participants (market oriented and social oriented), urban agriculture could not produce enough food to feed the people in the city, the insufficient yield was the basis on which market oriented participants justified the continued

reliance on commercial farms. Hence, market oriented participants saw urban agriculture as the expansion of agriculture into urban spaces, as more areas would be brought into cultivation in order to increase production. From this understanding, market oriented participants perceive the social issue under study (food insecurity) as being a result of insufficient supply to match demand and therefore deem it repairable through the integration of urban agriculture into capital markets in order to increase the supply of food. However, as it was noted in the literature, this is the orthodox approach to food security (Cock, 2013; Despommier, 2010; Gaisie, 1996; Ogola & Sawe, 2013).

A food sovereignty understanding of food insecurity looks at the social problem differently, considering high prices and low wages (and hence affordability and access to food) as the root cause of the problem (Cock, 2013). Furthermore, as noted in the literature review, the issue to food security is not the productivity of agriculture as the orthodox approach would suggest, but rather the process of redistributing the produce under capitalism. The socio-economic viability of urban agriculture should therefore not be judged against its productivity but its ability to redistribute to the hungry, the marginalised, the excluded. We therefore need to determine how accessible produce is to the poor, which was a concern for the socially oriented participants. Therefore, by employing a food sovereignty approach, this research sought to determine how closely urban agriculture would be able to replicate a food sovereignty AFN in the city.

Nevertheless, market oriented participants overlooked the utility of urban agriculture, which takes away the social aspect of these gardens, and only seeks to evaluate them against their productive commercial potential. As a result, market oriented participants look for an orthodox solution to food insecurity, and push towards an urban agriculture that can increase supply for the sake of profitability.

On the one hand, participants were confident in the ability of urban agriculture to feed the hungry (where the hungry are perceived as a social issue and urban agriculture is safety-net for the marginalised). However, on the other hand, market oriented participants were less confident in its ability to supply the market (its exchange value) and therefore would not see it as a real threat to the existing system, but rather as a safety-net. By merely considering the

value of urban agriculture in terms of economies of scale in order to realise surplus value through the creation of commodities we overlook the very people these projects are intended to help. Thus, from a social greens perspective for food security to be attained through food sovereignty, we cannot establish viability in terms of producing food for the sake of reaching profitable volumes (economies of scale), rather we need to ensure that the food produced is equally and equitably distributed in order to alleviate hunger.

The example of urban agriculture in Cuba cited in the literature review show how urban agriculture (and small-holder farming) has been made economically viable by looking at the use value and not just the exchange value. The Cuban case, while out of necessity, shows how when people work together for the betterment of society and become agents of change. When a system is driven by nutritional needs (use-value) and not profit, it will be able to achieve the socio-economic viability that is necessary for its sustainability in the long-term.

The next subsection discussed how participants believed projects could source the capital necessary for start-up. The research argues that an alternative food system rooted in food sovereignty would be incompatible with private investment as they would require a return on their investment, which is consistent with market oriented participants not thinking of urban agriculture as an alternative but rather as an appendage. Participants see the need for projects to be financially sustainable for them to be economically viable, which in turn for market oriented thinkers means getting produce into the market and hence not creating an alternative market but rather extending market access to urban farms so that they can make money conducive to sustain their livelihoods. For socially oriented thinkers this means making a surplus in order to be less reliant on external donors and the like in order to become more self-sustaining in the long run, where profit is not linked to sustainability.

The market oriented approach is consistent with literature that says the state's approach to urban agriculture has been marketised (Satgar & Williams, cited in Cock, 2013), and from the perceptions of participants it continues to be so. For instance, participants spoke about how urban agriculture can be used as a tool for local economic development, using hydroponics to scale up production - what the literature referred to as an agrarian transformation and what we will see in urban agriculture is a shift towards capitalist agriculture.

Therefore, what emanated from the data is that the way in which urban agriculture is structured in the city is for the extension of the existing system and not geared to challenge it. For the most part, market oriented participants perceive socio-economic viability in terms of volumes and exchange value, consequently, the inability to supply a growing demand in markets can be understood as participants' justification for the continued reliance on the industrial agro-food system. Market liberals prioritise exchange value and being able to scale up for profitability, whereas social greens prioritise the use value to challenge the status quo, increasing scale to make an alternative food system viable (and not for profit). While the use-value of urban agriculture cannot be ignored, market oriented participants do not see the ability to challenge a highly productive system with a system that cannot generate the yields necessary to supply the shelves, despite its ability to feed the hungry who are not being served by this industrial agro-food system.

Hence, although market oriented participants are confident of the ability of urban agriculture to be used as a safety net for the excluded (its use value) they are not confident about its ability to supply the market (exchange value) resulting in them being sceptical about its long-term socio-economic viability.

Furthermore, the research argued that unless there is a real necessity to utilise urban agriculture in a similar way to that of the Cuban experience, urban agriculture will continue to be structured as a safety net (for the poor) but its ability to challenge the existing system continues to be questionable. For the most part, urban agriculture is being structured around bringing local development, providing job opportunities, and as it continues to grow it is argued that it will be another opportunity for capital to co-opt.

Using urban agriculture as a developmental mechanism means it will be structured around the same principles as industrial agriculture, as it undergoes an agrarian transformation towards capitalist agriculture – to increase yield and make a profit, thus making it incompatible with an alternative food system rooted in food sovereignty. Consequently, urban agriculture is being structured and utilised to increase the production of food within the city and not to form an alternative food system. However, this is problematic because the food crisis in the city is not the production of food but rather the equitable redistribution. Hence, increased production

while it increases the volumes produced, it will do little to change the dire situation of the hungry if it does not reach them. Consequently, market oriented participants are not talking about an alternative system, but are talking about extending the existing system into urban markets, making the socio-economic viability of an alternative impossible as we continue to link it to capitalist principles.

When analysing the data for socio-political viability, the research asked 'if food security is the problem, how do participants perceive urban agriculture to address the problem' and when studying the data participants argued that urban agriculture would increase food security to the most vulnerable populations in urban areas. They therefore perceived it to increase access to healthy food within the city, however as noted in the previous section of this chapter they did not think it would produce enough to feed the entire city, that is, it would not produce enough to supply the market.

What emanated from the data regarding the socio-political viability is the social acceptance of urban agriculture regarding a communal buy-in and a government (corporate) buy-in. These were suggested by participants as evidence towards the support for urban agriculture, and hence would indicate the possibility of its success within the city. However, the researcher is cautious to read this at face-value and argues that we need to go beyond the surface level to understand the socio-political viability of urban agriculture in Johannesburg.

The research further distinguished the buy-in from the community between choice and necessity, where the former buy-in was attributed to the middle-class and the latter the working class. The middle-class disposition to support urban agriculture is often due to its trendiness and it was argued that it is a technique being used by capitalism to infiltrate our lives and create this culture of consumerism. The greening of capitalism is a marketing gimmick that is used to sustain its growth path, and we are led to believe that justice and sustainability can be purchased. Therefore, this research argues that the eco-chic culture created in modern society is sustaining an inequitable system and does little to nothing to challenge it, and if we would want the middle class to join a movement of food sovereignty they need to play a more active role in forming an alternative system.

The buy-in from the working class was argued to be a survivalist mechanism, where the working class are forced into cultivating their livelihoods due to their circumstances created by an unjust system. While participants felt that higher-income earners prefer to purchase their food than growing it themselves; however the research shows with the aid of literature that this may be true for lower-income earners as well. So while there is a middle-class disposition to grow their own food, the difference lies in whether there is a choice in the matter or if it is forced, because the middle-class are adequately removed from the necessity of engaging in urban agriculture and therefore, what emerges out of necessity for some (the working-class), tales on the glamour of eco-chic for the wealthy few (Barendregt & Jaffe, 2014). Consequently, the way in which urban agriculture is structured and utilised reinforces class divisions between the rich and poor. As a result, this research argues that urban agriculture is a consequence of the system and not structured to be an alternative, rather it is structured around a neoliberal ideology of self-help.

The discrepancy between what participants said regarding government support of urban agriculture (words) and the decline in funding (actions) was important to note, as one needs to be critical of where money is directed to see the importance of things. Furthermore, it was mentioned in chapter 4 that lack of funds is a barrier to the successful diffusion of urban agriculture in the city, therefore the decline of state funding proved to be a point for critical reflection. The decline of funds is a result of the global economic system of neoliberalism which calls for a rollback of the government and a rollout of privatisation. In urban agriculture, the way in which this manifests itself is through the rise of CSR programmes that sponsor these gardens, which are used as mechanisms for achieving social policy objectives – eradicate hunger in the city.

This research argued that urban agriculture is being used as a safety net, whereby people are educated on how to grow their own food because of the harsh realities of not being served by the current food system. Furthermore, this food system is allowed to continue unchallenged because the marginalised are being '*compensated*' with programmes like these, that teach them how to cope in these dire circumstances. Corporate sponsored gardens are part of the existing system and do not serve to challenge it, rather reproduce it. Therefore, while there are gardens within Johannesburg, they are not geared towards creating an alternative food

system, rather they are there to provide a safety net to the poor – they feed the poor because the system in its current monopoly cannot. In essence, this research found that the socio-political viability of urban agriculture is more complex than accepting participants' perceptions of whether the community and government are supporting urban garden initiatives, as when studied in more depth, the underlying logic of the system unravels itself, and we see the floors of the system hide behind a feel-good story of planting your own garden. Consequently, this research argues that urban agriculture in its current form is a bandage approach, and thus the cause of the problem (the political economy of the food system) is not addressed, but rather covered up. Therefore, for urban agriculture to become a viable alternative, it needs to be structured differently whereby it needs to change from being a symptom of capitalism and a movement needs to take off.

Finally, chapter 5 analysed the ecological viability, which looked at whether produce was not only sustainably grown, the principles of agroecology but also if participants felt that South Africans prefer produce that is sustainably grown. The preference for buying food that is sustainably and locally grown was believed to indicate the extent to which society accepts responsibility for the environment, however, the data reveals that South Africans are more price conscious than they are environmentally conscious. Consequently, one finds that price is a limitation to sustainable practices, as it was discussed how often goods that are organic and/or sustainably grown have a higher price attached for a variety of reasons including: the inability to achieve economies of scale, smaller productive potential, time intensity, more expensive inputs and paying a fair wage. The higher costs of production translate into higher costs to the consumer. Therefore, from the perceptions of participants, if products are cheaper when they are produced through unsustainable methods and higher food miles, South Africans will buy them as they are not environmentally conscious but price conscious.

Furthermore, the ecological viability of urban agriculture may possibly be affected by the co-optation of movements, whereby going green is viewed as a big business opportunity, as corporations see these as new spaces for profit extraction and it is of little doubt that they will attempt to co-opt these markets. That is, businesses will disguise a profit-driven project that will enhance the environmental sustainability. However, it was also noted that for agri-food businesses to enter these new markets they need to meet certain criteria, and more often than

not we see the weakening of standards, which in turn brings the alternative methods closer to the status quo. Consequently, the process of creating an alternative becomes redundant. This is a challenge to the viability of the food sovereignty movement, as what we find is that the market based structure of urban agriculture is a means for dominant retailers to sell local and they appropriate the discourse of selling local without necessarily abiding by the other ethical values upheld in the movement. Therefore, without significantly challenge the existing system and forming an alternative, the alternative becomes an appendage, and they become one in the same and would continue to embody the same elements as the existing system.

The chapter concluded by noting how the obstacles that challenge the successful implementation of urban agriculture limit the viability of a successful alternative food system rooted in food sovereignty. Therefore, while food sovereignty is about creating an alternative food system to the capitalistic one controlled by a minority, the way in which urban agriculture is structured is giving rise to a capitalist urban agriculture. Hence, from the perceptions of participants, the viability of urban agriculture in creating an alternative is not in the foreseeable future. The way it is currently structured leaves room for the expansion of capital. So while alternative food systems are emerging in pockets around the city, that are largely geared for middle-class consumption, it's not substantial enough to be considered a revolution. For the working class, it is not an alternative but a sign of capitalism's shortfalls, and capitalism is known to absolve itself to reproduce and expand itself.

In sum, based on the findings of this research, the viability of utilising urban agriculture as a means of achieving an alternative food system rooted in food sovereignty is weak and would require work in the direction of forming a strong positionality towards an alternative and not an appendage for this to change in the future. However, based on the thinking of the market oriented participants who were in many ways linked to what is happening in the field, they are not thinking of a solution to food security in the form of an alternative food system, but rather thinking of increasing production in the hope that it will reach those who need it most. Thus, urban agriculture in its current form is not a viable means of forming an alternative food system. This chapter will conclude by providing recommendations for an alternative food system in the future and highlights a few areas for possible future research in the field.

6.2. Recommendations

Based on this research findings the following recommendations can be made. Food sovereignty is about creating a movement to link all these isolated initiatives to work towards a common goal – an alternative food network.

While there are NGOs that are championing food sovereignty in South Africa such as COPAC and SAFSC, their presence is limited. Furthermore, the movements do little to communicate with the public, for instance when looking at the events on SAFSC has not been updated since October 2016. Similarly, the COPAC website has been down for a few months, and their Facebook page is not interactive, for instance with a recent update on the 7th of May 2017, the page had not been updated since April 2016. Social media and websites are used as platforms to inform the public of events, and the lack of updates demonstrates the irregularity and poor communication of a movement in our country.

Moving forward we would need to do more to build a bottom-up food sovereignty movement, that does not only target student activists but appeals to the public who should also be made aware of being part of challenging the food system. Civil society (NGOs, trade unions, churches, stokvels) should approach urban farmers, and AFNs such as the Munching Mongoose, the Open Food Network and the like within the city and join forces. As it has been continuously noted in this research, these isolated initiatives are not in tune with other initiatives, and will do little to form a revolution in the food system. We therefore need to look at making the necessary connections – and a civil society organisation pioneering this movement would need to initiate such practices.

The case study of Cuba shows how unity and being part of a movement would help drive the successful diffusion of urban agriculture. The whole country pioneered the development of urban agriculture, whereas in South Africa the onus is on the individual. That is, when only some individuals are doing it there is an isolation and stigmatisation as it was found in research that there is a certain amount of shame associated with not being able to purchase food to feed one's family (Battersby, 2011). A movement would need to raise awareness among both the middle class and working class, and increase the acceptability and remove the stigma of

urban farming among the working class so they can see that they are part of something bigger than survivalist farming. A movement geared to create an alternative food system would be able to break existing monopolies, and to be part of that would feel like we are all moving in the same direction, not leaving some behind (and reinforcing the stigma associated with it).

A further recommendation, although related to the previous point, is the need for urban agriculture to be structured differently within food security policies and NGOs. This research highlighted how the utilisation of urban agriculture is for the relief of hunger caused by the inequitable food system and does not go beyond that. The food parcels and the starter kits are symptomatic of a failing system and teach people how to cope in these dire circumstances. To utilise gardens in a movement would take urban agriculture from being a relief programme to being an alternative food system rooted in food sovereignty, from being passive to proactive.

6.3. Suggestions for Future Research

While urban agriculture is an area being thoroughly investigated in South Africa, based on this research findings I would make the following recommendations for future research in the field. While these matters were not the focus of this research paper, in order to further research these matters should be considered:

i. While only two AFNs were used as case studies in this paper, there are various similar initiatives emerging across the country. An area worth investigating is whether these initiatives would consider themselves to be part of and/or would want to be part of a food sovereignty movement in the country. And research would be conducted amongst these various initiatives.
ii. More research is needed to investigate the continuation of urban gardens once other employment opportunities are presented. This would require finding urban farms across the city and interviewing the farmers themselves.
iii. Research should investigate the extent to which the stigma is present in utilising gardens to feed oneself and one's family, and how the stigma can be removed from the perception of the poor. Research would also consider reasons for cultivating one's own food.

iv. Research could investigate the different perceptions among the middle class and working class of buying food from urban farms/street markets etc. and compare their perceptions of where they purchase their food from.

v. Finally, what are the obstacles to scaling up these various initiatives to build viable movement? Research would investigate the ability of urban agriculture to challenge the existing system.

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8. Appendices

Appendix 1: List of Participants

Participant Name	Organisation	Sector	Date of Interview
Anri Manderson	Southern African Food Lab (SAFL)	NGO	05/07/2016
Kobus Pienaar	Woolworths	Commercial Sector	08/07/2016
Joe Mazibuko	Joburg Market (acting CEO)	Joburg Market	07/07/2016
Robyn Hills	Food and Trees for Africa	NGO	27/06/2016
Nicky van Rensburg	University of Johannesburg (UJ)	Academic	29/06/2016
Dr. Adronis Nciizah	ARC-Institute for Soil, Climate and Water	Agricultural colleges	22/07/2016
Barend Erasmus	Global Change and Sustainability Research Institute	Academic	11/07/2016
Thabisa Nyamakazi	GDARD	GDARD	02/08/2016
Thapelo Loabile	City of Johannesburg (COJ)	Municipality	15/08/2016
Lerato Matthews	GDARD	GDARD	02/09/2016
Mario Athanasopoulos	Greencity Farms	Urban Farmer	01/09/2016
Dr. Vishwas Satgar	COPAC	NGO	15/09/2016

Appendix 2: Graphical Representation of Market/Social Orientation of Participants

The colour based graph depicts the overall extent to which participants were market oriented or socially oriented throughout the interview. It should also be noted that this is the researcher's subjective interpretation of where participants stand, and it may be subject to variation.



