

A PROPOSED FRAMEWORK FOR THE DEVELOPMENT OF URBAN  
AGRICULTURE IN SOUTH AFRICAN CITIES

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## ABSTRACT

While climate change and rapid urbanisation are impacting our cities and existing infrastructure, population growth and resource scarcity are placing unprecedented pressure on our food systems. In light of such challenges and the Sustainable Development Goals, resilient solutions are being sought to move both urban development and food production towards a more sustainable future. In this context, Urban Agriculture (UA) has been identified as a possible mechanism to complement rural food production with many associated social, economic and environmental benefits for urban communities. Some of these benefits include increased food system resilience, better urban environmental management, circular and productive reuse of urban wastes, employment opportunities, reduced food miles and the promotion of social inclusivity.

Through a sustainable food system lens and underpinned by Resilience Theory, this research study sets out to investigate and explore the considerations for UA development. The research study reviews UA literature to identify and analyse the common challenges which act as barriers to implementation, as well as the current or potential opportunities which could be leveraged to drive UA development. The insights gained from literature on UA and UA development frameworks; and the data gathered from qualitative interviews with experts working in UA-related fields in South Africa (SA), were used to build a conceptual framework for UA development in SA. The conceptual framework developed is intended to be used as a guide for local municipalities, urban planners, urban farmers, urban communities and UA support organisations in their approach to developing UA initiatives.

The findings from this research study reveal that UA development in SA involves numerous actors at both provincial and municipal levels; and within private institutions, businesses, universities, farmer organisations and society. The findings also reveal that UA currently occurs at many levels in SA, with each level drawing a particular range of participants due to the various social, economic and/or environmental features of the initiative.

Along with challenges associated with land access, the lack of UA-related knowledge, the threat of theft, vandalism and soil contamination (to name a few); a lack of understanding of how agriculture can fit into urban spaces was found to be a major obstacle. The findings suggest that this lack of understanding has led to an under-realisation of the full potential of UA in South African towns and cities; and an inability to incentivise and optimise the development of UA. Considering the findings derived from the investigation, the study proposes five major considerations for UA

development in SA, all of which are unpacked in the conceptual framework. The study concludes by making recommendations for UA decision-makers and UA organisations to consider for future developments.

## DECLARATION

I, Nicola Brown, hereby declare that the research presented in this thesis is my own original work; does not, in its entirety or part, exist as someone else's work and was not previously submitted to any institution. All sources used have been presented and accurately acknowledged with utmost integrity.

Signed: NJ BROWN

Date: 11 November 2020

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## LIST OF ABBREVIATIONS

BMC	Business Modelling Canvas
CSIR	Council for Scientific and Industrial Research
CSR	Corporate Social Responsibility
FAO	Food and Agricultural Organization
GIS	Geographic Information Systems
MADRE	Metropolitan Agriculture for Developing an innovative and sustainable and Responsible Economy
PEDI	Philippi Economic Development Initiative
SA	South Africa
SAFE	Self-organising Action for Food Equity
SDG	Sustainable Development Goal
TBL	Triple Bottom Line
TFPC	Toronto Food Policy Council
TIA	Technology Innovation Agency
RUAF	Resource Centre for Urban Agriculture and Forestry
UA	Urban Agriculture
UAI	Urban Agriculture Initiative
UJ	University of Johannesburg
UN	United Nations
USDA	United States Department of Agriculture
WESSA	Wildlife and Environment Society of South Africa

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## CHAPTER 1: INTRODUCTION AND BACKGROUND

### 1. SETTING THE CONTEXT OF THE STUDY

Rapid urbanisation is recognised as one of the most crucial social transformations in history, because of the role cities play in social, economic and biophysical processes (Bai, Surveyer, Elmqvist, Gatzweiler, Guneralp, Parnell, Prieur-Richard, Shrivastara, Siri, Stafford-Smith, Toussaint and Webb, 2016). With urbanisation on the rise, city governments and policy-makers are being asked to plan for and manage the impacts thereof (Murali, Cummings, Feyertag, Gelg, Hart, Khan, Langdown and Lucci, 2018). While cities occupy only 3% of the Earth, they are estimated to account for 75% of the world's energy consumption and global carbon emissions (Bai et al., 2016). Therefore it has been said that “the collective actions of cities will determine whether the world as a whole moves towards sustainability” (Bai et al., 2016, p.69).

By the year 2050, the global population is expected to stand at 9–10 billion people, with approximately 68% of that figure living in urban centres (Swilling, Robinson, Marvin and Hodson, 2013), which will increase food production needs by 70–100% (World Bank, 2007; The Royal Society, 2009; Alexandratos and Bruinsma, 2012). However, reports have shown (a) that food demand is a major driver of biodiversity loss (Millennium Ecosystem Assessment, 2005) and (b) that industrial agriculture accounts for approximately one-quarter of all greenhouse gas emissions (Intergovernmental Panel on Climate Change, 2007), which highlights the need to shift food production towards more sustainable and responsible practices.

In light of the above, many authors (e.g. Koont, 2008; Grewal and Grewal, 2012; McDougall, Kristiansen and Rader, 2019) argue that Urban Agriculture (UA) is a viable method of growing food in the city with many social, economic and environmental benefits (Van Tuijl, Hospers and Van Den Berg, 2018). Firstly, UA has been identified as a strategy to move food production towards a low-carbon economy because of its proximity to consumers, decreasing the need for long supply chains and transport (Ferreira, Guilherme, Ferreira and Oliveira, 2018). Secondly, UA has been acknowledged as a mechanism to improve urban food security and build food system resilience (Resource Centre for Urban Agriculture and Forestry, 2020) while also promoting food sovereignty (Leitgeb, Schneider and Vogl, 2016) and creating employment (Whittinghill and Rowe, 2012). Finally, UA has been suggested as an urban strategy to enhance climate change resilience through the provision of urban green spaces (Dubbeling, 2014) and as a complementary strategy to improve urban environmental management by productively reusing

urban wastes (Resource Centre for Urban Agriculture and Forestry, 2020) in the circular economy.

In Western countries, UA has gained traction due to these integrated benefits (Prove, Kemper and Loudiyi, 2018), however in South Africa (SA), UA development has primarily been focused on increasing food production to improve food security at a household level (Haysom and Battersby, 2016). With many South African Urban Agriculture Initiatives (UAs) no longer functional for a host of different reasons (Dean, 2018; Chirume, 2018), this research project aims to identify and investigate the common challenges and opportunities relevant to UA development in SA. In 2013, the World Bank (p. iii) reported that “gaps in the availability of good quality, current and comparable data on the benefits and constraints of urban agriculture limit the design of relevant policies and interventions”, and while UA frameworks have been published for use in developed countries (such as Europe, the US and Canada); there is, however, often a stark difference between UA in developed and developing countries (Pearson, Pearson and Pearson, 2010; Thomaier, Specht, Henckel, Diedrich, Siebert, Freisinger and Sawicka, 2015). Therefore, it is important to develop a framework which is relevant to the SA context.

A few preceding UA studies in SA explored (i) UA as a social enterprise using vegetable box schemes in Cape Town (Thom and Conradie, 2013); (ii) the social benefits of UA (Olivier, 2015); (iii) organisational obstacles and strategies for UA development in Johannesburg (Malan, 2015); (iv) technology solutions to participation challenges such as skills and knowledge deficits and networking limitations in Johannesburg (Campbell, 2013) and; (v) the linkages between urban farmers and various supporting organisations in Cape Town (Kanosvamhira, 2018), to name a few. A similarity between these studies was the strong focus on multi-stakeholder dialogue and participatory engagement of UA actors to seek practical solutions to optimize UA development.

Using these arguments as a point of departure along with findings from previous SA research and global UA literature, this research study aims to contribute meaningfully to the development of UA in SA by proposing a conceptual framework for various role-players to consider in the design, implementation and management of UA development in SA.

## 2. SUSTAINABILITY CHALLENGES IN THE CURRENT FOOD SYSTEM

Sustainable development has been defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p.37). Conceptually, this definition recognises that resources are finite and provides a paradigm for thinking about intragenerational

and intergenerational development that is just, inclusive and fair, and occurs within the Earth's biological capacity (Holden and Linnerud, 2007). Similarly, Daly (2006) argues that for development to be sustainable, the macroeconomy needs to be scaled relative to the ecosystem so to avoid diminishing ecosystem services or depleting natural capital resources for future generations. This is in line with the United Nations Educational, Scientific and Cultural Organization's (2015) notion which is that economic development should not be sought in isolation, but rather, social and environmental growth are of equal importance.

The stand-alone concept of 'sustainability' emphasises the nested dependency of economies on communities and ultimately on the environment (Figure 1, Willard, 2010). Sustainability as a business concept is often referred to as the Triple Bottom Line (TBL) (Elkington, 2013) and consists of People, Planet and Profit (Elkington, 2013).

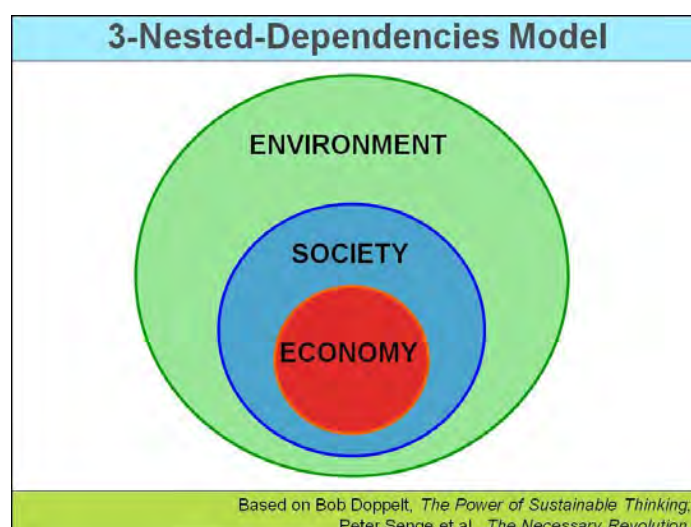


Figure 1: Nested dependencies Model of Sustainability (Source: Willard, 2010, p.1)

It was with this understanding of sustainable development that the United Nations (UN) recommended that the world adopt a collection of 17 Sustainable Development Goals (SDGs) at the Rio+20 World Summit in 2012 (United Nations Development Programme, 2020). The SDGs seek to shift governmental approaches to development based on the philosophy that for communities and businesses to flourish, all three pillars of sustainability need to be integrated into national growth strategies (United Nations Development Programme, 2020).

### 2.1 Agriculture's role in the food system

According to Ericksen (2007, p. 234), a food system can be regarded as "a set of activities ranging from production through to consumption" and is influenced by political, cultural, social,



technological, natural and economic factors. Similarly, the Food and Agricultural Organisation includes activities such as *production, aggregation, processing, distribution and consumption into* their definition of a food system (Food and Agriculture Organization, 2018). Furthermore, they describe how food systems are made up of sub-systems (i.e. farming, waste management and input supply systems) which interact with other key systems (i.e. healthcare, energy, and trade) (Food and Agriculture Organization, 2018).

This interaction between the food system and other key systems is important to understand as a structural or policy change in one or more of the connected key systems may have an impact on the food system (Food and Agriculture Organization, 2018). A very tangible example of these interactions on food availability was seen during the early days of the COVID-19 pandemic in 2020. Due to the contagious nature of the Coronavirus, many government authorities around the world instated national lockdowns which forced most individuals to stay away from work and to stay home for varying numbers of weeks to control the spread of the disease. In the wake of these lockdowns; various international trade restrictions and consumer panic buying, supermarket shelves were left bare (Chandran, 2020). Without describing in detail, the enormity of the impact caused by the pandemic, this example simply highlights the interdependency of elements which affect food availability and frames the food system as an intricate network of non-linear relationships. By including *production* and *distribution* in their description of the food system, the Food and Agricultural Organisation (FAO) (2018) demonstrate that in the context of sustainable development, consideration should be given to how these activities can contribute towards social, environmental and economic development.

According to Umesha, Manukumar and Chandrasekhar (2018), exploitative agriculture which seeks to maximise production with scant regard for the ecological fallout (such as land degradation, biodiversity loss, loss of soil fertility and soil erosion) has been the status quo for the last 30 years. Additionally, Jörisen, Meyer, Preifer and Bräutigam (2014) highlight that water demand for food production is likely to be 2.5–3.5 times higher in 2050 than the total human use of fresh water was at the time of publication in 2014. Furthermore, the expansion of intensive agriculture into environmentally sensitive areas is likely to result in further loss of ecosystem services and biodiversity (Jörisen et al., 2014) which, with current agricultural practices, will limit the increase in achievable output and crop yields (Ericksen, Ingram and Liverman, 2009). In the context of such challenges, Umesha et al. (2018) advocate for **sustainable agriculture** as a responsible solution to food insecurity which will not disrupt environmental stability or derail the water-energy-food nexus. According to the FAO (1989 as cited in Umesha et al., 2018),

sustainable agriculture is the effective management of resources to meet the food needs of current generations without compromising capital stocks for future generations.

## 2.2 Influence of technical innovation on current food systems

Agricultural innovation aimed at improving food security without disrupting the water-energy-food nexus, has largely been focused on precision farming and smart fertilisers (Brouwers, 2019) or climate-smart agriculture (Lipper, Thornton, Campbell, Baedeker, Braimoh, Braimoh, Caron, Cattaneo, Garrity, Henry and Hottle, 2014). Such methods aim to increase productive output with less soil contamination (Wood, 2019) and greenhouse gas emissions (Lipper et al., 2014) than conventional farming. Other technical approaches to increasing food production in light of environmental challenges, involve 3D printers (Crawford, 2019) and the rearing of insects as alternative sources of protein (Gahukar, 2011). While such approaches can be recognised for their contribution to increasing food production, there is little evidence to suggest they will overcome the challenges associated with food *distribution* in developing countries. This will be discussed in the following section.

## 2.3 Distribution challenges in meeting food security needs

Food security was defined in 1996 at the World Food Summit as “when all people, at all times, have physical, social and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 1996, p.1). Lang and Barling (2012) however, argue that this and other old-fashioned definitions have led to policies which are too heavily centred on producing more food as the solution to food insecurity and furthermore, they advocate for a more holistic paradigm be applied to food security – one which recognises complexities exist between human health, environmental concerns, consumer behaviour, market demands, supply chains and economic balance (Lang and Barling, 2012).

Due to market globalisation, increased urbanisation and higher consumer expectations, food supply chains have become longer and more complex, resulting in more intermediaries and increased risk of losses (Jörissen et al., 2014). While Von Bormann (2019) estimates that 33% of all food produced is lost due to wastage, Lipinski, Hanson, Waite, Searchinger, Lomax and Kitinoja (2013) approximate that 12% of all food loss occurs during the *distribution* phase of the food value chain. Furthermore, food loss is more pronounced in developing countries than in developed countries (Lipinski et al., 2013). This suggests that food security challenges in developing countries are not only as a result of insufficient production but are also linked to distribution challenges. This is similar to Crush and Frayne (2010) and Battersby (2013) who argue that food insecurity in Southern Africa is linked to access challenges rather than production

challenges; and it is in this context that the Resource Centre for Urban Agriculture and Forestry (RUAF) propose UA as a development strategy for local municipalities to create resilient, sustainable, local food systems to improve access to nutritious and fresh food (RUAF, 2020).

#### 2.4 Introducing sustainability into food systems

It is against this backdrop that sustainable food systems are hereafter considered. Ericksen (2007) describes a *well-functioning* food system as one which delivers a high level of food security to local communities, while the FAO (2018) define a *sustainable* food system as one which enhances food security in a manner which simultaneously considers environmental, social and economic development and intergenerational needs.

According to the FAO (2018), to achieve the SDGs, food systems will need to be more productive, more inclusive, more environmentally sustainable and more resilient. Encouragingly, the estimate that 60% of the city infrastructure required to house the global population by 2050 is yet to be built (Swilling et al., 2013), provides an opportunity to re-evaluate current approaches to developing city food systems. For example, growing food within cities, closer to consumers by means of UA, decreases the need for storage, refrigeration and transport, thereby mitigating the challenges and externalities associated with intensive agriculture and long supply chains as discussed in the sections above. Based on the aforementioned factors, this research study aims to explore UA through a sustainable food systems lens and contribute to the field of UA in SA.

### 3. PROPOSED BENEFITS OF THE STUDY

According to Martin and Wagner (2018), there is limited research to inform the steps required to build and execute a sustainable, city-wide UA action plan. By collecting data from local UA experts and developers, this research project aims to provide information relevant to this gap and the gaps identified by the World Bank (2013) for the SA context. The outcome of this research project proposes to be of use to both private and municipal organisations involved with designing, implementing and managing UAs in SA.

### 4. RESEARCH STUDY AIMS AND OBJECTIVES

This research project aims to contribute meaningfully to the development of UA in South African cities through the development of a conceptual framework for UA development in SA. This study will be the first to develop and propose a guide which considers the social, economic and environmental benefits of UA and adds to the logic of implementation. The proposed framework is intended to be useful for city and municipal planners, urban developers, UA development and

support agencies (e.g. NGOs or business incubators) and other interested organisations or decision-makers involved with UA development in SA.

#### 4.1 Aim of the research study

The research study aims to identify enablers and barriers to UA in SA cities and propose a conceptual framework for implementing and developing UA.

#### 4.2 Objectives of the research study

The objectives of the research study are to:

(i) based upon a review of the literature, develop a conceptual framework for developing UA in SA;

(ii) assess the suitability of the conceptual framework to the **South African context** by:

(a) identifying and confirming current and potential opportunities which facilitate and enable UA to be developed and implemented in South African cities; and

(b) identifying and confirming current and potential pitfalls which act as barriers to developing and implementing UA in South African cities.

(iii) revise the conceptual framework in the light of the assessment by UA experts; and

(iv) make recommendations based on the revised framework, which city planning offices and private organisations can consider in their approach to UA development.

This chapter begins with a review of the literature on Resilience Theory as the underpinning theory of the research study. The chapter then goes on to discuss the different types of UA and the impact of UA on the three pillars of sustainability. To provide the foundation of the conceptual framework for UA development in SA, Section 3 of the chapter discusses the current and potential challenges and enablers of UA while Section 4 reviews three other UA frameworks and guidelines to building resilient programmes. Section 5 concludes the chapter by presenting the first version of the conceptual framework, which was developed for the SA context, considering the literature reviewed and the underpinning theory of the research study.

### 1. RESILIENCE THEORY

Resilience has been described as the ability of a system to withstand disturbances without changing its function (Holling, 1973). Resilient systems are said to have the 'adaptive capacity' to absorb shocks, and when changes do occur, resilience can deliver mechanisms for renewal and reorganisation (Folke, Carpenter, Elmqvist, Gunderson, Holling and Walker, 2002). Resilience is what allows re-configuration during times of crisis and vulnerability (Gallopín, 2006).

Vulnerability has been written about as the opposite of resilience (Miller, Osbahr, Boyd, Thomalla, Bharwani, Ziervogel, Walker, Birkmann, Van der Leeuw, Rockström, Hinkel, Downing, Folke and Nelson, 2010). This means that should a social or ecological system lose resilience, its vulnerability to shocks and changes will increase (Miller et al., 2010). Folke et al. (2002) wrote about how changes in a resilient system potentially create development opportunities, whereas changes in a vulnerable system will likely be overwhelming, even if relatively small. Managing for resilience seeks to shift policies away from current models which attempt to control change, to creating systems with increased capacity to withstand and adapt to change (Folke et al., 2002). Furthermore, managing for resilience is said to increase the likelihood of sustainable development in uncertain and constantly changing environments (Levin, Barrett, Aniyar, Baumol, Bliss, Bolin, Dasgupta, Ehrlich, Folke, Gren, Holling, Jansson, Jansson, Maler, Martin, Perrings and Sheshinski, 1998). According to Laycock (2018), building resilience involves the intentional guiding of a system to increase the adaptive capacity of the system while maintaining its identity, structure and function.

Resilience has been written about at both personal and organisational levels; however, the UN links the concept of resilience to communities and cities through SDG 11 which advocates for

human settlements which are inclusive, safe, resilient and sustainable (UN, 2020). While a clear definition for what makes a *resilient city* is difficult to ascertain, the UN (2020b, p.1) supports the inclusion of “accessible, green and public spaces” in the pursuit of developing resilient and sustainable cities. This is also supported by literature which describes cities and urban systems as social-ecological systems due to their nested interaction with the environment (Du Plessis, 2008). In terms of building resilient food systems, Eldridge (2020) argues that the vulnerability of food systems is made worse by long supply chains. As a possible response, Dubbeling (2014), suggests that UA can eliminate the dependence on long supply chains and increase the diversity of urban food sources, leading to more resilient food systems and communities.

Grounded in Resilience Theory, this research study aims to explore the benefits, the challenges and the opportunities of developing UA, all of which are discussed hereafter.

## 2. URBAN AGRICULTURE

UA can be defined as “an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city or a metropolis, which grows or raises, processes and distributes a diversity of food and non-food products” (Mougeot, 2000, p.11). Non-food products relate to the Triple Bottom Line benefits of UA, such as enhanced social inclusion, local economic development or the productive reuse of urban wastes (RUAF, 2020).

While there are many forms, varieties and definitions of UA, Cai (2014, p.1) captures the UA philosophy by describing it as “the practice of incorporating farming into city areas through mixed land use and innovative techniques that allow cultivation to occur on much smaller plots of land”. Rather than competing with rural or industrial agriculture, UA is seen to complement it, which results in a stronger national food system (Mougeot, 2000). The acronym UPA (Urban and Peri-Urban Agriculture) is often used interchangeably with UA in literature; however, it refers to practices on the periphery of urban areas. Although UA is practised in both developed and developing countries, it seems to serve different purposes, “e.g. recreation in the former and food security in the latter” (Pearson et al., 2010, p.7). White and Hamm (2014, p.3) describe how UA in developing countries is often practised opportunistically, “in the in-between spaces of towns and cities”. Van Tuijl et al. (2018) describe UA as a multidimensional concept due to its many offerings and variations (shown in Figure 2), which are discussed hereafter.

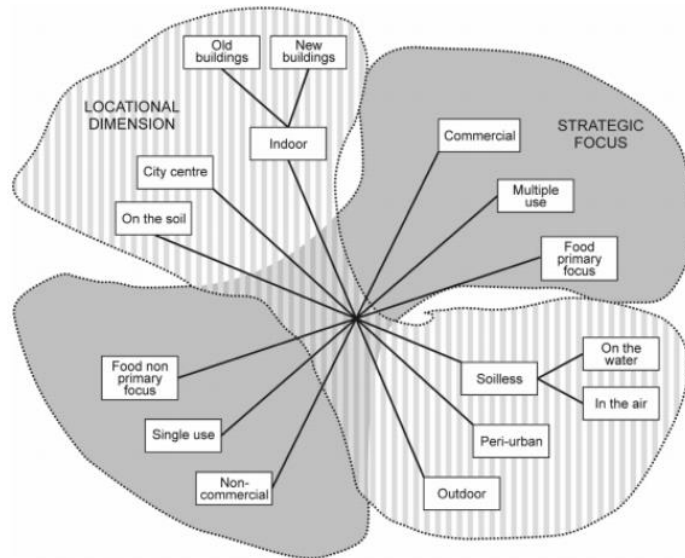


Figure 2: UA depicted as a multidimensional concept with strategic and locational considerations (Source: Van Tuijl et al., 2018, p.9)

To unpack UA as a multidimensional concept, Van Tuijl et al. (2018) discuss elements which pertain to the *strategic focus* and the *locational dimension* of the UAI. According to Van Tuijl et al. (2018), the *strategic focus* of a UAI relates to whether or not it is practised commercially, its primary focus (food versus non-food benefits) and whether it is used for a single purpose or multiple purposes. The *locational dimension* refers to the influence different geographic locations will have on the growing methods adopted (e.g. climatic or spatial challenges may mean indoor systems are more suited to the city centre whereas outdoor systems are more prevalent in peri-urban areas).

### 2.1 UA typologies

Due to its location, UA is influenced by several factors, including legal barriers and land-use zoning rights (Crush and Frayne, 2010; Thomaier et al., 2015; Pfeiffer, Silva and Colquhoun, 2015) and does not follow the same agricultural model as its rural counterpart (Eliades, 2016). UA is practised by a variety of people in a variety of places at varying scales (Thomaier et al., 2015). Van Tuijl et al. (2018) describe the typical typologies associated with UA (Table 1).

Table 1: Various UA typologies (Direct source: Van Tuijl et al., 2018, p.8)

Type	Description	Reference(s)
Community gardens	Broad term covering various types of gardens, including demonstration gardens, horticultural therapy gardens, job-training gardens, neighbourhood gardens, inter-cultural, etc. Those diverse gardens can play a role for various purposes, such as promoting urban health, social inclusion, and active civic participation.	Turner <i>et al.</i> , 2011 Guitart, <i>et al.</i> , 2012
Institutional gardens	Food production management by institutes, such as schools, hospitals, prisons, and other non-profit organisations.	Pulighe & Lupia, 2016
Guerrilla gardening	Gardening public space with or without permission, in the latter case also known as ‘illegal gardening’.	Tracey, 2013
Urban farm	Commercial food production by professional farmers using intense and advanced growing systems.	Pulighe & Lupia, 2016
Vertical farming	Indoor farming based on hydroponic and aquaponic technologies.	Despommier, 2010
Plant factories with artificial lighting	Indoor farming combined with resource utilisation efficiency and closed plant production system.	Kozai, 2013
Zero-Acreage Farming	Specific forms of food production that are characterised by the non-use of land, covering various forms and technologies.	Thomaier <i>et al.</i> , 2014
Agro-park	Clusters of agro-activities in which various links of the food chain are located in one place. The concept has been developed to apply industrial ecology in the agro-sector.	Smeets, 2009 Metze & Van Zuydam, 2013
Agro-tourism	Farming in agro-recreational parks in peri-urban locations combined with the provision of facilities and services for urban tourists (e.g. food, accommodation, guided tours, and horse riding).	Yang <i>et al.</i> , 2010

It is evident from the descriptions given in Table 1 that there is an array of UA typologies, each of which serves a different purpose and involves a different set of activities and participants. For example, Pulighe and Lupia (2016, as cited in Van Tuijl et al., 2018), describe how commercial urban farms involve professional farmers and the use of intense and advanced growing systems. This is in stark contrast to community gardening where the focus is on the social and health benefits derived from UA (Turner et al., 2011, and Guitart et al., 2012 [as cited in Van Tuijl et al., 2018]). Therefore, a conceptual framework for developing UA in SA will need to consider the wide



variety of UA activities operating at various levels (e.g. commercial and non-commercial entities as well as open-air and indoor farming ventures).

Looking at the SA context, Small (2007) describes a continuum model (shown in Figure 3) developed by *Abalimi Bezekhaya* which is an SA-based organisation involved with the training of community UAs in the Western Cape. The continuum model represents how people tend to ‘flow’ through small-scale agricultural initiatives and depicts four levels: *Survival*, *Subsistence*, *Livelihoods* and *Commercial* (Small, 2007). It proposes that the social impacts of agriculture on poverty alleviation are most prominent at the *Survival*, *Subsistence* and *Livelihood* levels and suggests that often people involved at *Survival* and *Subsistence* levels tend to move onto other things (such as other jobs) (Small, 2007). Small (2007) argues that this higher turnover of people involved at the lower levels is because it only takes three to four days to learn enough to farm for subsistence, but it takes three to four years to gain enough knowledge to farm commercially. The phases of the continuum can be linked to the Van Tuijl et al. (2018) multi-dimensional model of UA (Figure 2) and Table 1, both of which show that there is a difference in strategic thinking between the different models of UA.

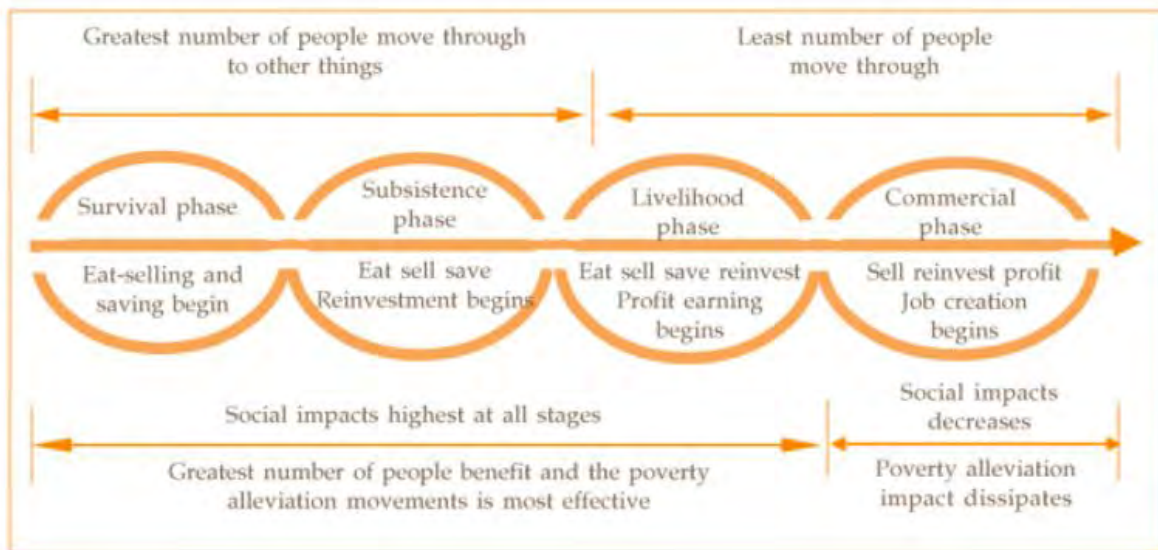


Figure 3: Sustainable Development Continuum for Organic Micro Farming Projects (Source: Small, 2007, p.268)

## 2.2 Sustainability considerations

UA has been written about as a potential tool for sustainable city development due to the economic, social and environmental benefits it provides to urban communities (Van Tuijl et al.,

2018). The next section aims to unpack UA as it relates to the three pillars of sustainability by looking at its social, environmental and economic impacts.

### 2.3 Social impacts

Studies conducted across the USA found that UA can deepen social development and community cohesion through the creation of shared learning experiences (Poulsen, Hullah, Gulas, Pham, Dalglis, Wilkinson and Winch, 2014). Similar studies conducted in SA found UA to strengthen social capital and interpersonal relations within communities (Olivier, 2015; Olivier and Heinecken, 2017). Participation in allotment- or community gardening has also been found to result in improved physical and psychological health both abroad (Poulsen et al., 2014; Soga, Cox, Yamaura, Gaston, Kurisu and Hanaki, 2017) and in SA (Olivier and Heinecken, 2017). Furthermore, children (Heim, Stang and Ireland, 2009) and households (Alaimo, Packnett, Miles and Kruger, 2008) who participated in community gardening tended to eat more vegetables. These studies showcase the positive impacts of UA on health and wellbeing.

### 2.4 Ecological impacts

According to Lipinski et al. (2013), storage, refrigeration and transport accounted for 40% of food loss and waste in 2011, with more lost in developing countries than in developed countries. Growing food within cities presents an opportunity to reduce food miles and the associated energy requirements of long supply chains (Eigenbrod and Gruda, 2015). Due to its proximity to consumers, Ferreira et al. (2018) advocate for UA as a strategy to shift food production towards a low-carbon economy.

Furthermore, UA increases the provision of urban green spaces which reduces the heat island effect (Andersson, Barthel, Borgström, Colding, Elmqvist, Folke and Gren, 2014) and boosts city biodiversity (Soga, Gaston, Yamaura, Kurisu and Hanaki, 2016). Whittinghill and Rowe (2012) emphasize the benefits of UA green roofs for the sustainable management of storm water runoff and energy consumption. They also suggest that the expansion of UA green roofs may reduce the costs of developing new infrastructure (such as roads and sewer lines) and stimulate infill development or the redevelopment of vacant urban areas in the city centre (Whittinghill and Rowe, 2012). Lastly, Soga et al. (2016) show that experiences with nature are likely to increase a child's willingness to conserve it.

### 2.5 Economic impacts

With economic impacts as the third pillar of sustainability, it is important to consider UA as a potential income generator. Along with produce, some UAs sell grow-kits, farming materials and

equipment while others offer education and training courses (Van Tuijl et al., 2018). Incorporating tourist activities into agricultural practices has been shown to diversify revenue streams (Yang, Cai and Sliuzas, 2010) and renting urban farms and gardens as unique spaces for workshops and events can also produce revenue (Thomaier et al., 2015). Grewal and Grewal (2012) write about the benefit of buying food locally as it boosts the local economy. In SA, the economic benefits of UA are largely realised through improved food security and selling surplus produce which potentially frees up funds to be used elsewhere (Olivier and Heinecken, 2017).

## 2.6 Criticism of UA

While the above section discussed the potential benefits of UA, UA is not free of criticism. Complaints range from concerns about pollution and the discarding of wastes; to noise and animal rights abuses (Van Tuijl et al., 2018). Another critique is the extensive use of energy in certain types of UA (e.g. indoor farming or aquaponic systems) which can overload the city grid (Lawson, 2016). Additionally, trace metals have been shown to potentially contaminate soil in urban areas (Olowoyo and Lion, 2016) raising health concerns about the food produced at UA sites.

## 3. CHALLENGES AND OPPORTUNITIES AS CONSIDERATIONS FOR UA DEVELOPMENT

UA has many different forms, is practised in a variety of places and fulfils many different purposes (Dimitri, Oberholtzer and Pressman, 2015). Due to its diverse nature and broad definition, factors which influence UA development are numerous and varied. This section aims to analyse peer-reviewed literature to identify central challenges and opportunities for UA development globally and locally. These considerations will serve as the basis of a conceptual framework for developing UA in SA.

### (a) Competition for resources, financial support and the influence of urban natural capital and climate

Game and Primus (2015, p.3) state that “the importance of the following factors in different geographic areas may impact UA activities: competition for resources (land, water, labour, energy); financial support from the private or public sector; horticulture techniques: production of vegetables; productive use of under-utilised resources; low input processing and storage techniques with micro-credit support. Taking those factors into consideration will help make urban agriculture sustainable”. In Johannesburg, SA, competition for land and water have also been identified as major barriers to UA development (Malan, 2015). In the context of land access, Van Tuijl et al. (2018) recognise the influence of geographic location and climate on the choice of growing systems. Similarly, Olowoyo and Lion (2016) and Game and Primus (2015) raise

concerns about UAs interaction with urban natural capital and pollutants possibly compromising soil health.

#### (b) The influence of socio-cultural perceptions

Prove et al. (2018) argue that geographic locations in the urban context relate to cultural values which influence community perception and engagement with UA. Their work acknowledges that these socio-cultural perceptions can influence UA both positively and negatively (Prove et al., 2018). In SA, Campbell (2013) identifies the negative social stigma associated with subsistence farming. Correspondingly, the FAO's (2018) *Food System Wheel* recognises that a food system is influenced by Societal Elements (i.e. socio-cultural norms), Natural Elements (i.e. access to water) and the availability of Core Systems (i.e. inputs, labour and knowledge).

On the topic of labour, Prove et al. (2018) also discuss the use of volunteers over employees as a consideration, depending on the strategic focus of the UAI. In SA, Campbell (2013) argues that finding volunteers to work for grassroots UAIs in return for food instead of monetary returns can be a major challenge. Pfeiffer et al. (2015), also found the reliance on volunteers to be a limiting factor for urban farming operations due to a lack of skill and knowledge. While Thomaier et al. (2015) point out that the interaction with social capital and the proximity of UA to urban stakeholders is what allows UA to succeed, Prove et al. (2018) caution that new UAIs would need to be cognizant of the current food system in place and the socioeconomic status of the surrounding community. White and Hamm (2014) also refer to the resilience of current and existing food systems in discussing UA's ability to address food security.

#### (c) Market challenges, intermediaries and diversity of services offered

Thom and Conradie (2013, p.67) link urban farming challenges in SA to market challenges as "given the spatial and logistical constraints on growing large volumes of food in an urban setting, selling to traditional retail markets is unrealistic for many urban farmers". However, they also offer a solution to this challenge, whereby small-scale urban farmers sell their produce to high-income communities through organised intermediaries in what is termed 'vegetable box schemes' (Thom and Conradie, 2013).

While such partnerships help UAIs to reach different or additional markets, Van Tuijl et al. (2018) advocate for designing 'agro-parks' whereby various activities of the food value chain are combined to increase the diversity of services offered by the UAI. Similarly, a case study written by Yang, Cai and Sliuzas (2010) showcases how having multiple models within the same venture or linking to partner organisations can benefit the UAI's bottom line (i.e. combining tourism with

agricultural activities and food services). However, Yang et al. (2010) point out that multiple models need to align with the overall vision of the initiative and not be in conflict with one another.

#### (d) Land access challenges

Looking specifically at UA in SA, Olivier (2015) found that a major barrier to development was the lack of access to land. According to Crush and Frayne (2010) and van der Schans, Renting and Van Veenhuizen (2014), UA can be limited by municipal policy and land zoning regulations which do not provide for UA development. A challenge identified in Singapore's UA landscape was the incompatibility of land use legislation and urban farming initiatives (Low, 2019). The legislative mismatch highlighted that land zoned for agricultural purposes did not provide for or include social community farming, and conversely, land set aside for community development did not permit farming practices to occur there (Low, 2019). Additional land challenges have been linked to the uncertainty of land tenure agreements in Europe (Prove et al., 2018) and informal land agreements and policies in SA (Malan, 2015; Majavu, 2019).

#### (e) High operational costs circumvented by collaborative partnerships

Labuschagne and Zulch (2016) found that while urban rooftop gardens hold much potential, their development has been slow in SA due to high operational costs. Suggestions to overcome high capital investment costs involve better support from financial institutions (Van der Schans et al., 2014) and the development of collaborative partnerships between urban farmers (or UA developers) and owners of buildings (Whittinghill and Rowe, 2012; Vermeulen, 2018). The Toronto Food Policy Council's (TFPC) *Yes in My Back-Yard* campaign shows that such partnerships are not only viable for large scale initiatives but can also be created between community members who have land and those who want land for UA purposes. The campaign aims to link homeowners with spare growing space to members of the same community who want to practise UA but don't have access to land (TFPC, 2012).

#### (f) A lack of knowledge, the loss of knowledge and the absence of skills needed to scale

Pfeiffer et al. (2015) found that a lack of knowledge has caused major hurdles for UA initiatives in the USA, while Malan (2015) found the same for SA initiatives. Typical types of knowledge needed in UAs range from business knowledge and planning (Lohrberg, Licka, Scazzosi and Timpe, 2015); to logistics and marketing (Prove et al., 2018); to technical and agricultural knowledge (Pfeiffer et al., 2015; Van Tuijl et al., 2018). Depending on the initiative, food processing skills may also be needed (Prove et al., 2018).

In SA, Labuschagne and Zulch (2016) identified a lack of expertise and knowledge as a barrier to UA development in the green infrastructure sector. Looking at small scale farmers in a peri-urban area in SA, Khapayi and Celliers (2016) found that farmers looking to move from *Subsistence* and *Livelihood* levels to *Commercial* UPA often lacked the necessary skills to scale up. More specifically, they found that a lack of knowledge about production, planning and logistics, as well as a lack of farm management skills, were barriers to scaling up from these lower levels (Khapayi and Celliers, 2016). Additionally, *Abalimi Bezekhaya's* continuum (shown in Figure 3) explains how knowledge is continually “lost” as people move onto other things at these lower levels of UA, highlighting an additional challenge of retaining knowledge (Small, 2007).

Referring to government-funded UAIs in SA, Haysom and Battersby (2016) recommend that initiatives improve their monitoring and evaluation, as the recording of lessons learnt could add to a body of knowledge which can better inform future initiatives and improve their overall sustainability. Similarly, to help build community capacity and UA knowledge, the TFPC advocate for the creation of an online repository to disseminate UA information and serve as a platform to publicise UA workshops and training (TFPC, 2012). Furthermore, they believe that connecting communities with UA coordinators and implementers will further UA development (TFPC, 2012).

#### (g) [The influence of technical support, business incubators, education and training](#)

To foster UA development through the development of skills and training initiatives, van der Schans et al. (2014) recommend that more technical support is given to UAIs in developing countries. While Jones, Pimbert and Jiggins (2010) highlight the benefits of using ‘local science’ in a developing country over ‘expert science’ to solve agricultural challenges with tacit knowledge, Thomaier et al. (2015) and Pfeiffer et al. (2015) recommend the use of business incubators to build UA knowledge and capacity. Business incubators typically serve as support centres for training and development for entrepreneurs and/or start-up businesses (Thulo, 2019).

#### (h) [Considerations on how and why to define the strategic focus of a UAI](#)

Due to the diversity of UAIs, Pfeiffer et al. (2015, p.89) argue that “it will be critical that organisations clarify within their missions the specific goals in undertaking agricultural production” to avoid conflicting objectives and misallocation of resources. To help UA developers map the business elements and define the strategic focus, Lohrberg et al. (2015) recommend using a Business Modelling Canvas such as the one developed by Osterwalder and Pigneur (2010). The Business Modelling Canvas (BMC) is a strategic management tool which helps to conceptualise how an organisation “creates, delivers and captures value” (Osterwalder and Pigneur, 2010, p.14). The Osterwalder and Pigneur (2010) BMC recognises nine building blocks (*Key Activities*,

*Key Partners, Key Resources, Cost Structure, Customer Relationships, Customer Segments, Value Propositions, Customer Channels and Revenue Streams*) which together make up the structure or business model of an organisation (shown in Appendix A).

Furthermore, *Value Propositions* refer to the bundle of products and services which an organisation uses to meet customer needs by solving customer problems or by creating value for different *Customer Segments* (Osterwalder and Pigneur, 2010). *Customer Segments* are the different groups of people the organisation intends to serve or reach, while *Customer Channels* refer to the mechanisms through which an organisation communicates with or reaches their customers, to deliver on their value propositions (Osterwalder and Pigneur, 2010). This is in turn underpinned by *Customer Relationships* which relates to the types of relationships developed with various customer segments (e.g. automated vs personal) (Osterwalder and Pigneur, 2010). *Revenue Streams* refer to the income generated from customers and involves pricing considerations, while the *Cost Structure* refers to the costs incurred by the business (Osterwalder and Pigneur, 2010). The *Key Resources* describe the assets which are important to the organisation in order to operationalise their business model, while the *Key Activities* relate to the actions an organisation must take to set their business model in motion; and finally, the *Key Partnerships* describe the network of partners and suppliers which act as alliances to help organisations optimise their business model and reduce risks (Osterwalder and Pigneur, 2010). Researching the organisational structuring and dynamics of UAs, Prove et al. (2018) recommend that UA organisations aim to be flexible, as diverse challenges and uncertainties make it difficult to plan (e.g. informal land tenure agreements).

#### (i) Conflicts, theft and vandalism

By its nature, UA interacts with other urban activities and local residents, which may lead to energy conflicts due to overloading the city grid (Lawson, 2016). In SA, load-shedding as part of the larger energy crisis, has been identified as a risk to food security due to its impact on agriculture (Von Bormann, 2015). Furthermore, Campbell (2013) identified the risk of electricity circuit breakers being stolen from UA sites in SA. As discussed previously, external conflicts and criticism of agriculture in the urban context often relate to the entity's treatment of animals and agricultural waste (Van Tuijl et al., 2018). In SA, theft and vandalism have been identified as major challenges to community UAs in the Eastern Cape (Dean, 2018) and Johannesburg (Campbell, 2013; Malan, 2015); and therefore could be argued as similar concerns in the other areas. Additionally, conflict between farmers, growers and managers have posed challenges for UA development in SA (Chirume, 2018).

(j) Opportunities associated with integrated waste management policies

As an enabling opportunity, there is evidence to suggest that UA may assist in the management of urban wastes (Asomani-Boateng, 2007; Lohrberg et al., 2015). Primarily, food waste can be processed and reused as compost in UAs, which helps local governments, businesses and communities deal with solid wastes in a more circular fashion as opposed to a linear system (shown in Figure 4 below).

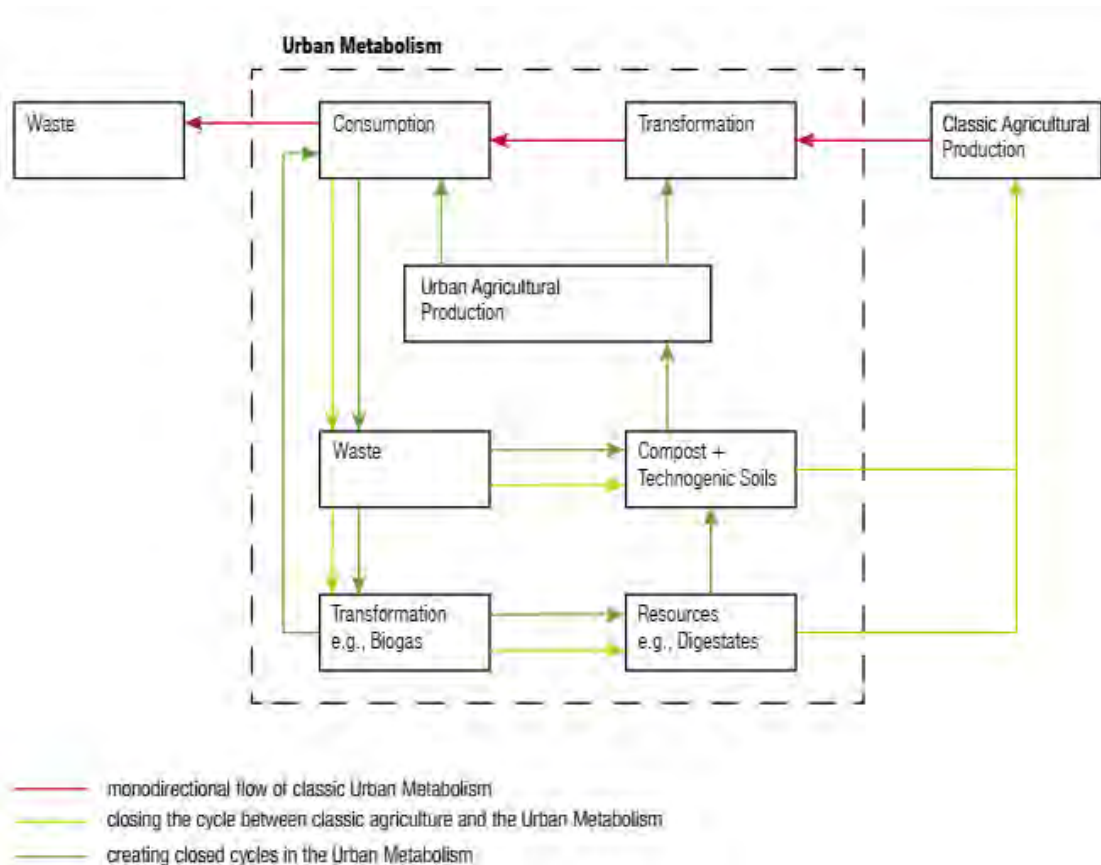


Figure 4: Circular management of urban wastes in UA (Source: Lohrberg et al., 2015, p.171)

(k) Engaging multiple stakeholders and organisations to foster UA development

To help UAs navigate uncertainties, Prove et al. (2018) found that involving a 'change agent' to drive the process was useful. Furthermore, they argue that entrepreneurial-type thinking, social networking, creative problem solving and flexibility enable UA development (Prove et al., 2018). The World Economic Forum's *New Vision for Agriculture* outlines eight steps to agricultural development which calls for multi-stakeholder engagement between government, the private sector, farmers, civil society, donors/ international organisations and research and thought leaders (World Economic Forum, 2016). Additionally, they advocate for influential champions,



government catalysts and community drivers as integral stakeholders to drive agricultural development strategies (World Economic Forum, 2016).

Similarly, in SA, in response to struggling UAs in the Eastern Cape province, a member of the Mayoral Committee for Economic Development, Tourism and Agriculture in Nelson Mandela Bay Municipality called for an integrated approach from civil society, farmers, governments and private businesses to work collectively to improve UA implementation and development (Dean, 2018). A similar suggestion was made by Malan (2015) for urban farmers to be accommodated and included in agricultural organisations such as AgriSA, the African Farmers Association of SA, the Agri-Sector Unity Forum or the National Emergent Red Meat Producers Organisation.

#### (l) The benefit of public-private partnerships

Singapore's *Edible Garden City* initiative is a model example of how public-private partnerships have the potential to enable UA. The idea behind the partnership is to identify challenges to UA and to provide an effective platform for communication between public and private entities to overcome such challenges, allowing Singapore to decrease their reliance on food imports as UA increases (Low, 2019).

#### (m) Governance and implementation considerations

In Singapore, Low (2019) reports that conflicting legislation on urban land use and urban farming hinder UA development. This is compounded by a lack of understanding and transparency of the government structures and local authority processes involved with UA implementation (Low, 2019). Similarly, in SA, Kanosvamaha (2018) found that ineffective coordination and conflicting agendas between government and non-government stakeholders were significant barriers to UA development locally. Furthermore, Campbell (2013, p.10) documents that UA development in SA does not reside in one governmental department which "leads to a fragmentation of focus and serious confusion for urban farmers on the ground trying to negotiate the quagmire of departmental authority".

### 3.1 Summary of challenges and opportunities for UA development

For this research, Tables 2 and 3 were developed as summary tables of the identified challenges and opportunities for UA development as discussed in the above sections and have been included for ease of reference. These served as the basis for the development of the conceptual framework for developing UA in SA, outlined later in this chapter.

Table 2: Summary table of global challenges to UA development

Challenges which currently or potentially act as barriers to UA development	References
<b>1. Resource challenges</b>	
1.1 Competition for resources (land, water, labour, energy) and infrastructure (storage facilities and techniques)	Game and Primus (2015); Malan (2015); Olivier and Heinecken (2017)
1.2 Energy use conflicts such as load-shedding	Von Bormann (2015); Lawson (2016)
1.3 High operational costs	Labuschagne and Zulch (2016)
1.4 Financial support and financial resources	van der Schans et al. (2014); Game and Primus (2015)
1.5 A lack of knowledge	Malan (2015); Pfeiffer et al. (2015); Labuschagne and Zulch (2016)
1.6 Knowledge is continually lost as people move onto new jobs	Small (2007)
1.7 A lack of skills and the knowledge needed to scale up	Khapayi and Celliers (2016)
<b>2. Organisational challenges</b>	
2.1 The interaction between natural capital, being in an urban geographic location and production decisions (i.e. influence on choice of growing methods and systems)	Game and Primus (2015); Van Tuijl et al. (2018)
2.2 Conflicting objectives and ill-defined strategic focus	Pfeiffer et al. (2015)
2.3 Uncertainties around land agreements make it difficult to plan or scale up	Malan (2015); Prove et al. (2018); Majavu (2019)
2.4 Criticism of UA linked to the treatment of wastes and animals	Van Tuijl et al. (2018)
<b>3. Local community challenges</b>	
3.1 Interaction with social capital and stakeholders: sociocultural norms and perceptions of UA	Campbell (2013); Prove et al. (2018)
3.2 Conflicts with other urban activities and citizens (theft and vandalism)	Dean (2018)
3.3 Market challenges	Thom and Conradie (2013)
3.4 Municipal policies and zoning regulations which don't support or provision for UA	Crush and Frayne (2010); van der Schans et al. (2014); Low (2019)
3.5 Inhouse fighting amongst members	Chirume (2018)
3.6 Current and existing food systems within the community	Prove et al. (2018)
<b>4. Urban governance challenges</b>	
4.1 Lack of understanding of government structures and local authority bodies, processes. (e.g. applications, governance procedures)	Campbell (2013); Low, (2019)
4.2 Fragmented implementation by the government (e.g. conflicting policies, differing authority bodies and agendas to implement)	Campbell (2013); Kanosvamhira (2018); Low (2019)

Table 3: Summary table of global UA enablers

Opportunities which currently or potentially enable UA	References
<b>5. Organisational elements</b>	
5.1 Business Modelling Canvas to help define strategic focus and objectives	Lohrberg et al. (2015)
5.2 Designing multiple models to increase the diversity of services and participation in the food value chain	Yang et al. (2010); Van et al. (2018)
5.3 Flexibility	Prove et al. (2018)
5.4 Involving influential champions, community drivers and government catalysts	World Economic Forum (2016)
5.5 Involving change agents, social networkers, creative problem solvers and entrepreneurial thinking	Prove et al. (2018)
5.6 A repository of information to inform and improve the sustainability of future organisations	Toronto Food Policy Council (2012); Haysom and Battersby (2016)
<b>6. Enabling partnerships</b>	
6.1 Support from financial institutions	van der Schans et al. (2014)
6.2 Local knowledge building and education	Jones et al. (2010)
6.3 Collaborations between farmers and owners of land and buildings	Whittinghill and Rowe (2012); Vermeulen (2018)
6.4 Technical support and partnerships to increase skills and build capacity	van der Schans et al. (2014)
6.5 Support from business incubators to build capacity	Thomaier et al. (2015); Pfeiffer et al. (2015)
6.6 Supportive government policies and land use schemes which provision for UA (e.g. UA strategy)	Low (2019)
6.7 Mutually beneficial public-private partnerships and agreements (e.g. integrated waste management strategies meet secondary needs of community and help municipalities)	Asomani-Boateng (2007); Lohrberg et al. (2015)
6.8 Effective communication and multi-stakeholder engagement between public, private entities and civic groups)	World Economic Forum (2016)
6.9 Market access via proximity, partners and intermediaries	Thom and Conradie (2013)

#### 4. CRITICAL REVIEW OF UA FRAMEWORKS AND GUIDELINES TO BUILDING RESILIENT PROGRAMMES

Due to limited literature on **how** to develop a UA development framework (Martin and Wagner, 2018), various approaches (e.g. Prove et al., 2018) were considered and are elaborated on hereafter. Three frameworks which were developed for use in Europe, Canada and the US, along with guidelines on building resilient programmes, are reviewed and discussed in the following sections to describe the literature which fed into the development of the first version of the conceptual framework for UA development in SA.

##### 4.1 A European framework for UA

Prove et al. (2018) developed a UA framework by exploring the ‘modus operandi’ of various European UAIs using a case study approach. Their final framework (shown in Figure 5) aims to serve as an analytical tool to evaluate UAIs and create a common language around UA between academics, public, private and civic stakeholders.

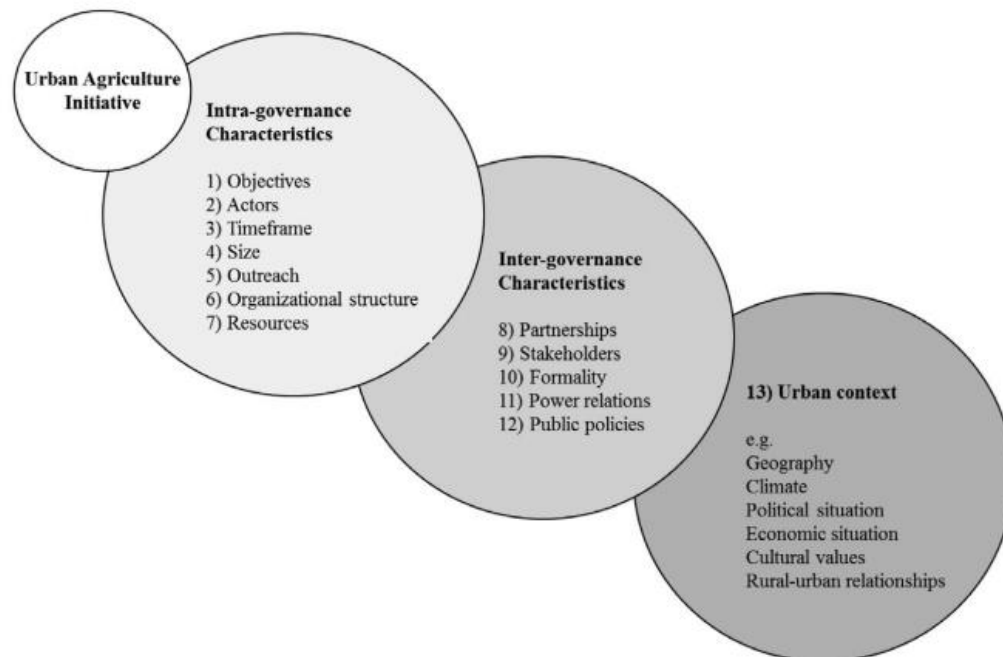


Figure 5: A conceptual framework of the Modus Operandi of Urban Agriculture Initiatives (Source: Prove et al., 2018, p.24)

The Prove et al. (2018) framework identifies key characteristics and important considerations for the organisational design of UAIs and lists these thematically in descending levels of control for the UAI. Seven of the 13 considerations are regarded as *intragovernance* characteristics, as they

are viewed as within the management or control of the UAI and are focused on the internal structure of the organisation (Prove et al., 2018). The framework (Prove et al., 2018) also lists five *intergovernance* characteristics, which are not overtly within the control of the organisation, but do require adherence, compliance and some level of mutual understanding between participants of the UAI and external parties – such as government authorities, partners of the initiative and other stakeholders. The final consideration (*the urban context*) speaks to external influences on UA which organisations have little or no control over (Prove et al., 2018) such as geography, climate and the political and economic situation of the area.

#### 4.2 The US Department of Agriculture Toolkit for UA

In America, the US Department of Agriculture (USDA) released a practical guide to urban farming called a “Toolkit” (US Department of Agriculture, 2016). The Toolkit describes the major *operational, financial, administrative* and *resource* considerations for new urban farming initiatives and provides a hyperlink or reference to financial and technical resources available to urban farmers (USDA, 2016). The guide is intended to provide support to entrepreneurs and community leaders by increasing the awareness of the necessary requirements for starting a UAI and providing information on how to go about acquiring or developing these (USDA, 2016).

#### 4.3 Toronto’s Action plan for growing UA

To promote and enable UA development in Toronto, the TFPC worked to identify the current challenges to UA within the city and propose a UA Action Plan (TFPC, 2012). By using this approach, the TFPC was able to identify six priority areas and suggest ‘next steps’ to foster UA development (TFPC, 2012). The priority areas identified were: *linking growers to land and space; increasing visibility and promotion; strengthening education and training; cultivating relationships; adding value to urban gardens; and developing supportive policies* (TFPC, 2012). The Action Plan was intended to encourage active participation in UA development by proposing practical solutions for both city officials and urban farmers (TFPC, 2012).

#### 4.4. How to build resilient programmes

Due to the focus on Resilience Theory for the research study, this section unpacks Ungar's (2018) guidelines for developing resilient programmes. Ungar's (2018) suggests seven steps which are to (1) *choose your programme*, (2) *create your programme outline*, (3) *gather your resources*, (4) *build links form your programme to other supports and services*, (5) *adapt your programme to the local context*, (6) *track your success* and (7) *plan for sustainability*. With regard to *choosing an appropriate programme*, Ungar (2018) suggests this should be a viable programme which seeks to address people’s most important problems. Ungar (2018) likens the *programme outline* (Step

2) to a logic model or road map, which informs the design of your programme according to its aims. *Gathering your resources* involves considering what is required to achieve the programme objectives while *building links and partnerships* serves as a mechanism to build a support system to assist the programme (Ungar, 2018). Ungar (2018) recommends *adapting the programme* according to the context and culture of the location of the programme. Furthermore, Ungar (2018) advocates that *tracking and monitoring outcomes* can show that the programme has value and is worth investors time and money. Lastly, Ungar (2018) emphasises the need to *plan and scale* programmes to reach as many people as possible but cautions that each programme will need to be individualised based on the local context.

Using these guidelines and elements of the three UA frameworks discussed above, Version 1 of the framework for developing UA in SA was developed and is discussed hereafter.

#### 5. VERSION 1 OF THE CONCEPTUAL FRAMEWORK

Drawing on the approach taken by the TFPC in creating the Toronto UA Action Plan (TFPC, 2012), the conceptual framework was derived from reviewing the literature on the current challenges and opportunities for UA development as discussed in Section 3. The structure and format of the framework used Ungar's (2018) guidelines for designing resilient programmes and listed the major considerations for UA development in seven steps. This meant that the framework did not list the identified considerations as challenges and opportunities specifically, but rather represented them as *Key Actions*, *Important Considerations* and *Helpful Tips* under each of the seven steps for the user to consider. Table 4 illustrates the first version of the conceptual framework for UA development in SA, the size of which has been scaled, with the regular sized version appearing in Appendix B.

Table 4: Version 1 of the UA framework for SA

Key actions to be done under each step	Important Considerations for each step	Useful tips for each step
<b>Step 1. Consider which approach is best suited</b>		
<ol style="list-style-type: none"> <li>Multi-stakeholder engagement will help you identify stakeholders and establish what type of UA may be needed in the community</li> <li>Investigate municipal zoning permissions, maps and relevant bylaws</li> <li>Consider the <b>strategic focus</b> and the <b>locational dimension</b> of the initiative:</li> </ol> <p><b>Strategic focus:</b></p> <ul style="list-style-type: none"> <li>Is food production going to be primary or secondary objective?</li> <li>Commercial vs non-commercial venture?</li> <li>Single use or multi-use facility?</li> </ul> <p><b>Locational dimension:</b></p> <ul style="list-style-type: none"> <li>What type of growing system will work?</li> <li>City centre vs peri-urban?</li> <li>Soil vs soilless?</li> <li>Outdoor vs indoor?</li> <li>Design new buildings or retrofit old buildings?</li> </ul>	<p>Influences of geographic location:</p> <ol style="list-style-type: none"> <li>Practical growing considerations: <ul style="list-style-type: none"> <li>Climate</li> <li>Soil quality</li> <li>Storage techniques</li> <li>Access to water, electricity and labour</li> </ul> </li> <li>Provincial and municipal frameworks (IDP, SDF, LUS)</li> <li>Which local municipal office is involved with UA implementation and their willingness/ perception?</li> <li>Community socio-economic status / socio-cultural norms</li> <li>Available resources and markets</li> <li>Influence of current food system and interdependent key systems (health, trade)</li> <li>Related national and provincial policies: <ul style="list-style-type: none"> <li>Food security and food resilience strategies</li> <li>LED plans</li> <li>UA strategy</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>Involve <b>influential champions and government catalysts</b> to get buy in</li> <li>Some municipalities have a <b>UA strategy</b> but not all</li> <li>Consider the <b>Triple Bottom Line</b> benefits of UA</li> <li>Need to understand the <b>community context</b> and current <b>food system</b></li> </ol> <p><b>Different approaches to UA:</b></p> <ol style="list-style-type: none"> <li><b>Community led UA:</b> usually focused on improving food security/ resilience of those involved</li> <li><b>Commercial urban farms and Agro-parks:</b> generates income and provides employment</li> <li><b>Agro-tourism:</b> combines agriculture with tourism</li> <li><b>Eco-education:</b> provides workshops and training</li> <li><b>Farm to fork:</b> usually linked to amenities (schools, hospitals, restaurants, vegetable box schemes etc.)</li> <li><b>Green infrastructure, architecture and gentrification</b></li> <li><b>Circular systems</b> (hydro/ aquaponics, aquaculture, waste to energy concepts)</li> <li><b>Precision farming</b></li> <li><b>Zero acreage farming</b> (rooftop gardening / indoor farming)</li> </ol>
<b>Step 2. Plan the business model(s) of the UA initiative</b>		
<ol style="list-style-type: none"> <li>Use the <b>Business Modelling Canvas*</b> to map the following: <ul style="list-style-type: none"> <li>What are the objectives / value propositions / intended outcomes of the initiative?</li> <li>Which market(s) do you intend to reach and how?</li> <li>What activities do you intend to include?</li> <li>Where along the value chain do you plan to act?</li> <li>Who are your key partners or enablers?</li> <li>What/who are your key resources?</li> <li>What is the cost structure?</li> </ul> </li> <li>Identify actors, role players, farmers and linking organisations involved with UA</li> <li>Multi-stakeholder engagement to align conflicts and problem solve collectively *<a href="https://www.strategyzer.com/canvas/business-model-canvas">https://www.strategyzer.com/canvas/business-model-canvas</a></li> </ol>	<ol style="list-style-type: none"> <li>Resources (dealt with more in step 3)</li> <li>Funding options</li> <li>Land sharing / land agreements <ul style="list-style-type: none"> <li>Formal vs informal</li> <li>Private vs public private partnerships</li> </ul> </li> <li>Legal frameworks <ul style="list-style-type: none"> <li>Zoning permits, permissions and bylaws</li> <li>Labour legislation</li> </ul> </li> <li>Conflicts of interest with other urban activities/ between stakeholders</li> <li>Proximity to markets and market response, local perceptions of UA</li> </ol>	<ol style="list-style-type: none"> <li>Lots of <b>uncertainties</b> can make it difficult to plan, therefore business models and structures need to be in place, but they also need to have the <b>capacity to adapt and be flexible</b></li> <li>Business Modelling Canvas can be used in <b>NPO's</b> and to <b>manage multiple business models</b></li> <li>Helps <b>develop links and partnerships</b> from your programme to others</li> <li><b>Business incubators</b> may be able to provide support</li> </ol>
<b>Step 3. Map your resources and plan your budget</b>		
<ol style="list-style-type: none"> <li>Establish which resources are readily available</li> <li>Determine which resources will need to be developed, hired or bought</li> <li>Draw up a budget</li> <li>Investigate partnerships or institutions that could provide support</li> </ol>	<ol style="list-style-type: none"> <li>Financial: capital investment for infrastructure, land, operating finance, marketing expenses</li> <li>Human resources: Labour vs. volunteers</li> <li>Intellectual capital: business planning, logistics and marketing, governance structures, technical, agricultural and food processing knowledge</li> <li>Social and natural capitals: interaction with stakeholders and the environment</li> <li>Built (infrastructure): retrofit into old space or redesign new space</li> </ol>	<ol style="list-style-type: none"> <li><b>Knowledge is continually lost at Community UA level</b> as people move onto other jobs</li> </ol>
<b>Step 4. Build links and supportive partnerships</b>		
<ol style="list-style-type: none"> <li>Develop multiple business strategies</li> <li>Identify opportunities to link with other initiatives which will diversify or add to the services offered</li> <li>Approach promising partners</li> </ol>	<ol style="list-style-type: none"> <li>Secondary needs of the community or municipality that could also be met with UA</li> <li>Additional revenue streams along the food value chain</li> <li>Linking with organisations to reach different / bigger markets</li> </ol>	<ol style="list-style-type: none"> <li><b>Mutually beneficial partnerships</b> with the local municipality may provide an <b>enabling</b> environment for UA</li> <li>Involve <b>change agents</b> who possess <b>entrepreneurial traits</b> who are capable of <b>social networking</b></li> </ol>
<b>Step 5. Consider the local and legislative context and adapt</b>		
<ol style="list-style-type: none"> <li>Understand local governance and development frameworks for your area</li> <li>Understand the community context and its influence</li> <li>Address any conflicts with internal or external parties through multi stakeholder engagement</li> </ol>	<ol style="list-style-type: none"> <li>The responsibility to implement UA differs across provinces</li> <li>Municipal by laws and LUS controls are specific to each municipal district</li> <li>Community participation – socio-cultural norms</li> <li>Related local policies</li> </ol>	<ol style="list-style-type: none"> <li>The use of <b>local knowledge</b> may be more appropriate than external/ expert knowledge</li> <li>NB: to check land use permissions, bylaws and definition of UA for your area</li> <li>Provincial and local plans might be at loggerheads (might need to <b>engage municipality to better understand overlap and to collectively seek solutions</b>)</li> </ol>
<b>Step 6. Track and monitor success</b>		
<ol style="list-style-type: none"> <li>Conduct impact or process evaluation to track outcomes</li> </ol>	<ol style="list-style-type: none"> <li>Compile a <b>repository of information</b> to help future initiatives</li> </ol>	
<b>Step 7. Plan to be sustainable</b>		
<ol style="list-style-type: none"> <li>Scale and institutionalize proven models</li> </ol>	<ol style="list-style-type: none"> <li>Future proofing</li> <li>Diversification and differentiation</li> <li>Profitability</li> </ol>	<ol style="list-style-type: none"> <li>Involve <b>community drivers</b> who will spearhead the effort</li> </ol>

Using this literature-derived framework as the basis for the research study, the rest of the document will explain the research methods used and the findings related to the testing of the framework.



## CHAPTER 3: METHODOLOGY

This chapter starts by reiterating the research aims and objectives. It then describes the research design, paradigm and methodology used. The chapter concludes with a discussion of the research validity, reliability and the ethical considerations.

### 1. RESEARCH AIMS AND OBJECTIVES

The overall aim of this research study was to identify and confirm enablers and barriers to UA in SA cities and propose a conceptual framework for implementing and developing UA. The research objectives can be outlined as follows:

- (i) Based upon a review of the literature, develop a conceptual framework for developing UA in SA.
- (ii) Assess the suitability of the conceptual framework to the **South African context** by:
  - (a) identifying and confirming current and potential opportunities which facilitate and enable UAs to be developed and implemented in South African cities.
  - (b) identifying and confirming current and potential pitfalls which act as barriers to developing and implementing UAs in SA cities.
- (iii) Revise the conceptual framework in the light of the assessment by UA experts.
- (iv) Make recommendations based on the revised framework, which city planning offices and private organisations can consider in their approach to UA development. This guide is intended to be of use to those designing, implementing, managing or supporting UA development in SA cities.

### 2. RESEARCH DESIGN

This research study adopted a qualitative approach. Hlady-Rispal and Jouison-Laffitte (2014, p.594), propose that qualitative research can be used to “describe, decode and advance the understanding of intertwined past, present and future eclectic data (i.e., facts, activities, actors’ actions, decisions, or representations)”. As such, a qualitative approach was used to explore UA through the participants' experiences and gain a deep understanding of the different perspectives on UA development in SA.

The research paradigm used was post-positivism, as described by Guba and Lincoln (1994). Post-positivism involves researching experiences and reporting on what the majority says while also recognising that there may be multiple perspectives and understandings present (Guba and Lincoln, 1994). Post-positivism encourages the researcher to explore the diversity of the findings, which allows the researcher to value all findings as critical to the overall development of knowledge (Clark, 1998). The implication of involving humans in the research study means that personal processes and characteristics are at play, which may result in participant and researcher bias (Clark, 1998).

### 3. RESEARCH METHODOLOGY

This research study made use of a theory-driven evaluation approach, as described by Donaldson (2007). In their systematic review, Coryn, Noakes, Westine and Schröter (2010, p.201) define theory-driven evaluation as “any evaluation strategy or approach that explicitly integrates and uses stakeholder, social science, some combination of, or other types of theories in conceptualizing, designing, conducting, interpreting, and applying an evaluation”. Donaldson and Gooler (2003, p.357) describe that theory-driven evaluation efforts can be formative, process-orientated or aimed at identifying “synergies within and across programs to facilitate success of the overall initiative”. Due to the limited literature focusing on the management of UA development in SA, this research study adopted a formative approach, which according to Donaldson and Gooler (2003, p.357), is “aimed at developing and improving programs from an early stage”.

#### 3.1 Sampling methodology

Initially, two participants were identified via purposive sampling, as described by Tongco (2007). Purposive sampling is a non-random technique whereby the researcher deliberately chooses an informant due to the qualities or characteristics they possess (Tongco, 2007). This technique is useful when knowledgeable experts are required for the research study (Tongco, 2007). Thereafter, snowball sampling, as described by Goodman (1961), was used to identify further participants. Snowball sampling is a technique which requires participants to identify further participants for the research study (Goodman, 1961). Following the nominations of further participants, online research of open-access documents was conducted to ascertain the potential participants' background in UA in SA before approaching them via a direct email, seeking their permission to participate in the study. These sampling methodologies were chosen due to the relatively small field of UA experts in SA.

### 3.2 Research participants

The sample population of research participants consisted of six UA experts and was made up of three academics with comprehensive UA backgrounds, two UA consultants and one project manager involved with a large-scale UA development. Table 5 gives an outline of the respondents with further details listed in Appendix C to increase the credibility of the research study as suggested by Lincoln and Guba (1985, as cited in Elo, Kääriäinen, Kanste, Pölkki, Utriainen and Kyngäs, 2014).

Table 5: Research participants

Name	Professional Background
<b>Respondent 1:</b> Anonymous	An academic career in development studies with a large UA focus
<b>Respondent 2:</b> Chris D’Aiuto	Agricultural value chain consultant at <i>Philippi Economic Development Initiative (PEDI)</i> . Previously worked with <i>Abalimi Bezekhaya</i> and <i>Harvest of Hope</i>
<b>Respondent 3:</b> Associate Professor Jane Battersby	Urban geographer, Associate Professor at <i>African Centre for Cities</i>
<b>Respondent 4:</b> Erich Dixon	Project Manager at <i>Urban Dynamics</i> and lead UA project manager on Lufhereng Housing Development Project
<b>Respondent 5:</b> Dr Michael Magondo	Chief Idea Surfer and co-founder of <i>Wouldn’t it be cool?</i> open innovation idea and business incubator
<b>Respondent 6:</b> Associate Professor Raymond Auerbach	Research Associate Professor of Soil Science and Plant Production at <i>Nelson Mandela University, George Campus</i> . Member of the <i>Centre of Excellence in Food Security</i> and the <i>Agricultural Research Council</i>

## 4. DATA COLLECTION TECHNIQUES AND MATERIALS

This section will discuss the data collection techniques and materials used.

### 4.1 Semi-structured interviews

A semi-structured interview process, as described by Cohen and Crabtree (2008) was chosen for the research study. According to Bernard (1988, as cited in Cohen and Crabtree, 2008), semi-structured interviews are useful when it is unlikely that you will have the opportunity to re-interview a participant. This approach was adopted as it is said to provide reliable and comparable data (Cohen and Crabtree, 2008). Interviews were conducted using mainly open-ended questions as outlined in the interview guide (see Appendix D) to stimulate deep discussion and provide an opportunity to identify new insights, as proposed by Cohen and Crabtree (2008).

Preliminary interviews were conducted with Respondents 1, 2 and 3 to test the data collection instruments and assess the suitability of the first version of the conceptual framework; where after slight adjustments were made (see Chapter 4, Section 3). The second version of the framework was then evaluated in further interviews with Respondents 4, 5, 6 and 1. The interviews were conducted online using Zoom and recorded. The recorded interviews were transcribed to text using Otter.ai and edited by the researcher where necessary. The transcribed interviews were copied into Microsoft Excel, formatted and structured using a method described by Ose (2016) for structuring qualitative data.

### 4.2 Questionnaire

Following the preliminary interviews, a self-administered online questionnaire was added to the data collection phase. The content of the questionnaire was the same as the interview guide and was created using Google forms. The link for the questionnaire was sent to Respondents 1, 4, 5, and 6 ahead of their interviews.

## 5. DATA ANALYSIS

Deductive thematic analysis (Boyatzis, 1998) was used to analyse the interview data and questionnaire responses. According to Boyatzis (1998), deductive thematic analysis uses theory as its point of departure. The theory Boyatzis (1998) refers to is derived from the literature and represented by research propositions (Pearse, 2019). Therefore, when analysing the data, the researcher is matching the data to the propositions as a means of establishing if the propositions (or themes) explain the data, rather than exploring the data to generate themes (Pearse, 2019). This approach seeks to determine if the data “confirms or refutes the propositions and by extension, the theories” (Boyatzis, 1998 as cited in Pearse, 2019, p.150). Based on this

understanding, deductive thematic analysis using pattern-matching was adopted in combination with theory-driven evaluation to assess the suitability of the conceptual framework, which was presented to respondents.

As a means of analysing the data, Pearse (2019) describes steps for developing a coding manual and using it to match patterns in the data which confirm or refute the propositions. Following these steps (Pearse, 2019), a coding manual was developed via an inductive process of identifying reoccurring themes in the UA literature. Codes (also referred to as themes), along with anecdotes about what qualifies or excludes a statement from being coded as such, were captured in the coding manual. Once the data had been collected, pattern-matching was applied to the collected data to code it. Pattern-matching involves identifying evidence in the collected data and matching it to the pre-determined codes in the coding manual (Pearse, 2019).

Once the data had been coded, a record of hits and misses using Pearse's (2019) guidelines was developed to confirm or refute the propositions which were put to the participants in the conceptual framework during the interview. "Y" (yes) and "N" (no) were used to illustrate which respondents confirmed or refuted the propositions and a blank cell represented where there was no comment made in reference to that proposition (shown in Tables 6 and 7 in Chapter 4). Statements which did not meet the code criteria (as per the coding manual) but were relevant to the research study, were analysed inductively and included in the final revision of the framework.

## 6. RESEARCH VALIDITY, RELIABILITY AND TRUSTWORTHINESS

By interviewing a diverse set of UA experts, the research project sought to increase the validity and reliability of responses. With the addition of the questionnaire, triangulation of multiple data sources was introduced, which, according to Denzin (2017), increases research credibility and reliability. The reliability and validity of the coding manual were piloted in the preliminary interviews. The coding of the data was performed twice, to increase the reliability of the pattern-matching.

To increase the trustworthiness of the research study, Elo et al.'s (2014) checklist was applied ahead of the preparation, organisation and reporting phases of the research, with the necessary adjustments being made accordingly. For example, the addition of the questionnaire came about after asking the self-awareness question: "what are my skills as a researcher?" (Elo et al., 2014, p.1) to improve the dependability and confirmability of the data collected, as described by Lincoln and Guba (1985, as cited in Elo et al., 2014).

## 7. ETHICAL COMPLIANCE AND CONSIDERATIONS

Due to the involvement of human participants, the researcher applied for and obtained ethical clearance from Rhodes University's Ethics Committee (Review Reference: 2020-1278-3457). A letter of informed consent (Appendix E) which outlined the details of the study and interview process was circulated to participants ahead of the interviews. All participants were given the option of being provided with anonymity. The researcher is not affiliated to any UA group or organisation; however, I recognise that I may be biased in favour of UA development. To decrease potential researcher bias in recalling interview data, interviews were recorded and transcribed using an automated programme.

## CHAPTER 4: RESEARCH FINDINGS AND DISCUSSION

The two aims of this chapter are to present and discuss the findings of the research study as per the four research objectives. The chapter concludes by presenting the final version of the conceptual framework for developing UA in SA (shown in Figure 8).

### 1. LITERATURE-BASED CONCEPTUAL FRAMEWORK

The first objective of the research study was to *develop a conceptual framework for developing UA in SA, based upon a literature review*. This was achieved and described in Chapter 2, Section 5 (Table 4).

### 2. ASSESSING THE SUITABILITY OF THE DRAFT FRAMEWORKS FOR THE SA CONTEXT

The second research objective was achieved through interviews and questionnaires with UA experts who assessed Versions 1 and 2 of the draft conceptual frameworks. Tables 6 and 7 respectively show the record of hits and misses of the challenges and enablers for UA development in SA, based on these interviews.

Table 6: Record of hits and misses for proposed UA challenges in SA

	R1	R2	R3	R4	R5	R6
<b>1. Resource challenges</b>						
1.1 Limited access to resources and inputs (land, water, labour) and infrastructure (storage techniques and facilities), competition for electricity (load-shedding)	Y	Y	Y	Y	Y	Y
1.2 High operational costs, coupled with a lack of financial support and resources	Y	Y		Y		Y
1.4 Lack of knowledge	Y	Y	Y	Y	Y	Y
1.5 Knowledge is continually lost as people move onto new jobs						Y
1.6 Lack of skills and knowledge prohibit scaling up and sustainability		Y				
<b>2. Organisational challenges</b>						
2.1 The challenge of being in an urban geographic location:						
(a) on natural capital (e.g. soil health)						Y
(b) on production decisions (choice of growing methods and techniques undertaken)	Y	Y		Y	Y	Y
(c) related to uncertain or informal land agreements (affects scaling up and sustainability)	Y					
2.2 Conflicting objectives and ill-defined strategic focus			Y		Y	
<b>3. Local community challenges</b>						
3.1 Interaction with social capital and stakeholders (sociocultural norms, perceptions of UA)	Y	N	Y	Y		
3.2 Conflicts with urban citizens (theft, vandalism) and criticism (treatment of wastes and animals)		Y			Y	Y
3.3 Market challenges (includes current and existing food systems)	Y	Y	N	Y	Y	N
3.4 Inhouse fighting amongst members			Y	Y		
<b>4. Governance challenges</b>						
4.1 Confusion over government structures, conflicting implementation processes and agendas of authority bodies	Y		Y		Y	Y
4.2 A lack of municipal policies and zoning regulations which support or provision for UA	Y		Y		Y	Y

Legend: R = respondent, Y = validated of the proposition, N = disagreed with the proposition, blank cell = no comment

Note: Table adapted from Table 2 presented in Chapter 2.



Table 7: Record of hits and misses for proposed UA enablers in SA

	R1	R2	R3	R4	R5	R6
<b>5. Organisational elements</b>						
5.1 Business Modelling Canvas to help define strategic focus and objectives	Y			Y	Y	Y
5.2 Designing multiple models to increase diversity of services and participation in food value chain	Y	Y				
5.3 Flexibility	Y				Y	
5.4 Involving influential stakeholders (e.g. champions, community drivers and government catalysts)	Y		Y			Y
5.5 Involving change agents, social networkers, creative problem solvers and entrepreneurial type thinking	Y	Y				Y
5.6 A repository of info to inform and improve the sustainability of future projects (comes from monitoring and evaluating programmes)		Y	Y	Y		
<b>6. Enabling partnerships and policies</b>						
6.1 Better support from financial institutions				Y		
6.2 Local knowledge building and education	Y	Y				
6.3 Collaborations between farmers and owners of land and buildings	Y				Y	
6.4 Technical support and partnerships to increase skills and build capacity		Y		Y	Y	
6.5 Support from business incubators to build capacity		Y				
6.6 Supportive government policies and land use schemes	Y	Y	Y		Y	Y
6.7 Mutually beneficial public-private partnerships and agreements (e.g. integrated waste management strategies)		Y	Y		Y	Y
6.8 Multi-stakeholder engagement between public, private entities and civic groups	Y	Y	Y	Y	Y	Y
6.9 Market access via proximity, partners and intermediaries		Y	N		Y	Y

Legend: R = respondent, Y = validated of the proposition, N = disagreed with the proposition, blank cell = no comment

Note: Table adapted from Table 3 presented in Chapter 2

## 2.1 CHALLENGES TO UA DEVELOPMENT FINDINGS AND DISCUSSION

The findings which relate to the challenges facing UA development will be unpacked in further detail below and contrasted to peer-reviewed literature in Section 2.1.6 of this chapter.

### 2.1.1 FINDINGS ON THE RESOURCE CHALLENGES

All the resource challenges proposed in the framework were confirmed by the respondents as relevant to the SA context (Table 6).

#### (a) Limited access to resources, inputs and infrastructure

Limited access to resources, inputs and infrastructure, land and water were confirmed principal considerations by most respondents, while competition for labour was not commented on by anyone. In fact, Respondents 1 and 5 commented that unemployment had been a major driver of UA in SA and there was evidence to suggest that different types of UA attract different participants (refer to Section 2.1.3 below).

Regarding competition for energy, Respondent 5 confirmed that load-shedding is a challenge for hydroponic systems which rely on an uninterrupted supply of electricity. Responding to infrastructure challenges related to storage facilities and techniques, Respondent 2 suggested agro-processing to reduce food waste and agro-processing partners to reach additional markets. Additional resource, input and infrastructure challenges which were not in the framework but were raised by the respondents as important considerations spoke to:

- building a toilet on site (Respondent 6);
- the need for security fencing, water storage tanks, pumps, seedlings and compost (Respondents 1, 2, 5 and 6);
- the lack of vehicles for deliveries and logistics; and the lack of devices for monitoring and evaluation (Respondent 2).

#### (b) High operational costs and a lack of financial resources and support

Looking specifically at financial resources, most respondents confirmed that high operational costs and a lack of financial resources and financial support are challenges for UA development in SA. Firstly, Respondents 1 and 4 linked financial challenges to the high cost of land in urban areas. Secondly, speaking about commercial urban farms, Respondents 4 and 5 commented that the capital required for hi-tech systems and technical upgrades to meaningfully increase productive output are currently prohibitive. Thirdly, Respondents 2 and 6 suggested that the

financial challenges at community level are compounded by the long lead time before produce can be harvested and the low economic returns seen with community gardening.

Finally, Respondents 1 and 6 felt that financial challenges (particularly at lower levels of UA) are made worse by a false perception about the standard input requirements which are often costly (i.e. hi-tech commercial systems) and have associated externalities (i.e. fertilisers). In support of this finding, Respondent 6 shared a frustration, stating *“that’s [fertilisers] what the Department of Agriculture gives them, and the municipality gives them. We’ve had big arguments because they hand them out as prizes, you know, you enter a garden competition and the prizes are usually fertilizers and poisons”*.

Similarly, Respondent 1 mentioned that while low-cost alternatives are available, high costs appear to be fuelled by (a) *“input companies that promote conventional agriculture”*; (b) a lack of knowledge about agro-ecological practices; and (c) negative attitudes towards circular systems such as recycling food waste for use as compost. To reduce the costs associated with expensive inputs and resources, Respondents 1 and 6 promoted regenerative agricultural practices. Respondent 1 linked resource considerations to production decisions by saying *“so the other thing that has to be foreground, is design. You have to design the farm, using your permaculture design, circular system design, those things are important, and that changes the way we think about financial resources. If you don’t have that then your financial resources is something that you would have to apply for from the government, bank or NGO and hope for the best, whereas if you have a circular system, your financial resources start, it emerges from a circular cash flow system and then it’s your own money that you use, and the whole capital interaction changes”*.

(c) [A lack of knowledge, the loss of knowledge and absence of skills to scale up](#)

A lack of knowledge was confirmed as a major challenge for UA by all the respondents. More specifically, Respondent 6 confirmed that knowledge as a resource is regularly lost as people move onto other jobs and Respondent 2 spoke about the struggle of advancing farmers from *Survival* and *Subsistence* levels of UA to *Livelihood* and *Commercial* levels due to a lack of skill and education.

### 2.1.2 FINDINGS ON THE ORGANISATIONAL CHALLENGES

Regarding the proposed organisational challenges, all were confirmed by the respondents as relevant for the SA context (Table 6).

#### (a) Challenges of being in an urban environment

The findings confirmed that being in an urban geographic location has implications on production decisions such as the choice of growing methods, systems used and the need for security. More specifically, Respondent 6 highlighted the challenge of interacting with urban natural capital due to the possibility of soil and water being contaminated by other urban activities and urban dwellers while Respondent 5 suggested using rooftop gardening to avoid theft and vandalism.

Respondent 1 confirmed that uncertainties and informal land agreements make it difficult to plan or scale up, saying, *“they [farmers] don’t farm deeply [intensely] because they don’t know if they will keep the land”*. Similarly, Respondent 2 commented *“and even when someone gets a small patch, there’s always the issue of how do you get more land and scale-up”*. As an additional consideration which relates to land agreements, Respondent 5 raised traditional land ownership as an important consideration for UA development in SA, particularly in more peri-urban areas.

#### (b) Aligning strategic objectives

Regarding conflicting and ill-defined strategic objectives, there was confirmation from Respondents 3 and 5 that this is a challenging aspect for UAs in the planning and development phases for both commercial and non-commercial entities. Respondent 3 mentioned her involvement with a UA development venture which was derailed due to conflicting ideas and objectives between development agencies, saying *“it more or less fell apart after one meeting, because there were so many different kinds of agendas and so many different understandings about what the endpoint was, and who should be included and who shouldn’t. And you know, all those things got very complicated because there were so many different types of agricultural venture trying to be present”*. Referring to ill-defined objectives at an enterprise level, Respondent 5 said, *“I think we have too many farming enterprises that are conceptualized because they support, but have never challenged, whether what is required is another farm, or if it’s a different part of the value chain which is required to address the market gap”*.

Furthermore, the findings suggest that operational and production decisions need to be aligned with the strategic objectives of the UA, with Respondent 5 stating: *“So, if I can use a plant site to produce a product that would give me R8 or R9 per plant site a month, I can’t then afford to produce spinach, which would give me R2 per plant site each month because I would be sub-economic in my operation and yet, if I’m producing basil, it has much lower nutritional value for the community around the farm. And hence why we end up in a space like you say, where the support [from selling produce via vegetable box schemes] is more economic than it is direct into the food system”*.

### 2.1.3 FINDINGS ON THE LOCAL COMMUNITY CHALLENGES

Of the proposed local community challenges, all were confirmed as relevant for the SA context (Table 6).

#### (a) Urban stakeholders and social capital

While the interaction with urban stakeholders (e.g. sociocultural norms and perceptions of UA) was cited as a challenge by Respondents 1, 3 and 4, Respondent 2 disagreed, as his experience with marketing community gardens had shown social capital to be a major driver for urban consumers. Respondent 1 commented that society tends to see agriculture in urban spaces as “*primitive*” and went on to argue that this perception is perpetuated by town planning which “*systematically neglects the development of space in cities for food production*”.

Additionally, there was evidence in the data to suggest that currently there are five types of UA occurring across SA, namely backyard gardening, school gardening, community gardening with a market function, community gardening without a market function and commercial UAs. There was evidence to suggest that some community projects are NGO or government-initiated (Respondents 2 and 3) while others are driven by self-mobilising communities banding together to start something from the ground up (Respondent 6). Respondent 2 and 6 highlighted the demographics of urban farmers in the community setting, citing that they are mostly women who are generally not seeking large economic returns but were “*really just doing it for pocket change*” (Respondent 2) or the associated health benefits (Respondent 6). Respondent 2 went on to say that the low economic returns from community gardening were a barrier to bringing in the youth. Also talking about barriers to bringing in the youth, Respondent 3 spoke about the negative perceptions towards gardening, stating “*in one of the schools, the only interactions the pupils had with the garden was that if pupils were misbehaving, they were sent to go and garden, so immediately there are these negative connotations. So, I think there's this general perception amongst the youth, that this was something for older people. And it wasn't seen as particularly dynamic*”.

Respondent 3 did, however, go on to comment that profit-seeking UAs were attracting younger participants, saying “*the only ones that have managed to get younger people in are the ones that are financially viable. So there's a profit-making element to that*”. This was confirmed by Respondent 5, who stated that commercial UAs in Gauteng were drawing younger participants as it is seen as an opportunity for start-up businesses and employment by entrepreneurs, in a sector which is currently relatively unsaturated.

#### (b) Conflicts

In confirmation of internal conflicts such as inhouse fighting amongst members, Respondents 3 and 4 highlighted the challenge of differing ideologies, agendas, socio-cultural patterns and intergenerational perceptions. Additionally, Respondents 2, 5 and 6 confirmed external conflicts such as theft and vandalism as major challenges for UA. Respondent 5 added that due to a smaller footprint, UAs have “*less tolerances for loss of production*” when compared to larger agricultural ventures who can perhaps tolerate some degree of theft. There were no comments made by the respondents regarding the proposed criticism of UA about the treatment of animals and waste.

#### (c) Market challenges and the influence of existing food systems

While market challenges were confirmed by Respondents 1, 2, 4 and 5 for commercial UAs, Respondents 3 and 6 commented that market challenges are not as disabling at the level of community gardening. This is because the primary focus in community UAs is not on growing large quantities of produce for the market, the strategic focus is rather about improving personal or family nutrition by growing healthy produce (Respondent 6). Respondent 2 linked market challenges to logistic and transport challenges faced by small-scale farmers to reach markets. While most of the respondents stated that organic produce could fetch a higher price, Respondent 2 acknowledged the additional challenges that urban growers for niche and organic markets often face regarding the consistency of produce and increased competition from large-scale growers in smaller consumer pools.

Similarly, Respondents 1, 4 and 5 confirmed that market challenges are interlaced with the challenges of the current and existing food systems. Respondent 1 said “*We need to change the whole marketing idea of something for the rich, until we change that and say, listen, focus on the guy next door*”, UA is likely to fail. Similarly, Respondent 5 said, “*I think there’s too much centralisation. You know, if you look at the large retailers, we’ve done some work with the likes of Food Lovers, etc. because they still have centralized distribution centres, who are still responsible for distributing produce pretty much throughout the country, based out of Gauteng, you’re not getting the benefit of the potential of urban agriculture in various areas, supporting specifically those areas*”. Respondents 1 and 4 agreed that the lack of decentralisation within the current food system was a challenge for UA and small farmer development in SA.

#### 2.1.4 FINDINGS ON THE GOVERNANCE CHALLENGES

Of the two governance challenges proposed in the framework, both were confirmed as relevant for the SA context (Table 6).

##### (a) A lack of supportive policies and fragmented implementation

The findings reveal that Respondents 1, 3, 5 and 6 agree that municipal policies and zoning regulations don't easily facilitate UA development in SA. More specifically, the findings show that an enabling policy environment would not only decrease barriers to UA development but could even stimulate it, with Respondent 5 saying *"But the challenge is that local authorities haven't yet figured out how to develop appropriate policies and incentives to incentivize property owners to support more urban agriculture on their properties"*.

The findings confirmed that fragmented and conflicting implementation due to differing agendas and mandates are hampering UA development in SA. Respondent 1 shared a frustration about the lack of adequate policy by saying that UA *"is deliberately left to be outside the margins"*. Furthermore, Respondent 1 spoke about the *"confusion"* within the state as to how to develop UA. Similarly, Respondent 3 confirmed that often local, provisional and national agricultural strategies are in conflict with each other, and commented *"the way it's always been framed, is that the food issue is a productive issue that sits in the rural, which means that there's no obvious home for UA within municipal government. And then at provincial level, it [implementation] tends to be through the Department of Agriculture who don't really know how to engage very well within an urban context"*.

Respondent 3 further underlined that *"The argument is that anything to do with food is not a municipal competence, and so they can say, well, it's not our mandate, which means they don't want to do anything, or, it's an unfunded mandate, so we have no fiscal mechanism to really do anything...so what you'll see is that a number of municipalities will have some kind of urban agriculture programming, but, that will sit in different departments and have a different focus in different cities, partly because there is no clear mandate. And so, people are doing what they can, where they can and figuring out, finding a champion who will drive a process, but there's not really an obvious home for UA and there's not an obvious kind of funding mechanism, so it's all kind of pro bono"*.

Similarly, Respondent 5 referred to *"a lack of clarity around the policy regime for agriculture in an urban context"* and stated *"They [municipalities] are very ambiguous about agricultural policy especially as you move into zones and areas that they had not seen agriculture being a*

*consideration before*". The respondent additionally mentioned *"I don't think our policymakers had envisaged the application of some of the agricultural technology in spaces like Joburg CBD, and, so you ask the city: so what do we need to apply for to operate a rooftop farm? And it is very unclear what and how it's governed"*.

#### 2.1.5 ADDITIONAL CHALLENGES

While most challenges identified in the literature review and presented in the conceptual framework were confirmed by the participants, there was evidence in the data to suggest that additional challenges are at play in SA. This next section aims to explore comments made by respondents which identify additional challenges not already discussed in the above sections.

While there was confirmation that ineffective government policy development and UA implementation were indeed challenges to UA development, an overdependency on the state or implementation groups (e.g. NGOs) was cited as an additional challenge. Respondents 1, 3 and 4 argued that implementation models which created dependencies via a top-down approach were not sustainable due to ineffective stakeholder engagement (Respondent 3 and 4) and disregard for community or entrepreneur autonomy (Respondent 1).

Statements from Respondents 1 and 3 revealed that currently, UA does not provide adequate food security to local communities despite the perception that it does. More specifically, Respondent 1 stated that *"we need one hectare out of every four hectares to be open gardens, only then will a local food system work"*. Respondent 5 agreed that the misconception around UA providing food security was misleading, saying *"so, I think the problem is that we tend to see urban agriculture as an almost, a socio-economic development project, which is to contribute to the entire economy and we don't see urban agriculture as we would see any other commercial agricultural project. It is like any other commercial agricultural project, it has an entrepreneur, it has to yield the highest economic value for the produce being produced and the benefit of that will sort of dissipate through into the community in which the agricultural production takes place. You know, we try and link urban agriculture to food security and food resilience and I think, that is an unfair tag that we add to it because, at the moment, all of those projects feed into the normal food value chain or agricultural value chain and in some cases, they do create innovative shoots, like the fruit and veg boxes where they distribute into high-income communities, but it's almost seen as if 'Oh, we missed an opportunity to support food security in this low-income community, because all the produce is leaving to go somewhere else', **but** these projects cannot be about*



*food security for those communities, because there's an economic return that is required for those projects to be sustainable”.*

#### 2.1.6 DISCUSSION ON THE CHALLENGES TO UA DEVELOPMENT IN SA

The research findings confirm that most of the identified global challenges are relevant for the SA context and thus will be important considerations for the development of UA locally. Most notably, the findings call into question the current government implementation models, which are primarily focussed on UA as a food security strategy with little or no regard for the greater Triple Bottom Line benefits or participant autonomy, due to a top-down implementation method. This has major implications for agencies focused on developing UA through this channel (i.e. the SA government, according to Haysom and Battersby (2016)). The findings which suggest that currently, UA is not a significant contributor to food security are in line with arguments which suggest UA is not a one-size-fits-all solution for food insecurity (White and Hamm, 2014; Haysom and Battersby, 2016) and supports literature which indicates UA can only be as effective in providing food to urban residents as the food system it feeds into (White and Hamm, 2014; Game and Primus, 2015). This has major relevance for UA development in SA as it exposes the shortcomings of current approaches to UA. Alternative approaches to implementation are discussed in Section 2.2.4 on UA enablers, while the next few sections below aim to unpack other relevant findings.

The findings reveal that the availability of resources such as land, water, financial resources and knowledge are central to UA development in SA. This is in line with Prove et al. (2018), who suggest that UA development is influenced by the availability of resources. The findings also link the availability of resources to production decisions, by suggesting that access to vehicles, fencing, water, waste for compost etc. play an integral role in shaping the operating model of the organisation by influencing the *Key Activities* undertaken. This is consistent with the BMC (Osterwalder and Pigneur, 2010) and the Food System Wheel (shown below in Figure 6) described by the FAO (2018), which demonstrates the interdependency between production systems and access to natural resources, inputs, knowledge and finances.



Figure 6: The Food System Wheel (Source: FAO, 2018, p.3)

Considering that resources such as knowledge, skills and land ownership challenges were identified as limiting factors in the scaling up and long-term sustainability of UAIs, this reliance on resources will affect the organisational trajectory. This is also consistent with Prove et al. (2018) who identified land-lease and timescale uncertainties as limiting factors for long term planning. Referring specifically to strategic management literature (Louw and Venter, 2019) in the context of these resource challenges, the findings suggest that an “inside-out” approach (Louw and Venter, 2019, p.140) to business modelling would be better suited for UAIs in SA because the *Key Activities* (i.e. the operating model) depend on the availability of resources. An inside-out approach draws on Resource-Based Theory, which was first described by Barney (1991) and Grant (1991) who suggest that internal resources of the organisation such as knowledge, skills, competencies and capabilities are major drivers of success.

The findings further link production and operating decisions to the strategic objectives of the UAI, by suggesting that crop selection based on nutritional and/or economic returns is an important strategic consideration. Prove et al. (2018) suggest that strategic objectives are tied in with the intended impact on the surrounding community. In light of these findings, this has important management implications as it emphasises the need for UA developers to deeply understand how communities stand to benefit through different mechanisms and what this means for operational decisions. Put more simply; the findings suggest that the intended benefit to communities (the

strategic intention of the organisation) will determine which activities are undertaken, as discussed above, are likely to be limited by the availability of resources. This shows that these three elements (strategic considerations, resource considerations and operational considerations) cannot be considered in silos as they are interdependent.

While Game and Primus (2015) and the Food System Wheel (FAO, 2018, Figure 6) propose that competition for labour is a key consideration, the findings from this research study do not support this notion for SA, where the current unemployment rate is approximately 30% (Stats SA, 2020). Furthermore, the findings reveal that currently, UA is typically an unsaturated space, providing economic opportunities for young and innovative entrepreneurs interested in commercialising UA. This implies that growth and development in the UA space could create meaningful employment in SA and would occur in a *blue ocean* environment, as described by Kim and Mauborgne (2008). A *blue ocean* strategy is a management framework for organisations to create new market space, free from competitors (Alam and Islam, 2017) which would tie in to the notion that UA does not compete with rural agriculture but is rather a complementary strategy to strengthen the national food system (Mougeot, 2000).

With unemployment as a driver of UA, UA at *Survival* and *Subsistence* levels are likely to be under-resourced – which may affect their ability to be sustainable or resilient to disturbances. This has implications for UA development agencies, investors and donors as it suggests more support will be needed at these lower levels in terms of accessing resources, building capacity and developing knowledge, which is consistent with Small's (2007) findings. Considering that rural agriculture in SA makes use of extension officers to act as a link between farmers and research by disseminating information and propagating knowledge, the above argument suggests that there is scope for similar roles in UA, holding further promise for job creation in *blue ocean* environments.

The findings suggest that a lack of clarity and understanding within the state as to how agriculture fits into the urban context, is currently hampering UA development. This implies that UA capacity development is also required within state institutions. Furthermore, the findings reveal problems within state departments to effectively implement UA, due to conflicting strategies and agendas between the different spheres of government. This is further compounded by a tendency to implement UA via a top-down approach – which ignores autonomy of the stakeholders involved and can create unsustainable dependencies. The link between these findings indicates that authority bodies and development agencies need to consider where their support will be most beneficial. Furthermore, it suggests that the long-term sustainability of initiatives will be improved

if urban farmers and other stakeholders are included in the decision-making process. This is in line with Kanosvamhira (2018), who argues that such inclusion would develop a sense of ownership for the farmers – which is critical to long term success.

Kanosvamhira (2018) also advocates for improved synergies between key supporting organisations for the full gains of UA to be realised, particularly between government and non-government actors. This was also commented on by some of the respondents in this research study, who advocated for collaborations between government, the private sector and universities to optimise the development of UA in SA. In this context of co-production, Haysom, Olsson, Dymitrow, Opiyo, Taylor Buck, Oloko, Spring, Fermskog, Ingelhart, Kotze and Agong (2019) describe the Self-organising Action for Food Equity (SAFE) project which seeks to leverage knowledge and expertise from different sectors to facilitate the development of city-region food strategies in the UK. Haysom et al. (2019) explain that the SAFE project was established due to a lack of coordination between different state departments and a reduction in local government funding to roll out food-related strategies. This resulted in the local government repositioning themselves as “enablers” of coordinated action between business and civil society to work towards food system change” (Haysom et al., 2019, p.5). In the SA context, because of the notion that *“anything to do with food is not a municipal competence”* (Respondent 3), such a strategy presents an opportunity for the development of UA whereby local municipalities play a facilitatory role in implementing rather than a primary role.

The findings confirm that commercial or semi-commercial UAIs face similar market challenges as small-scale farmers in SA who tend to operate outside of formal markets. These challenges include a lack of production knowledge and planning and management knowledge to operate at commercial levels, as well as logistical challenges due to a lack of vehicles – again raising the importance of resource considerations and confirming market related challenges first identified by Khapayi and Celliers (2016). Other respondents linked market challenges to negative socio-cultural perceptions which don’t fully support or enable agriculture in the urban setting. This is consistent with the Food System Wheel (FAO, 2018), which links socio-cultural norms and the behaviour of diverse actors to the food system’s ability to provide food security. In this context, there then comes about an impetus to re-arrange social perceptions related to sustainable food systems and sustainable agriculture in both government and community settings. Opportunities to foster behavioural change will be discussed in the section covering UA enablers.

The findings related to market access challenges also align with the global literature that proposes that not all UAIs aim to generate profits (e.g. Saldivar-tanaka and Krasny, 2004; Poulsen et al.

2014), which has implications for the development of the UAI's *Value Proposition* and overall modelling of the organisation. This has relevance for those involved in developing and supporting these initiatives (i.e. NGOs and business incubators). Furthermore, the findings reveal that different models of UA tend to (a) draw different participants (as labour or volunteers) and (b) carve different customer segments. This is in line with Prove et al. (2018), who suggest that the modus operandi of the UAI will depend on who is involved. Therefore, **who** will be involved is an important factor for UA development agencies to consider because, in the context of management literature and the BMC (Osterwalder and Pigneur, 2010), human and intellectual capital are *Key Resources* which expand competitive advantage for the commercial organisation (Barney, 1991).

Finally, the findings suggest that an over-centralisation of the food system is a barrier to both urban and small farmer development in SA. This is in line with the global narrative and sustainability literature which emphasise how broader systemic challenges within our food systems (such as inequality) hamper progress towards food security and the related SDGs (e.g. Agarwal, 2018). Looking specifically at the role of UA in providing food to urban residents, the findings align with Game and Primus (2015), who argue that the ability of UA to provide food in light of food security challenges, is tied to the efficacy of the overall food system. In the context of SA, the findings align with the food system challenges reported by the *Southern Africa Food Lab*, which highlights that power is concentrated in the hands of a few large retailers (Southern Africa Food Lab, as cited in Von Bormann, 2019). To support this, Respondent 5 spoke about the central distribution centres of large retailers which see produce being transported from the farmer to the distribution centre and then across the country rather than feeding into local food procurement systems. Food distribution has been criticised for its contribution to climate change, due to greenhouse gas emissions (Wakeland, Cholette and Venkat, 2012) and the impact on the water-energy-food nexus (Al Quran, Hayajneh and El Shaer, 2019). It can therefore be argued that this current model of food distribution hinders progress towards a low-carbon economy and negates one of the principal benefits of UA, which is to reduce food miles by feeding into local food systems.

## 2.2 ENABLERS OF UA DEVELOPMENT FINDINGS AND DISCUSSION

As possible responses to the above challenges, current and potential opportunities which could enable UA were identified and put to the respondents in the conceptual framework. The following sections will present the findings in relation to the possible enablers for UA development in SA and discuss the implications thereafter in Section 2.2.4.

### 2.2.1 FINDINGS ON THE ORGANISATIONAL ENABLERS

All the organisational elements which were identified and suggested as possible enablers were confirmed as relevant for the SA context by the respondents (shown in Table 7).

#### (a) Using the BMC

Respondents 1 and 5 commented positively on the Business Modelling Canvas to help define the strategic focus and objectives of the UAI or venture. Respondent 1 referred to it as a “*most excellent tool*” but commented that guidance on how to interpret and use it effectively is necessary. Respondent 5 said it was a useful tool to help UA participants “*conceptualize an agriculture enterprise and then confirm if they really should be in primary production, or, then, most probably better placed somewhere else in the value chain*”.

#### (b) Building multiple models

In terms of structuring the UAI, Respondents 1 and 2 confirmed that building multiple models to increase the diversity of services offered and participation in the food value chain can result in competitive advantage. Respondent 1 referred to integrated and circular business models as “*holons*” and made an example of how an urban farmer can generate multiple sales to the same consumer group through different mechanisms such as selling fresh produce, seedlings and cooked food. Similarly, Respondent 2 commented on the advantage of incorporating agro-processing or agro-processing partners into the operating model of a UAI to increase the number and diversity of markets they can supply.

#### (c) Organisational flexibility and influential stakeholders

While the advantage of having organisational flexibility was confirmed by Respondents 1 and 5, Respondents 1, 3 and 6 further confirmed the need to involve champions and influential stakeholders at both community and government level to drive UA development. Furthermore, Respondent 2 suggested that it is helpful to involve “*people who think outside the box*” and are “*good at the kind of cross-cultural relationships*”. This statement and similar statements from Respondents 1, 5 and 6 confirmed that involving change agents, social networkers, creative problem solvers and entrepreneurial-type thinking was helpful for UAIs. For example, at a community level, Respondent 6 referred to a likeable character, Eve Stoffels who became known as “*Tannie Cool*”, “*because she'd made it cool to be a gardener*”.

#### (d) A repository of information

Respondents 2, 3 and 4 agreed that a repository of information may better inform future developments. To collect relevant information, Respondent 2's suggestion was for the city to

conduct a census of the current UA status quo, stating “*that kind of data is so important to then say, Okay, well then, if that’s the food situation now, what is the situation we want for the future of the city?*”, whereas Respondents 3 and 4 felt data for such a body of knowledge could come from monitoring, evaluating and recording lessons learnt. While Respondent 2 agreed that monitoring was important, he cited that a lack of monitoring devices (such as computers) was a challenge at community level UA. Respondent 6 suggested monitoring and evaluation be carried out by the community involved, using “*Participatory Rural Appraisal*”.

## 2.2.2 FINDINGS ON SUPPORTIVE PARTNERSHIPS AND POLICY OPPORTUNITIES

All the various partnerships and policies suggested in the framework were confirmed as possible enablers for the SA context (Table 7).

### (a) Financial mechanisms, knowledge building and education

Considering the high operational costs, Respondent 4 advocated for better financial support to be given to UAs. Furthermore, he suggested a community-based partnership approach to financing UAs whereby a “*community education hub*” would serve as a financial shareholder and business incubator for UA entrepreneurs. Respondent 1 also raised a financial mechanism to promote UA development via the introduction of innovative tax regulations (for consumers) to stimulate the buying of produce from small-scale urban farmers. Respondent 1 also advocated for regenerative and circular systems to be considered as a means of reducing financial costs.

Regarding the development of local knowledge as a resource, Respondent 1 suggested that farmers self-organise to build their own knowledge. The respondent confirmed that WhatsApp messenger was helping to facilitate this and creating collaborations between small-scale farmers in Gauteng. While Respondent 2 also felt strongly about the benefits of building knowledge, he advocated for farmers to seek institutional education, stating “*what I’ve seen is the farmers who are just outside Cape Town, like Malmesbury, Durbanville, who went to agri- school and got an NQF [National Qualification Framework] in agriculture, or aquaponics, or whatever it is, they’re the ones ....I see these people succeed*”. Respondent 2 agreed that smartphone technology and WhatsApp messenger were enabling UA development due to increased connectivity and dissemination of information. Looking forward, he said a “*Kickstarter*” for UA would be the development of agricultural and/or production apps which would upskill farmers in terms of production knowledge and help them to scale their operations.

#### (b) Technical support and partnerships

Respondents 2, 4 and 5 confirmed that technical support and partnerships to increase skills and build capacity would enable UA. Respondent 5 said *“I really think there needs to be a lot more collaboration with entities like ARC [Agricultural Research Council] to a certain extent, but CSIR [Council for Scientific and Industrial Research] you know the tech development innovation hub or TIA [Technology Innovation Agency]. I think for urban farming to be relevant; the tech development has to accelerate significantly. So, the partnerships in understanding where the tech is and the potential development glide path that needs to be followed is so important. And that can only come through the partnering of, you know, a UJ [University of Johannesburg] or a TIA or an innovation hub such as CSIR with urban agriculture projects”*. Similarly, Respondent 4 suggested that university research and development labs could play a role in progressing the UA tech agenda.

#### (c) Collaborations

Respondents 1 and 5 confirmed the proposition which sought to create collaborations between farmers and owners of land and buildings to further UA development. Respondent 1 recounted: *“I know there's one lady, she's retired, every two weeks, she just clears a piece of land four meters by four meters and grows spinach and every two weeks she harvests R400. That gives her R800 a month on top of her social grant. It's not a lot of work and it works for her. She gets it (the land) from the school so there's no cost there on renting”*. Not only did Respondent 5 see the benefit of such collaborations for the farmer, he proposed that agreements between rooftop farmers and building owners would benefit the building owner via increased income due to a larger lettable area. As another enabling collaboration, Respondent 2 described his experience of partnering with an organisation who focus on food distribution and suggested UAs who were constrained by a lack of vehicles for deliveries, approach potential partners through a Corporate Social Responsibility (CSR) channel, which he identified as a win-win for both organisations.

#### (d) Business Incubators

Concerning the role of business incubators as an enabling partnership, Respondent 2 confirmed their usefulness in UA development by stating: *“they teach the basic finance, basic business marketing and then they do mentorships. There are multiple levels, so if you graduate from level one to level two, you get weekly mentorship on how to improve your business and the people in that group are doing so well. It's such a fantastic programme”*.



#### (e) Supportive government policies and land use schemes

There was a high level of agreement between the respondents regarding supportive government policies and land use schemes as UA enablers. To overcome current challenges around land uncertainties, Respondents 1 and 6 cited the need for town planners to identify and rezone land in urban spaces to provide long term and secure access to land for urban farming. Furthermore, they argued that food production should be incorporated into urban development strategies. Respondent 6 advocated for municipal support of UA through the provision of land, water and security fencing. He likened this approach to UA development to the allotment type gardens in England and the Schrebergartens in Germany.

#### (f) Multi-stakeholder partnerships

All the respondents confirmed that a multi-stakeholder approach between public institutions, private entities and civic groups was central to UA development. Regarding public-private partnerships, Respondent 6 spoke about the potential double-sided benefit (for farmers and local municipalities) of UA to manage urban wastes via algal ponding systems which extract nutrients from organic waste, which is then processed and used as compost on the farm. In addition, Respondent 5 spoke about the opportunity for ground-based agricultural activities (in the urban setting) and rooftop gardens to provide natural sinks for rainwater runoff via natural drainage systems, presenting a more sustainable solution to managing storm water runoff in urban spaces. The respondent advocated for local government to recognise these types of benefits associated with UA and work on developing appropriate incentives to action such systems.

Respondent 2 advocated strongly for partnerships with the state and/or local government bodies to avoid land-use conflicts which lead to urban farmers being “*kicked off*” the land. He also viewed this multi-stakeholder approach as a possible mechanism to change the city’s food landscape and encourage UA development. Likewise, Respondent 3 recognised the need to work with state departments to restructure city food systems; however, her experiences showed that such partnerships need to establish effective communication strategies early in the project.

Respondent 6 felt strongly about leveraging UA development through its health benefits and advocated for partnerships with “*schools, clinics, welfare, planned parenthood, planners, industries (conservancies)*” to drive UA development. More specifically, Respondent 6 suggested the WESSA (Wildlife and Environment Society of South Africa) *Eco-schools* programme as a helpful resource for implementing and developing school food garden initiatives. Similarly, Respondent 4 referred to programmes such as *Farmer Kidz* and *Garden of Life* to stimulate UA development at community level. The respondent also spoke about the recent launch of the

*Agricultural Development Agency* in SA as a possible partnership to accelerate agricultural reform and small farmer development.

Furthermore, Respondent 4 encouraged multi-stakeholder engagement with the community where the planned or proposed UA development is likely to occur. He spoke about creating a platform where urban participants could voice their requests and “*feel heard*” which would create a sense of shared value between the various stakeholders of the planned UAI. Respondent 1 also commented about using a multi-stakeholder approach to leverage UA development and highlighted its potential to reorganise social contracts, influence perceptions of food production, democratize the food system and reconstruct cultural patterns associated with growing and purchasing food. The respondent mentioned these concepts as potential drivers for UA development and the circular economy under the umbrella of “social innovation”.

#### (g) Market access partners and intermediaries

Respondents 2, 5 and 6 commented positively on the inclusion of market access partners and intermediaries for UAIs. Respondent 6 spoke about the role of state entities in creating market access channels by stating “*the George municipality took this on board, we had a fantastic woman there who was a kind of economic development person, and she made the community centres available once a month for the women to sell their veggies and we had a lot of success around this period*”. On the other hand, however, Respondent 3 raised a critique about the intermediary model and said “*we’ve seen the Abalimi, Harvest of Hope and now the Umthumzi box scheme, which is essentially buying produce from farmers in low-income areas and selling them into elite markets. And there’s this question about whether that is actually an appropriate and ethical model ... I think there is this notion that it’s kind of a re-representation, that people are growing food in the community and none of the benefit is coming back directly in terms of food security, to the community. And there were cases in the past, I haven’t heard it for a while, where basically people were trying to maximize what they could sell, and therefore compromising their own nutrition security by not holding any back for themselves*”.

#### 2.2.3 ADDITIONAL ENABLERS

As with the UA challenges, most of the identified global enablers were confirmed as relevant for the SA context. There were, however, additional enablers which the respondents identified as possible mechanisms to drive UA development in SA. This next section will briefly explore those additional enablers which have not already been discussed in previous sections.

As additional enablers, sentiments shared by Respondents 1, 2 and 6 advocated for increased visibility of UAs as this would help “*give credence*” to UA (Respondent 6) and “*normalise*” the perception of seeing food growing in city spaces (Respondent 1). Respondent 6 encouraged the media to play a bigger role in increasing awareness about UA and its associated health benefits, while Respondent 2 commented that increased visibility could provide a business learning opportunity for new or novice farmers.

#### 2.2.4 DISCUSSION ON THE ENABLERS OF UA DEVELOPMENT IN SA

These research findings confirm that many of the identified global enablers are relevant for the SA context and would be appropriate to consider in the conceptual framework for developing UA in SA. According to Ferrari, Cavaliere, De Marchi and Banterle (2019), governments can use command-and-control instruments, economic instruments (e.g. incentives, taxes and subsidies), and information and education tools to manage sustainability challenges. Using these instruments as the point of departure for the following discussion on the current and potential UA enablers, the sections which follow aim to unpack and discuss the findings in relation to some of these instruments along with organisational and management instruments, to add to the logic of implementation and the final revision of the framework for SA.

Economic incentives in the form of tax subsidies for consumers and owners of buildings with rooftop space to rent were suggested by two of the respondents, which is consistent with Richards and Taylor (2012) who argue such instruments would stimulate UA development. To help future or novice organisations design more resilient UAs, the findings suggest that a repository of information of lessons learnt for UA would be helpful. Such an information repository was also identified as an opportunity to grow UA in Toronto by the TFPC (2012). A secondary aim of the Toronto repository was to link landowners, urban farmers and development agencies. Richards and Taylor (2012) made a similar suggestion for SA, whereby a land inventory could be used to link landowners and farmers. To identify suitable land for agriculture in urban spaces which could feed into such a land inventory, Weerakoon (2014) suggest the use of Geographic Information System (GIS) mapping to determine the suitability of land for specific uses. Such an approach may reduce cross-contamination of water and soil from other urban activities which was shown to be a challenge (refer to Section 2.1.2).

While the above tools present opportunities for UA development, they would require coordination across all levels of government to effectively implement; however, this was identified as a significant challenge due to conflicting ideas, agendas and interests (refer to Section 2.1.4). To

align differences between government institutions, levels and departments and to ensure that UA receives adequate support within the policy environment, Richards and Taylor (2012) recommended the creation of an 'institutional home' for UA in SA within local government. Eight years after their publication, this has not yet happened as indicated by Respondent 3 saying "*there's no obvious home for UA within municipal [local] government*". The findings also suggest that increasing the visibility of UA would (a) provide a learning opportunity for other initiatives, (b) give credence to UA, and (c) normalize social perceptions of growing food in the city, providing solutions to some of the challenges already discussed. All the above, have major significance for UA development as they call for government to recognise and institutionalise UA development and to develop appropriate policies and instruments.

Regarding enabling partnerships for UA development, the findings suggest that a triple helix approach between universities, private and public institutions to tech development will provide UA with critical leverage. To re-visit the findings, Respondent 5 made it clear that due to the smaller footprint of UA plant sites, there was scope for tech development to increase production and lessen the impact of crop failure or loss. These findings have relevance for tech development agencies operating in the agri-sector in SA, as UA development may provide additional market opportunities. The findings also suggest new areas of research for universities as well as software and/or app developers as there appears to be scope for knowledge development to help farmers upskill.

In terms of organisational instruments which could assist in developing more sustainable UAs, the findings confirm that the BMC (Osterwalder and Pigneur, 2010) is a useful tool to fully conceptualise the venture before any money is spent and potentially lost. Furthermore, the findings are consistent with Van Tuijl et al. (2018) who suggest that designing multiple complementary models which integrate activities along the food value chain, can provide opportunities for competitive advantage.

While the findings confirmed that high costs are currently prohibitive for UA development, the findings also suggest financial costs and ecological externalities can be reduced with regenerative and circular systems which recycle wastes for compost and harvest rainwater or storm water. This bears similarity to Game and Primus (2015) who argue that the efficiency of UA will depend on the productive use of under-utilised resources, horticulture techniques and low input processing. However, while such findings point to a low-cost opportunity for UA development, the findings also highlight that there exists a lack of understanding about agricultural externalities, regenerative systems and how UA can improve urban environmental management (refer to

findings in Sections 2.1.1 and 2.2.2 above). This absence of knowledge and awareness suggests that there are large-scale systemic barriers to transitioning food production towards the circular economy. However, as Nogueira, Ashton, Teixeira, Lyon and Pereira (2020) suggest, it also creates an opportunity for UA to play a role in this transition by creating awareness about sustainability and sustainable resource flows. This ties into the concept of using UA as a complementary strategy for enhanced environmental management (RUAF, 2020) and education (Van Tuijl et al., 2018), which is discussed hereafter.

The rest of this section aims to explore alternative implementation strategies to leverage UA development in SA which is relevant, due to Haysom and Battersby's (2016) argument that the government entry point for UA development in SA has always been focused on providing food security. The following sections will unpack three different paradigms for UA implementation and will discuss them as potential platforms to drive development.

Aligned to the findings, the first paradigm focuses on leveraging UA via schools and education, using it as a tool to raise environmental awareness and foster sustainable agriculture. Specific references have been made to established programmes and methodologies (e.g. *WESSA's Eco-schools* programme, *Farmer Kidz* and *Garden of Life*) to help drive UA development using an eco-education approach. The *Farmer Kidz* programme aims to teach children about sustainable food production, caring for natural resources, entrepreneurial skills, environmental stewardship and teamwork (Farmer Kidz, 2020). While the *Farmer Kidz* programme has been developed by the Institute for Rural and Community Development, there is no obvious reason it cannot work in an urban setting too. *Garden of Life* is an agricultural technique focused on maximising production in small spaces (Loving Thy Neighbour, 2020) which has relevance for UA considering urban spatial limitations. The *WESSA Eco-schools* programme also aims to foster environmental stewardship using education and looks to stimulate an awareness towards sustainable development and the role food production has to play in our communities (WESSA, 2020). Such initiatives hold promise for using UA as a development approach to create awareness about sustainable food production and are in line with international literature proposing that children immersed in nature tend to develop a deeper connection to the environment and are therefore more likely to conserve it (Soga et al., 2016).

The second paradigm evident in the findings is to leverage UA development based on its associated health benefits. The physical and mental health benefits derived from UA have been well documented (e.g. Soga et al., 2017) which suggests that this implementation model holds value and would be appropriate and relevant for health institutions such as community health

clinics, planned parenting centres, conservancies and welfare institutions to consider. In the context of developing the UA framework for SA, this means that having a strategic focus on health will influence what produce is grown and the *Key Activities* undertaken, as discussed in Section 2.1.6.

The third UA paradigm identified by the findings, links to a less tangible approach to UA development and links the ability of UA to act as a mechanism for social innovation. Social innovation has been described as “activities and services that are motivated by the goal of meeting a social need” (Mulgan, 2006, p.146). Social innovation as a UA model has been advocated for in Europe by the Metropolitan Agriculture for Developing an innovative and sustainable and Responsible Economy (MADRE) who describes it as a response to pressing social issues, resulting in positive outcomes for society, improved human well-being and an enhanced capacity of individuals to act (MADRE, 2018). The findings of this research suggest that by approaching UA as a social innovation strategy, collective solutions to wicked problems may be stimulated. Wicked problems are those that are often hard to solve due to their complex and evolving nature, and it is for this reason that they pose crucial challenges for policy-makers (Head and Alford, 2013). An example of a wicked problem is how to increase food production in line with sustainable development targets.

It is with this perspective that the remainder of Chapter 4 discusses the implications of these findings for the revision of the conceptual framework for the development of UA in SA.

### 3. USING THE FINDINGS TO REVISE AND IMPROVE THE CONCEPTUAL FRAMEWORK

The third research objective was to *revise the conceptual framework considering the assessment by UA experts*. As such, this section will discuss the revisions of the framework before presenting the final conceptual framework in Section 3.3.

#### 3.1 Feedback on Version 1

The first version of the conceptual framework outlined seven steps to developing a UAI (Table 4). The findings from the preliminary interviews suggested that this structure was not appropriate as it was not applicable to all types of UA and therefore, could not be used by many UA developers or support agencies. More specifically, Respondent 3 said “*I think this then is speaking to a particular type of urban agricultural venture*” and suggested the framework presented as a “*tick box exercise*”. Similarly, Respondent 1 warned that the first version of the framework had the tendency to endorse a top-down approach to implementation with little regard for entrepreneur

autonomy and suggested the framework rather be designed as a platform of ideas where the user can choose what is relevant to their context, calling for a more “*plural context*” for the user.

### 3.2 Feedback on Version 2

Considering the findings presented above, a second version of the conceptual framework was developed (shown in Figure 7 below, with the regular sized version appearing in Appendix F).



## An implementation framework for the development of Urban Agriculture

A consolidation of the major considerations of Urban Agriculture for those designing, implementing & overseeing urban farming in SA cities.

### What is Urban Agriculture?

Urban Agriculture (UA) is "an industry located within (intraurban) or on the fringe (periurban) of a town, a city or a metropolis, which grows or raises, processes and distributes a diversity of food and non-food products" (Mougeot, 1999)

Non food products relate to the Triple Bottom Line benefits of UA to:

- promote social inclusion
- enhance urban environmental management
- productively reuse urban wastes
- contribute to local economic development
- build food systems resilience
- enhance urban food security
- reduce urban poverty



(RUAFA, 2020)

Rather than competing with rural or industrial agriculture, UA is seen to complement it, resulting in a stronger national food system (Mougeot, 1999)

### Types & approaches to developing Urban Agriculture\*

- Community UA: focused on improving food security, resilience & community cohesion
- Commercial urban farms and Agro-parks: generates income & provides employment
- Agro-tourism: combines agriculture with tourism activities
- Eco-education: provides workshops & training
- Farm to fork: linked to amenities (schools, hospitals, restaurants, vegetable box schemes etc.)
- Green infrastructure, architecture & gentrification
- Zero acreage farming (rooftop gardening / indoor farming)
- Circular systems (waste to energy concepts)
- Precision farming

When applied efficiently, UA can increase the access, availability and distribution of food to urban citizens (Games and Primus, 2015)



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## RESOURCES



Inputs: land, water, infrastructure (old or new buildings), electricity (load shedding), storage facilities, labour.

Financial: operational costs, start-up investment, finance partners and institutions.

Knowledge: agricultural, production, farm management, technical, food processing, logistics, planning, marketing, business knowledge, government development frameworks and regulations, local government UA authority.

Consider: the use of local knowledge vs expert science and the typical flow of people through UA initiatives as they find new jobs and other opportunities.

## ORGANISATIONAL DESIGN & CHARACTERISTICS

City centre or peri urban, inside or outside, commercial vs. non-commercial entity, single use or multi use facility, Food production = primary or secondary focus

Growing methods and systems, the different approaches and types of UA\*

Helpful business characteristics: clearly stated objectives, multiple and complementary business models, flexibility, evaluation

Helpful personal characteristics: problem solvers, flexibility, social networkers, change agents, entrepreneurs

Use the Business Modelling Canvas to think about the entity's value proposition, customer relationships and segments, distribution channels, revenue streams, cost structure, key partnerships, key activities and key resources



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## LOCAL CONTEXT

Multiple stakeholders, community, socio-cultural norms, perceptions, local government, local land use schemes and zoning policies, local food systems (markets and resilience), internal conflicts and in house fighting, external conflicts (treatment of wastes and animals), security (theft and vandalism)

## URBAN POLICIES & GOVERNANCE FRAMEWORKS

NDP , IDP , SPLUMA , SDF, Land Use Schemes, municipal bylaws, zoning regulations, land use policies, local UA authority, development planning frameworks.

## PARTNERSHIPS

Technical partners, training and skills development, business incubators, CSR partners, financial partners and institutions, government partnerships, co-production platforms, land owner collaborations.

Consider: formality of partnerships, influential champions and multi stakeholder engagement

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Figure 7: Version 2 of the conceptual framework



The second version (Figure 7) aimed to be more accessible to different users and more inclusive of the different types of UA. Additional content considerations which were not particularly novel (e.g. “*CSR partners*” as suggested by Respondent 2) were included in the second version of the framework, whereas more novel concepts such as “*social innovation*” (Respondent 1) were not included right away but were rather explored in more detail, in a follow-up interview. Findings related to the second version of the framework revealed that while Respondents 1, 4 and 5 could engage with it relatively easily, Respondent 6 found it confusing. Respondent 1 commented on the section which lists numerous national and local policies linked to UA development and cautioned that these may overwhelm users and suggested that not all were necessary to list. Finally, Respondent 1 said “*I think you've got everything that needs to be included. It's there. But I think, it's just the means that you get there, your reader has to be jolted into thinking about the means, and the means also determine the outcomes*”.

### 3.3 Version 3 of the conceptual framework for UA development in SA

Considering the assessment of the second version of the conceptual framework and the additional challenges and opportunities identified by the respondents (discussed in section 2.1 and 2.2 above), the conceptual framework was revised a second time. The third and final version is presented in Figure 8 below (with the regular sized version appearing in Appendix G).

## A conceptual management framework for the development of Urban Agriculture

This guide is a consolidation of the major considerations involved with starting an Urban Agriculture initiative. It is intended to provide guidance to those involved with implementing, managing or supporting urban farming initiatives in SA cities and to create a common language around Urban Agriculture.

### What is Urban Agriculture?

Urban Agriculture (UA) is "an industry located within (intraurban) or on the fringe (periurban) of a town, a city or a metropolis, which grows or raises, processes and distributes a diversity of food and non-food products"<sup>1</sup>

Non-food products relate to the social, environmental and economic possibilities that UA brings. These include opportunities for education and learning; research and development; income from food services, leisure and tourism; social cohesion, healthcare and urban greening<sup>10</sup>

UA can be used as a complementary strategy to:

- promote social inclusion
- enhance urban environmental management
- productively reuse urban wastes
- contribute to local economic development
- build food systems resilience
- enhance urban food security
- reduce urban poverty<sup>11</sup>

Rather than competing with rural or industrial agriculture, UA is seen to complement it, resulting in a stronger national food system<sup>12</sup>

"When applied efficiently, UA can increase the access, availability and distribution of food" to urban citizens<sup>13</sup>

UA is practised by a variety of people in a variety of places and takes many different forms<sup>14</sup>. In SA, UA is mostly practised for food production<sup>15</sup> at four levels: *Survival, Subsistence, Livelihood and Commercial levels*<sup>16</sup>

UA initiatives are generally focused on achieving different outcomes and therefore they often follow different models. Common urban farming models and concepts are listed below<sup>17</sup> - these are often used independently or in combination:

- Community or citizen-led UA usually focuses on growing nutritious food for personal consumption or to sell locally. In SA, this is done at both a household level and on larger scales (i.e. community gardens). In the UK, these types of gardens are called Allotment gardens and in Germany, they are known as Schrebergarten.
- Commercial urban farms can provide employment opportunities and generate income.
- Agrotourism combines tourist activities with farming operations as an additional revenue stream.
- Eco or agro-education farms serve as training facilities.
- Farm-to-forek urban farms can be linked to amenities close by such as schools, hospitals and restaurants to decrease the transportation of food.
- Rooftop gardens or green rooves can help buildings reduce their heating and cooling costs or they can be used to grow food in built-up areas or rented out for events.

Due to the smaller size of urban farms compared to traditional agriculture, UA tends to use innovative technologies to allow cultivation to happen on smaller plots of land or in small spaces<sup>18</sup>. Such systems include hydroponics, aquaponics and aquaculture; indoor or vertical farming, underground or tunnel farming and circular systems that reuse waste for energy or compost.

The process of setting up a UA initiative involves thinking about 5 main elements: the *Availability of Resources*; *Strategic Considerations*; *Operational Considerations*; *Partnerships and Policies, Laws and Regulations*.

The inner orange ring shows the 3 internal elements which together make up the primary building blocks of a UA initiative.

The outer grey ring shows the 2 external elements which may help or hinder the project or business.

It is worth thinking through all of the elements for both commercial and non-commercial entities because those working in the UA sector in SA have identified them all as either a challenge or an opportunity for UA initiatives.

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## A conceptual management framework for the development of Urban Agriculture

The following sections aim to provide UA roleplayers with an opportunity to think through the 5 main elements to setting up a UA initiative in SA.

It is important to note that there are interdependencies between the elements - particularly between the 3 internal factors.

### RESOURCE CONSIDERATIONS

Think about the following resources and consider which you have access to because this may influence how the initiative operates and the impact it has on the people involved, the surrounding community and the environment.

**Inputs and Infrastructure:** consider access, supply, cost, necessity and security thereof

- seeds, seedlings, compost, water tanks and pumps, monitoring devices, a toilet on-site, electricity supply, growing systems, machinery, land, water, buildings (build new or retrofit existing spaces), storage facilities, vehicles and security fencing

**Financial capital:** consider the interplay between cost structure and revenue streams

- consider how start-up and operational costs can be minimised by using regenerative or circular systems which recycle water and use waste for energy, compost or as a growing medium
- if starting a commercial entity, consider what the market demand is like and how you will reach those markets
- if the aim is to provide food locally, think about the existing food systems and how the initiative might feed into or conflict with these

**Intellectual capital and knowledge:**

- there are many types of knowledge needed for UA, namely: agricultural knowledge, production know-how, farm management skills, technical and food processing knowledge, logistics and planning skills, marketing, business management practices and an ability to interpret government laws and regulations
- at the lower levels of UA (i.e. *Survival, Subsistence and Livelihood levels*), people don't tend to stay in small-scale agriculture for a long time, so knowledge is often lost. This has been identified as one of the barriers which limit the scaling up of initiatives so it is important to think about how to retain, manage, convert and store knowledge.
- think about strategies to increase and disseminate knowledge with training and development and consider which institutions or partners can help with this (i.e. business incubators, tech development agencies etc.)

**Who is involved:** depending on the focus of the initiative, different groups of people and stakeholders may want to be involved

- younger participants tend to be more interested in financially viable projects while older participants might be more interested in the social or nutritional benefits of urban farming/gardening
- consider how participants will interact with each other as in-house fighting has been identified as a major pitfall
- consider how the local community perceives UA and the influence of this on your marketing strategy and revenue streams
- it has been suggested that involving community champions, change agents and government drivers helps to sustain UA initiatives

### STRATEGIC AND ORGANISATIONAL CONSIDERATIONS

It is important to be clear on the intended impact of the UA initiative as this will influence decisions about production, operations and the types of resources needed.

To help think through the strategic and organisational elements, consider using the Business Modelling Canvas to fully conceptualise what it is the initiative intends to do. This canvas acts as a management tool to help organisations identify how they create, capture and deliver value using nine building blocks<sup>19</sup>

- The strategic focus or the *Value Proposition* of UA initiatives will differ according to the problem they aim to address - e.g. some initiatives aim to generate profits through multiple revenue streams, some focus on providing participants with nutritious food and others aim to decrease food miles.
- When developing the *Value Proposition*, it is important to consider if the initiative will operate commercially and if producing food is the *primary* or *secondary* focus of the entity because this will drive numerous elements of the Business Modelling Canvas - such as the *Key Activities* of the organisation, the *Customer Segments*, the *Revenue Streams*, the *Cost Structure* and the *Customer Channels*.
- Initiatives where the focus on food is secondary, may use the UA site as a multi-purpose facility and rather promote other activities such as tourism, education, therapy gardening or social cooking classes as a means of delivering value and meeting their strategic focus.

There are lots of uncertainties within UA, so it is recommended to involve people who can think outside the box, who can network socially and cross-culturally, and who are good at problem-solving. Flexibility within the organisation is also a helpful characteristic due to the uncertainties. Monitoring and evaluation of the project are critical for the improvement of future initiatives.

**Challenges that need to be considered:**

- Uncertain timeframes and informal land agreements affect the scale of operations.
- Risks associated with being in an urban space: contamination of water and soil systems; conflicts with other urban activities and residents; theft and vandalism and negative perceptions towards agriculture in urban spaces
- Local authority bodies and regulations may prohibit certain activities from happening in urban spaces - limiting operations
- Technology to increase productive output in a small space is currently limited and can be expensive.

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## OPERATIONAL CONSIDERATIONS

With a clear idea of the availability of resources and the intended outcomes of the initiative, you can consider how these link with operational and production decisions

Operational considerations that are important to consider when planning or designing the initiative are:

- climate, location (city centre or periurban), stakeholder involvement, land use laws and zoning requirements

For initiatives where the focus is primarily on food, consider:

- the availability of technology and space to scale production meaningfully and achieve economies of scale
- crop selection for **food nutrition or economic return** (i.e. organic herbs may fetch a higher price but have less nutritional value)
- there is often a long lead time before the first crop can be harvested - generally weeks or months depending on the crop
- the different skills and resources required for the various agricultural systems
- externalities associated with producing food - impacts on water, energy and existing infrastructure as well as social and economic impacts on surrounding communities (both positive and negative)

For profit-seeking initiatives, consider:

- how recycling resources may decrease costs (i.e. leaner cost structures) and can be kinder to the environment
- marketing considerations: demand (includes looking at the socio-economic status and socio-cultural perceptions of the market); access and distribution; existing food systems (local or formal markets); customer segments and interaction with customers (being in urban areas allows for more interaction with and transparency of the food supply chains); competitors and competition for resources
- the diversity of the services offered, multiple revenue streams and the knowledge needed for these activities

The 3 internal elements should rather be considered alongside one another and not in silos as they are interdependent. They will also be influenced by the 2 external elements which are unpacked below.

### PARTNERSHIP OPPORTUNITIES

Partnerships can provide an opportunity to leverage the mutual benefits of UA between organisations and provides an opportunity to capitalise on knowledge and expertise across different sectors

Consider if any of the following partnerships may help your initiative:

- land collaborations (with schools or hospitals) or with building owners (e.g. rooftop farms)
- partnering to increase the diversity of services offered or provide solutions to mutual problems (e.g. reusing urban wastes may help initiatives save on costs and provide municipalities with an opportunity to deal with organic waste)
- utilising established programmes such as WESSA's *eco-schools programme*, *FarmerKiz* and the *Garden of Life* method
- working with education institutes and training partners (e.g. business incubators or universities)
- financial partners
- public-private partnerships
- technical partners to help increase production, output and efficiency
- research and development labs, community hubs, innovation labs and public service labs

Some of the challenges associated with partnerships are: Differing agendas, ideas and perceptions. Informal partnerships can give you flexibility but they can also cause uncertainties that limit the ability to scale operations up (e.g. informal land tenure agreements).

### POLICIES, LAWS AND REGULATIONS

In SA, UA is overseen by both provincial and local municipalities which means local bylaws and zoning regulations apply. These are specific to towns and cities and will need to be understood before you start anything as they might restrict certain activities or developments.

There is no clear mandate for UA at local municipal level and it is not overseen by the same municipal office in each of the provinces so it can be difficult to know where to get help. Start by looking at municipal land-use schemes, bylaws and zoning regulations for the area concerned and work with local government to avoid land-use conflicts.

This framework was developed by identifying the current challenges and opportunities facing UA in SA to better understand the management implications for those involved with designing, developing and supporting UA initiatives. It is intended to provide various roleplayers with an opportunity to think through various considerations and serve as a first step to creating an Action Plan for UA development in SA cities.

**REFERENCES:**

- Ch, J. (2014) Urban agriculture makes 'thin' cities more livable. *United Earth Solutions Network*. Available at: <http://www.earthnetwork.net/news/urban-agriculture-makes-thin-cities-more-livable/>
- Chen, J. and He, S. (2015) 2014 South African Agriculture. *United States University of New York College of Energy and Environmental Science*. Available at: [http://www.uscnia.edu/150105-0208\\_2015\\_South\\_African\\_Agriculture](http://www.uscnia.edu/150105-0208_2015_South_African_Agriculture)
- Waters, E. and Roberts, J. (2016) Why urban agriculture isn't a panacea for Africa's food crisis. *United The Conversation*. Available at: <http://theconversation.com/why-urban-agriculture-is-not-a-panacea-for-africa-food-crisis-71982>
- Maguire, J. A. (2008) Urban Agriculture: Evidence, Potential, Problems and Policy. *United States International Development Research Centre*. Available at: [http://www.usaid.gov/our\\_work/global\\_democracy\\_and\\_human\\_rights/docs/1833402411736.pdf](http://www.usaid.gov/our_work/global_democracy_and_human_rights/docs/1833402411736.pdf)
- Greenway, A. and Poppe, V. (2012) *Business Model Generation: A Handbook for visionaries, game changers, and challengers*. New Jersey: John Wiley & Sons, Inc.
- Philly, C. (2014) *Urban Agriculture: A Handbook for visionaries, game changers, and challengers*. New Jersey: John Wiley & Sons, Inc.
- Research Centre for Urban Agriculture and Food Security (2015) *Urban Agriculture and City Region Food Systems*, vol. 1 and 2. United States Urban Agriculture and Food Systems. Available at: <http://www.urbanagricultureandcityregionfoodsystems.org/>
- Smith, C. (2017) *The urban agriculture movement: growing food near the city*. New York: Routledge.
- Stratton, A. (2015) *Business Model Canvas: Business Models & Value Propositions*. United Kingdom: Available at: <http://www.strategyfirst.co.uk/>
- Van der Grinten, E. and Van der Grinten, L. (2015) *Opportunities and Challenges of Urban Agriculture for Sustainable City Development*. *European Journal Research and Policy*, 03(2), pp. 1-21.

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Figure 8: Final version of the conceptual framework for UA development in SA

The final framework draws together all the research findings based on the literature reviewed and the data collected from UA experts. The framework identifies five key elements which need to be considered at the outset of a UAI. Three of these elements are considered *internal considerations* as they are seen to be the building blocks of the UAI and refer to the *Availability of Resources*, *Operating Considerations* and *Strategic and Organisational Considerations*. *Partnerships* and *Policies, Laws and Regulations* are considered *external considerations* as they are not within the control of the UAI but may help or hinder development.

#### 4. RECOMMENDATIONS FOR UA DEVELOPMENT AND MANAGEMENT IN SA

As per the final research objective, the study aimed to make *recommendations based on the revised framework which are intended to provide guidance to city planning offices and private organisations involved with the design, implementation and management of UA in SA*. As the bulk of the recommendations are contained within the final version of the framework, this section briefly outlines the overarching recommendations for UA planning and development in SA.

Based on the research findings and the literature discussed in Chapter 4, it is recommended that those involved with UA development consider the following points:

- investigate the possible use of economic incentives to leverage UA (i.e. taxes, subsidies for land and building owners who rent to urban farmers) as suggested by Richards and Taylor (2012);
- prioritise UA in local government and provide an institutional home for it (Richards and Taylor, 2012), to align policy development, coordination efforts and agendas, all of which have been identified as obstacles to UA development in SA (Kanosvamhira, 2018);
- clarify or adapt existing mandates within local government to better support and facilitate UA interventions by incorporating UA planning into town planning, development strategies or food system change as described by Haysom and Battersby (2016) and Haysom et al. (2019);
- move away from top-down implementation strategies to more multi-stakeholder engagements to increase farmer (or community) buy-in and project ownership as suggested by Kanosvamhira (2018);
- UA cannot be relied on as the sole solution for food security challenges, echoing previous research which argues that primarily, challenges within the food system need to be addressed to alleviate food insecurity (e.g. Haysom and Battersby (2016));

- following on from the above, it is important that municipalities understand the mechanisms through which UA contributes to cities and considers UAs role within local food procurement systems (Martin and Wagner, 2018);
- a repository of information and land inventory may be useful tools to link urban farmers to land and relevant information, both of which have been advocated for in SA (Richards and Taylor, 2012) and Canada (TFPC, 2012);
- monitoring and evaluation are important processes to record lessons learnt and track organisational targets and progress (Haysom and Battersby, 2016);
- UAIs can be built using principles of the circular economy to help manage urban wastes and move food production towards a low-carbon economy (Ferreira et al., 2018);
- increased visibility of UA will help to normalise perceptions of agriculture occurring within the city and mainstream it as suggested by previous research (Martin and Wagner, 2018);
- Geographic Information System (GIS) mapping is a potential strategy to help identify suitable land for UA (Weerakoon, 2014); and
- due to knowledge being a critical resource for UA, it is recommended capacity be developed within the sector to increase awareness and disseminate UA-related knowledge.

Based on the conceptual framework developed in this research study, it is recommended that entrepreneurs or those involved with UA development at an organisational level:

- align the UAI operating model with the strategic goals and availability of resources;
- use the BMC to fully conceptualise the idea in terms of the *Key Activities, Key Resources, Revenue Streams, Key Partnerships, Cost Structure, Customer Channels, Customer Relationships, Customer Segments* and the *Value Proposition* of the initiative;
- investigate possible partnerships which may help the organisation (i.e. health institutions, schools, restaurants, intermediaries etc.); and
- investigate policies, local by-laws and regulations which may help or hinder the organisation as these are specific to the area, city or town within which the organisation operates.

## CHAPTER 5: CONCLUSION

This chapter briefly discusses the limitations of the study and recommendations for further research, before concluding with a high-level summary of the main research findings and concluding remarks.

### 1. LIMITATIONS OF THE STUDY AND RECOMMENDATIONS FOR FURTHER RESEARCH

Owing to the novelty of the research which looked at UA through a management lens, there was limited research looking specifically at UA development in this context. As UA is not mainstream in SA yet, there were also limitations concerning projects to reflect on and experts to include in the study.

With regard to further research, Lohrberg et al. (2015) discuss five business models for UA in Europe (*diversification, differentiation, low cost, experience and the commons*), however, due to the limited scope of this research study, these could not be explored in any detail for the SA context. It is therefore recommended that further research be conducted on the various business models of UA in SA and how these could feed into UA development. Additionally, due to the diversity of UAIs occurring in SA, it is recommended that further research on the challenges and opportunities for UA development be conducted on each variation of UAI, to gain a deeper understanding of limitations and opportunities when it comes to implementation and development. Finally, it is also recommended that more research is done on the tech development front to ensure UA development makes use of innovative strategies to align the social, economic and environmental outcomes of sustainable agriculture in the urban context without added to existing infrastructure challenges.

### 2. SUMMARY OF THE MAIN FINDINGS AND ALIGNMENT WITH THE RESEARCH OBJECTIVES

The objectives of the research study were to identify and explore the opportunities and challenges of developing UA in SA and to develop a conceptual framework with recommendations for city planning offices and private organisations to consider in their approach to UA development and management. The first two objectives were met using a literature review, interviews and questionnaires which gathered insights from UA experts. The final two objectives were met through the revision of the conceptual framework and the recommendations made in reference to it.

To highlight the main results of the research study, the findings show that UA implementation and development involve diverse and complex elements which influence one another, and a diverse

set of actors and participants. The findings reveal that at policy-level, UA development is not currently supported by an enabling policy environment in SA. This is further compounded by a lack of understanding as to how agriculture fits into urban spaces. At a nation-wide level, the findings reveal that a myopic focus on UA development as a food security strategy has resulted in an under-realisation of many of the associated benefits of UA: particularly the social, health and green benefits of local food production and urban green spaces, and an under-realisation of the economic and employment opportunities associated with developing UA as a commercial industry. At an organisational level, the research study shows that there is an interdependence between the *Availability of Resources, Strategic and Organisational Considerations* and *Operating Considerations* within the UAI. UAIs and those involved with UA development in SA will need to carefully consider these internal elements when developing their modus operandi. *Partnerships* and *Policies, Laws and Regulations* can be considered external considerations which may help or hinder UA development and will need to be fully investigated at the outset of the development and planning process.

### 3. CONCLUSION

In conclusion, this research study reveals that UA development in SA holds many social, environmental and economic benefits and could be developed as a complementary strategy to rural agriculture to provide jobs, improve urban environmental management and provide a sustainable solution to increased urbanisation, population growth and food demands.

## LIST OF REFERENCES

- Agarwal, B., 2018. Gender equality, food security and the sustainable development goals. *Current Opinion in Environmental Sustainability*, 34, pp.26–32.
- Alaimo, K., Packnett, E., Miles, R.A. and Kruger, D.J., 2008. Fruit and vegetable intake among urban community gardeners. *Journal of Nutrition Education and Behavior*, 40(2), pp.94–101.
- Alam, S. and Islam, M., 2017. Impact of Blue Ocean Strategy on Organizational Performance: A literature review toward implementation logic. *Journal of Business and Management*, 19(1), pp.1–19.
- Alexandratos, N. and Bruinsma, J., 2012. *World agriculture towards 2030/2050: the 2012 revision*. Available at: <<https://ageconsearch.umn.edu/record/288998>> [Accessed 3 Feb. 2020].
- Al Quran, S., Hayajneh, A. and El Shaer, H., 2019. *Nexus comprehensive methodological framework: the MENA Region Initiative as a model of Nexus Approach and Renewable Energy Technologies*. [online] Amman, Jordan: IUCN ROWA. Available at: <[https://www.iucn.org/sites/dev/files/content/documents/water\\_publication\\_2019\\_1.pdf](https://www.iucn.org/sites/dev/files/content/documents/water_publication_2019_1.pdf)> [Accessed 23 Sep. 2020].
- Andersson, E., Barthel, S., Borgström, S., Colding, J., Elmqvist, T., Folke, C. and Gren, Å., 2014. Reconnecting Cities to the Biosphere: Stewardship of Green Infrastructure and Urban Ecosystem Services. *Ambio*, 43(4), pp.445–453.
- Asomani-Boateng, R., 2007. Closing the loop: Community-Based Organic Solid Waste Recycling, Urban Gardening, and Land Use Planning in Ghana, West Africa. *Journal of Planning Education and Research*, 27(2), pp.132–145.
- Bai, X., Surveyer, A., Elmqvist, T., Gatzweiler, F.W., Güneralp, B., Parnell, S., Prieur-Richard, A.-H., Shrivastava, P., Siri, J.G., Stafford-Smith, M., Toussaint, J.-P. and Webb, R., 2016. Defining and advancing a systems approach for sustainable cities. *Current Opinion in Environmental Sustainability*, 23, pp.69–78.
- Barney, J., 1991. Firm Resources and Sustained Competitive Advantage: *Journal of Management*, 17(1), pp.99–120.
- Battersby, J., 2013. Hungry Cities: A Critical Review of Urban Food Security Research in Sub-Saharan African Cities. *Geography Compass*, 7(7), pp.452–463.
- Boyatzis, R., 1998. *Transforming Qualitative Information: Thematic Analysis and code development*. Thousand Oaks: SAGE Publications.
- Brouwers, B., 2019. *Top 10 Emerging Technologies (5): Smarter Fertilizers and Precision Farming*. [online] World Economic Forum. Available at: <<https://innvtn.org/top-10-emerging-technologies-5-smarter-fertilizers-and-precision-farming/>> [Accessed 9 Sep. 2020].
- Cai, J., 2014. *Urban agriculture makes China's cities more liveable*. [online] Earth Journalism Network. Available at: <<https://earthjournalism.net/stories/urban-agriculture-makes-chinas-cities-more-liveable>> [Accessed 11 Feb. 2020].

Campbell, A., 2013. Participatory technology design for urban agriculture in South Africa. *Urban Agriculture: A Growing Field Of Research*, 8120, p.8.

Chandran, R., 2020. *Urban farming is flourishing during the coronavirus lockdowns*. [online] World Economic Forum. Available at: <<https://www.weforum.org/agenda/2020/04/grow-your-own-urban-farming-flourishes-in-coronavirus-lockdowns/>> [Accessed 4 May 2020].

Chirume, J., 2018. R1,5 million project ends in shambles in Motherwell. *Elitsha*. [online] Available at: <<http://wwmp.org.za/elitsha/2018/02/02/r15-million-project-ends-in-shambles-in-motherwell/>> [Accessed 23 Jan. 2020].

Clark, A.M., 1998. The qualitative-quantitative debate: moving from positivism and confrontation to post-positivism and reconciliation. *Journal of Advanced Nursing*, 27(6), pp.1242–1249.

Cohen, D. and Crabtree, B., 2008. *Qualitative Research Guidelines Project | Semi-structured Interviews*. [online] Robert Wood Johnson Foundation. Available at: <<http://www.qualres.org/HomeSemi-3629.html>> [Accessed 10 Sep. 2020].

Coryn, C.L.S., Noakes, L.A., Westine, C.D. and Schröter, D.C., 2010. A Systematic Review of Theory-Driven Evaluation Practice From 1990 to 2009. *American Journal of Evaluation*, 32(2), pp.199–226.

Crawford, M., 2019. *Solving World Hunger with 3D-Printed Food*. [online] American Society of Mechanical Engineers. Available at: <<https://www.asme.org/topics-resources/content/solving-world-hunger-3dprinted-food>> [Accessed 5 May 2020].

Crush, J. and Frayne, B., 2010. *The invisible crisis: urban food security in Southern Africa*. Cape Town: African Food Security Urban Network.

Daly, H.E., 2006. Sustainable development—definitions, principles, policies. In *The future of sustainability* (pp. 39-53). Springer, Dordrecht.

Dean, S., 2018. Eastern Cape urban agri projects to be rejuvenated. *Farmer's Weekly*. [online] 21 Mar. Available at: <<https://www.farmersweekly.co.za/agri-news/south-africa/eastern-cape-urban-agri-projects-rejuvenated/>> [Accessed 23 Jan. 2020].

Denzin, N., 2009. *The Research Act*. [online] New York: Routledge. Available at: <<https://0-www.taylorfrancis.com/wam.seals.ac.za/books/9781315134543>> [Accessed 11 Feb. 2020].

Dimitri, C., Oberholtzer, L. and Pressman, A., 2015. The promises of farming in the city: Introduction to the urban agriculture themed issue. *Renewable Agriculture and Food Systems*, 30(1), pp.1–2.

Donaldson, S.I., 2007. *Program theory-driven evaluation science: Strategies and applications*. Routledge.

Donaldson, S.I. and Gooler, L.E., 2003. Theory-driven evaluation in action: lessons from a \$20 million statewide Work and Health Initiative. *Evaluation and Program Planning*, 26(4), pp.355–366.

Du Plessis, C., 2008. Understanding cities as social-ecological systems. In: *Understanding Cities as Social-ecological Systems*. [online] World Sustainable Building Conference.



- Melbourne, Australia. Available at:  
<<https://researchspace.csir.co.za/dspace/handle/10204/3306>> [Accessed 10 Sep. 2020].
- Dubbeling, M., 2014. Urban agriculture as a climate change and disaster risk reduction strategy. *Urban Agriculture Magazine*, 27, pp.3–7.
- Eigenbrod, C. and Gruda, N., 2015. Urban vegetable for food security in cities. A review. *Agronomy for Sustainable Development*, 35(2), pp.483–498.
- Eldridge, H.M., 2020. *Building Resilience into our Food Systems*. [online] Resilience. Available at: <<https://www.resilience.org/stories/2020-04-09/building-resilience-into-our-food-systems/>> [Accessed 18 May 2020].
- Eliades, A., 2016. *The Problem with Urban Agriculture? A Fact Based Rebuttal to a Landscape Architecture's Misconceptions*. [online] The Permaculture Research Institute. Available at: <<https://www.permaculturenews.org/2016/11/17/problem-urban-agriculture-fact-based-rebuttal-landscape-architectures-misconceptions/>> [Accessed 1 Apr. 2020].
- Elkington, J., 2013. Enter the Triple Bottom Line. In: *The triple bottom line*. Routledge. pp.23–38.
- Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K. and Kyngäs, H., 2014. Qualitative Content Analysis: A Focus on Trustworthiness. *SAGE Open*, 4(1), p.215824401452263.
- Ericksen, P.J., 2007. Conceptualizing food systems for global environmental change research. *Global Environmental Change*, 18(1), pp.234–245.
- Ericksen, P.J., Ingram, J.S. and Liverman, D.M., 2009. Food security and global environmental change: emerging challenges. *Environmental Science & Policy*, 12(4), pp.373–377.
- Farmer Kidz, 2020. *About Farmer Kidz*. [online] Available at: <[https://www.farmerkidz.co.za/home.php?vURL=mod\\_defaults/content.php&intCID=2053&linkID=286](https://www.farmerkidz.co.za/home.php?vURL=mod_defaults/content.php&intCID=2053&linkID=286)> [Accessed 28 Sep. 2020].
- Ferrari, L., Cavaliere, A., De Marchi, E. and Banterle, A., 2019. Can nudging improve the environmental impact of food supply chain? A systematic review. *Trends in Food Science & Technology*, 91, pp.184–192.
- Ferreira, A.J.D., Guilherme, R.I.M.M., Ferreira, C.S.S. and Oliveira, M. de F.M.L. de, 2018. Urban agriculture, a tool towards more resilient urban communities? *Current Opinion in Environmental Science & Health*, 5, pp.93–97.
- Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C.S. and Walker, B., 2002. Resilience and sustainable development: building adaptive capacity in a world of transformations. *Ambio*, 31(5), pp.437–440.
- Food and Agricultural Organization, 1996. Rome Declaration on World Food Security. In: *Rome Declaration on World Food Security*. [online] World Food Summit. Rome. Available at: <<http://www.fao.org/3/w3613e/w3613e00.htm>> [Accessed 23 Jan. 2020].
- Food and Agriculture Organization, 2018. *Sustainable Food Systems – Concept and Framework*. [online] Food and Agriculture Organization of the United Nations. Available at:

<<http://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1160811/>> [Accessed 5 May 2020].

Gahukar, R.T., 2011. Entomophagy and human food security. *International Journal of Tropical Insect Science*, 31(3), pp.129–144.

Gallopín, G.C., 2006. Linkages between vulnerability, resilience, and adaptive capacity. *Global Environmental Change*, 16(3), pp.293–303.

Game, I. and Primus, R., 2015. *GSDR 2015 Brief Urban Agriculture*. [online] State University of New York College of Forestry and Environmental Science. Available at: <[https://www.academia.edu/17507897/GSDR\\_2015\\_Brief\\_Urban\\_Agriculture](https://www.academia.edu/17507897/GSDR_2015_Brief_Urban_Agriculture)> [Accessed 7 May 2020].

Goodman, L.A., 1961. Snowball Sampling. *The Annals of Mathematical Statistics*, 32(1), pp.148–170.

Grant, R., 1991. The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation. *California Management Review*, 33(3), pp.114–135.

Grewal, S.S. and Grewal, P.S., 2012. Can cities become self-reliant in food? *Cities*, 29(1), pp.1–11.

Guba, E.G. and Lincoln, Y.S., 1994. Competing paradigms in qualitative research. *Handbook of Qualitative Research*, 2(163–194), pp.105–117.

Haysom, G. and Battersby, J., 2016. *Why urban agriculture isn't a panacea for Africa's food crisis*. [online] The Conversation. Available at: <<http://theconversation.com/why-urban-agriculture-isnt-a-panacea-for-africas-food-crisis-57680>> [Accessed 26 Sep. 2020].

Haysom, G., Olsson, E.G.A., Dymitrow, M., Opiyo, P., Taylor Buck, N., Oloko, M., Spring, C., Fermskog, K., Ingelhag, K., Kotze, S. and Agong, S.G., 2019. Food Systems Sustainability: An Examination of Different Viewpoints on Food System Change. *Sustainability*, 11(12), p.3337.

Head, B.W. and Alford, J., 2013. Wicked Problems: Implications for Public Policy and Management. *Administration & Society*. [online] Available at: <<https://0-journals.sagepub.com/wam.seals.ac.za/doi/full/10.1177/0095399713481601>> [Accessed 28 Sep. 2020].

Heim, S., Stang, J. and Ireland, M., 2009. A Garden Pilot Project Enhances Fruit and Vegetable Consumption among Children. *Journal of the American Dietetic Association*, 109(7), pp.1220–1226.

Hlady-Rispa, M. and Jouison-Laffitte, E., 2014. Qualitative Research Methods and Epistemological Frameworks: A Review of Publication Trends in Entrepreneurship. *Journal of Small Business Management*, 52(4), pp.594–614.

Holden, E. and Linnerud, K., 2007. The sustainable development area: satisfying basic needs and safeguarding ecological sustainability. *Sustainable Development*, 15(3), pp.174–187.

Holling, C.S., 1973. Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics*, 4(1), pp.1–23.

Jones, A., Pimbert, M. and Jiggins, J., 2010. *Virtuous Circles: Values, Systems and Sustainability*. [online] London: International Institute for Environment and Development (IIED). Available at: <<https://pubs.iied.org/G03177/>> [Accessed 10 Sep. 2020].

Jörissen, J., Meyer, R., Preifer, C. and Bräutigam, K., 2014. Future Food Systems: Challenges and Perspectives, Introduction to the Thematic Focus. *Technikfolgenabschätzung – Theorie und Praxis*, 23(3), pp.4–11.

Kanosvamhira, T.P., 2018. The organisation of urban agriculture in Cape Town, South Africa: A social capital perspective. *Development Southern Africa*. [online] Available at: <<https://www.tandfonline.com/doi/abs/10.1080/0376835X.2018.1456910>> [Accessed 5 May 2020].

Khapayi, M. and Celliers, P.R., 2016. Factors limiting and preventing emerging farmers to progress to commercial agricultural farming in the King William's town area of the Eastern Cape Province, South Africa. *South African Journal of Agricultural Extension*, 44(1), pp.25–41.

Kim, W. and Mauborgne, R., 2008. Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant. *Long Range Planning*, 41(2), pp.226–228.

Koont, S., 2008. A Cuban Success Story: Urban Agriculture. *Review of Radical Political Economics*, 40(3), pp.285–291.

Labuschagne, P. and Zulch, B., 2016. Green Rooftop Systems: A South African Perspective. *Energy Procedia*, 96, pp.710–716.

Lang, T. and Barling, D., 2012. Food security and food sustainability: reformulating the debate. *The Geographical Journal*, 178(4), pp.313–326.

Lawson, L., 2016. Agriculture: Sowing the city. *Nature*, 540, pp.522–524.

Laycock, K., 2018. The Community Resilience Reader: Essential Resources for an Era of Upheaval. *Journal of Urban Technology*, 25(2), pp.165–168.

Leitgeb, F., Schneider, S. and Vogl, C.R., 2016. Increasing food sovereignty with urban agriculture in Cuba. *Agriculture and Human Values*, 33(2), pp.415–426.

Levin, S., Barrett, S., Aniyar, S., Baumol, W., Bliss, C., Bolin, B., Dasgupta, P., Ehrlich, P., Folke, C., Gren, I., Holling, C.S., Jansson, A., Jansson, B., Maler, K., Martin, D., Perrings, C. and Sheshinski, E., 1998. Resilience in natural and socioeconomic systems. *Environment and Development Economics*, 3(2), pp.222–235.

Lipinski, B., Hanson, C., Lomax, J., Kitinoja, L., Waite, R. and Searchinger, T., 2013. *Reducing Food Loss and Waste Creating a Sustainable Food Future, Instalment Two*. Available at: <<https://www.wri.org/publication/reducing-food-loss-and-waste>> [Accessed 3 Feb. 2020].

Lipper, L., Thornton, P., Campbell, B., Baedeker, T., Braimoh, A., Bwalya, M., Caron, P., Cattaneo, A., Garrity, D., Henry, K. and Hottle, R., 2014. Climate-smart agriculture for food security. *Nature climate change*, 4(12), pp.1068–1072.

Lohrberg, F., Licka, L., Scazzosi, L. and Timpe, A. eds., 2015. *Urban Agriculture Europe*. [online] Jovis. Available at: <<http://www.ideabooks.it/wp-content/uploads/2016/12/Urban-Agriculture-Europe.pdf>>.

Louw and Venter eds., 2019. *Strategic Management: Towards sustainable strategies in Southern Africa*. 4th ed. South Africa: Oxford University Press.

Loving Thy Neighbour, 2020. *Garden of Life*. [online] Available at: <<https://www.lovingthyneighbour.org/projects?projectId=E422B149-9061-11EA-8B84-001DD8E73008>> [Accessed 28 Sep. 2020].

Low, B., 2019. Building sustainable urban farms with government support in Singapore. *The journal of field actions: Field Actions Science Reports*, (Special Issue 20), pp.98–103.

Majavu, A., 2019. *Urban farmers wait on help from municipality*. [online] New Frame. Available at: <<https://www.newframe.com/urban-farmers-wait-on-help-from-municipality/>> [Accessed 18 May 2020].

Malan, N., 2015. Urban farmers and urban agriculture in Johannesburg: Responding to the food resilience strategy. *Agrekon*, 54(2), pp.51–75.

Martin, W. and Wagner, L., 2018. How to grow a city: cultivating an urban agriculture action plan through concept mapping. *Agriculture & Food Security*, 7(1), p.33.

McDougall, R., Kristiansen, P. and Rader, R., 2019. Small-scale urban agriculture results in high yields but requires judicious management of inputs to achieve sustainability. *Proceedings of the National Academy of Sciences*, 116(1), pp.129–134.

Metropolitan Agriculture for Developing an innovative and sustainable and Responsible Economy, 2018. *White Paper on Consumer Innovation in Urban and Peri-urban Agriculture in the Mediterranean region*. Interreg MED Project 2014-2020: MADRE Project. [online] Interreg. Available at: <<https://www.euneighbours.eu/en/south/stay-informed/publications/madre-white-paper-consumer-innovation-urban-and-peri-urban>> [Accessed 28 Sep. 2020].

Miller, F., Osbahr, H., Boyd, E., Thomalla, F., Bharwani, S., Ziervogel, G., Walker, B., Birkmann, J., Van der Leeuw, S., Rockström, J., Hinkel, J., Downing, T., Folke, C. and Nelson, D., 2010. Resilience and Vulnerability: Complementary or Conflicting Concepts? *Ecology and Society*, [online] 15(3). Available at: <<https://www.jstor.org/stable/26268184>> [Accessed 18 Aug. 2020].

Mougeot, L.J.A., 2000. *Urban Agriculture: Definition, Presence, Potentials and Risks, and Policy Challenges*. [online] Cuba: International Development Research Centre. Available at: <<https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/26429/117785.pdf?sequence=12>>.

Mulgan, G., 2006. The Process of Social Innovation. *Innovations: Technology, Governance, Globalization*, 1(2), pp.145–162.

Murali, M., Cummings, Feyertag, J., Gelb, S., Hart, T., Khan, A., Langdown, I. and Lucci, P., 2018. *10 things to know about the impacts of urbanisation*. [online] Overseas Development Institute. Available at: <<https://www.odi.org/publications/11218-10-things-know-about-impacts-urbanisation>> [Accessed 16 Oct. 2020].

- Nogueira, A., Ashton, W., Teixeira, C., Lyon, E. and Pereira, J., 2020. Infrastructuring the Circular Economy. *Energies*, 13(7), p.1805.
- Olivier, D., 2015. *The physical and social benefits of urban agriculture projects run by non-governmental organisations in Cape Town*. [Doctoral dissertation] Stellenbosch University. Available at: <<https://core.ac.uk/download/pdf/37438493.pdf>> [Accessed 14 Oct. 2020].
- Olivier, D. and Heinecken, L., 2017. The personal and social benefits of urban agriculture experienced by cultivators on the Cape Flats. *Development Southern Africa*, 34(2), pp.168–181.
- Olowoyo, J.O. and Lion, G.N., 2016. Urban farming as a possible source of trace metals in human diets. *South African Journal of Science*, 111(1/2), pp.30–35.
- Ose, S.O., 2016. Using Excel and Word to Structure Qualitative Data. *Journal of Applied Social Science*, 10(2), pp.147–162.
- Osterwalder, A. and Pigneur, Y., 2010. *Business Model Generation: a handbook for visionaries, game changers, and challengers*. New Jersey: John Wiley & Sons, Inc.
- Pearse, N., 2019. An Illustration of a Deductive Pattern Matching Procedure in Qualitative Leadership Research. *The Electronic Journal of Business Research Methods*, 17(3), pp.143–154.
- Pearson, L.J., Pearson, L. and Pearson, C.J., 2010. Sustainable urban agriculture: stocktake and opportunities. *International Journal of Agricultural Sustainability*, 8(1–2), pp.7–19.
- Pfeiffer, A., Silva, E. and Colquhoun, J., 2015. Innovation in urban agricultural practices: Responding to diverse production environments. *Renewable Agriculture and Food Systems*, 30(1), p.79.
- Poulsen, M.N., Hulland, K.R.S., Gulas, C.A., Pham, H., Dalglish, S.L., Wilkinson, R.K. and Winch, P.J., 2014. Growing an Urban Oasis: A Qualitative Study of the Perceived Benefits of Community Gardening in Baltimore, Maryland. *Culture, Agriculture, Food and Environment*, 36(2), pp.69–82.
- Prove, C., Kemper, D. and Loudiyi, S., 2018. The Modus Operandi of Urban Agriculture Initiatives. *Nature and Culture*, [online] 13(1). Available at: <<https://www.berghahnjournals.com/view/journals/nature-and-culture/13/1/nc130102.xml>> [Accessed 6 May 2020].
- Resource Centre for Urban Agriculture and Forestry, 2020. *Urban Agriculture and City Region Food Systems: what and why*. [online] RUAF Urban Agriculture and Food Systems. Available at: <<https://ruaf.org/urban-agriculture-and-city-region-food-systems/>> [Accessed 25 Sep. 2020].
- Richards, R. and Taylor, S., 2012. *Changing land use of the periphery: a case study of urban agriculture and food gardening in Orange Farm*. [online] Johannesburg: University of the Witwatersrand. Available at: <[http://wiredspace.wits.ac.za/bitstream/handle/10539/17142/Report5\\_RichardsTaylor\\_WMR.pdf?sequence=1&isAllowed=y](http://wiredspace.wits.ac.za/bitstream/handle/10539/17142/Report5_RichardsTaylor_WMR.pdf?sequence=1&isAllowed=y)>.

Saldivar-tanaka, L. and Krasny, M.E., 2004. Culturing community development, neighborhood open space, and civic agriculture: The case of Latino community gardens in New York City. *Agriculture and Human Values*, 21(4), pp.399–412.

Small, R., 2007. Can community-based organic micro-farming create food security? *The CSI Handbook*, (8), pp.266–269.

Soga, M., Cox, D.T.C., Yamaura, Y., Gaston, K.J., Kurisu, K. and Hanaki, K., 2017. Health Benefits of Urban Allotment Gardening: Improved Physical and Psychological Well-Being and Social Integration. *International Journal of Environmental Research and Public Health*, 14(1), p.71.

Soga, M., Gaston, K.J., Yamaura, Y., Kurisu, K. and Hanaki, K., 2016. Both Direct and Vicarious Experiences of Nature Affect Children's Willingness to Conserve Biodiversity. *International Journal of Environmental Research and Public Health*, 13(6), p.529.

Stats SA, 2020. *Mbalo Brief – June 2020 | Statistics South Africa*. Available at: <<http://www.statssa.gov.za/?p=13411>> [Accessed 23 Sep. 2020].

Swilling, M., Robinson, B., Marvin, S. and Hodson, M., 2013. *City-level decoupling: urban resource flows and the governance of infrastructure transitions. A Report of the Working Group on Cities of the International Resource Panel*. [online] Birkeland Trykkeri AS, Norway: United Nations Environment Programme. Available at: <<https://www.resourcepanel.org/reports/city-level-decoupling>>.

The Royal Society, 2009. *Reaping the benefits science and the sustainable intensification of global agriculture*. London: The Royal Society.

Thom, A. and Conradie, B., 2013. Urban agriculture's enterprise potential: Exploring vegetable box schemes in Cape Town. *Agrekon*, 52(1), pp.64–86.

Thomaier, S., Specht, K., Henckel, D., Dierich, A., Siebert, R., Freisinger, U.B. and Sawicka, M., 2015. Farming in and on urban buildings: Present practice and specific novelties of Zero-Acreage Farming (ZFarming). *Renewable Agriculture and Food Systems*, 30(1), pp.43–54.

Thulo, L., 2019. *What Entrepreneurs Can Expect From a South African Business Incubator*. [online] SME South Africa. Available at: <<https://smesouthafrica.co.za/south-african-business-incubators/>> [Accessed 15 May 2020].

Tongco, M., 2007. Purposive sampling as a tool for informant selection. *Ethnobotany Research and Applications*, 5, pp.147–158.

Toronto Food Policy Council, 2012. *Grow To: an urban agriculture Action Plan for Toronto*. [online] Food Initiatives Greenhouse. Available at: <<https://sustainontario.com/greenhouse/resource/grow-to-an-urban-agriculture-action-plan-for-toronto/>> [Accessed 11 Feb. 2020].

Umesha, S., Manukumar, H.M.G. and Chandrasekhar, B., 2018. Chapter 3 - Sustainable Agriculture and Food Security. In: R.L. Singh and S. Mondal, eds. *Biotechnology for Sustainable Agriculture*. [online] Woodhead Publishing. pp.67–92. Available at:

<<http://www.sciencedirect.com/science/article/pii/B9780128121603000039>> [Accessed 22 Sep. 2020].

Ungar, M., 2018. *What Works: A Manual for Designing Programs that Build Resilience*. [online] Resilience Research Centre. Available at: <<https://resilienceresearch.org/whatworks/>> [Accessed 18 May 2020].

United Nations, 2020. *Goal 11*. [online] Sustainable Development Goals Knowledge Platform. Available at: <<https://sustainabledevelopment.un.org/sdg11>> [Accessed 21 Apr. 2020].

United Nations Development Programme, 2020. *Sustainable Development Goals: UNDP in Africa*. [online] UNDP. Available at: <<https://www.africa.undp.org/content/rba/en/home/sustainable-development-goals.html>> [Accessed 13 Oct. 2020].

United Nations Educational, Scientific and Cultural Organization, 2015. *Sustainable Development*. [online] UNESCO. Available at: <<https://en.unesco.org/themes/education-sustainable-development/what-is-esd/sd>> [Accessed 31 Jan. 2020].

US Department of Agriculture, 2016. *USDA Urban Agriculture Toolkit*. [online] USDA Climate Hubs. Available at: <<https://www.climatehubs.usda.gov/hubs/northeast/tools/usda-urban-agriculture-toolkit>> [Accessed 17 May 2020].

Van der Schans, J.W., Renting, H. and Van Veenhuizen, R., 2014. Innovations in Urban Agriculture. *Urban Agriculture magazine*, [online] 28, Dec. Available at: <<https://issuu.com/femkehoek/docs/uam28>>.

Van Tuijl, E., Hospers, G.-J. and Van Den Berg, L., 2018. Opportunities and Challenges of Urban Agriculture for Sustainable City Development. *European Spatial Research and Policy*, 25(2), pp.5–22.

Vermeulen, 2018. *The utility of Vertical Farming for Urban Renewal: an Integrated Business Model for profitable and sustainable vegetation production*. [Doctoral dissertation] Nelson Mandela University. Available at: <<http://vital.seals.ac.za:8080/vital/access/manager/PdfViewer/vital:30522/SOURCE1?viewPdfInternal=1>>.

Von Bormann, T., 2015. *How the energy crisis impacts on food security in South Africa*. [online] WWF South Africa. Available at: <<https://www.wwf.org.za/?13461/energy>> [Accessed 9 Sep. 2020].

Von Bormann, T., 2019. *Agri-food Systems: Facts and Futures: How South Africa can produce 50% more by 2050*. [online] Cape Town: WWF South Africa. Available at: <<https://www.wwf.org.za/land/?27341/agri-food-systems-facts-and-futures>>.

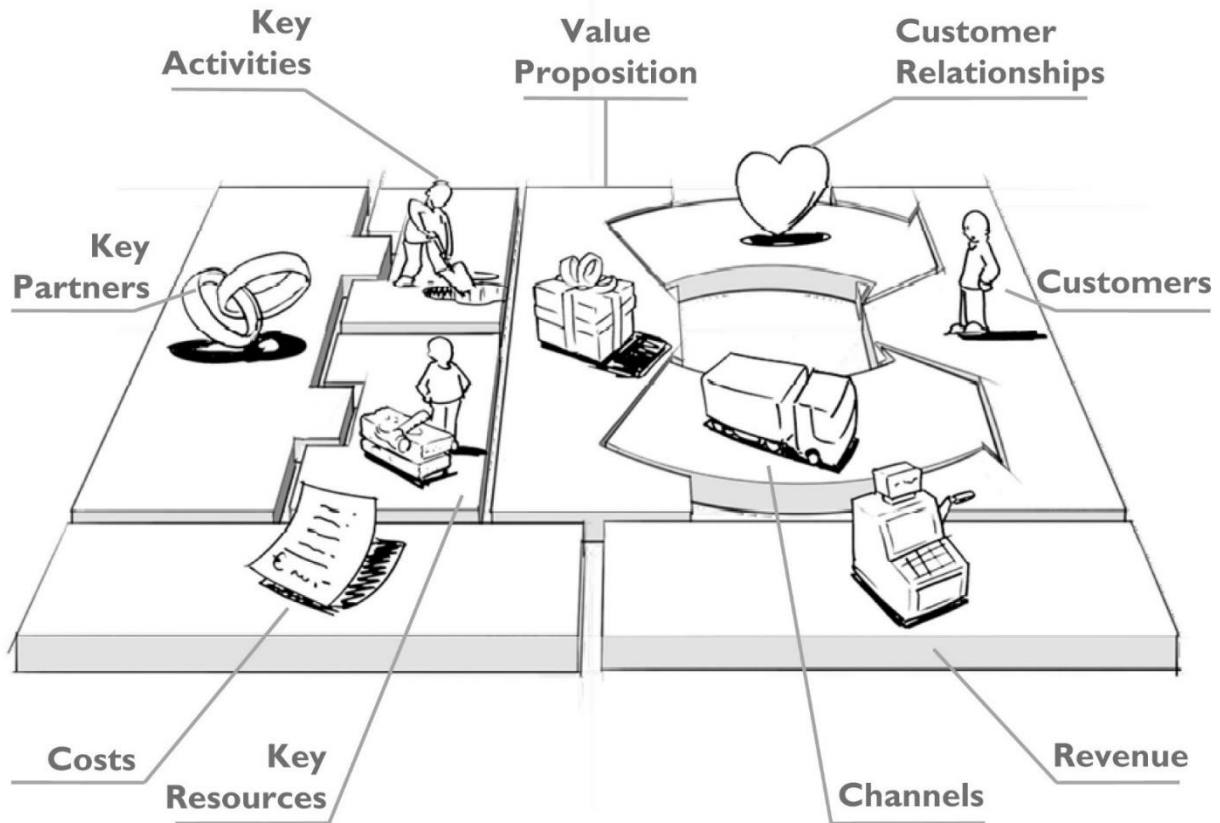
Wakeland, W., Cholette, S. and Venkat, K., 2012. Food transportation issues and reducing carbon footprint. In: J.I. Boye and Y. Arcand, eds. *Green Technologies in Food Production and Processing*, Food Engineering Series. [online] Boston, MA: Springer US. pp.211–236. Available at: <[https://doi.org/10.1007/978-1-4614-1587-9\\_9](https://doi.org/10.1007/978-1-4614-1587-9_9)> [Accessed 23 Sep. 2020].

- Weerakoon, K., 2014. Suitability analysis for urban agriculture using GIS and multi-criteria evaluation. *International Journal of Agricultural Science and Technology*, 2(2).
- WESSA, 2020. *WESSA Eco-schools*. [online] Available at: <<https://wessa.org.za/our-work/schools-programme/wessa-eco-schools/>> [Accessed 28 Sep. 2020].
- White, S. and Hamm, M.W., 2014. *Urban Agriculture and a Planning Approach to Urban Food Systems*. East Lansing, Michigan, USA: Global Center for Food Systems Innovation, Michigan State University.
- Whittinghill, L.J. and Rowe, D.B., 2012. The role of green roof technology in urban agriculture. *Renewable Agriculture and Food Systems*, 27(4), pp.314–322.
- Willard, B., 2010. *3 Sustainability Models*. [online] Sustainability Advantage. Available at: <<https://sustainabilityadvantage.com/2010/07/20/3-sustainability-models/>> [Accessed 21 Apr. 2020].
- Wood, J., 2019. *These are the top 10 emerging technologies of 2019*. [online] World Economic Forum. Available at: <<https://www.weforum.org/agenda/2019/07/these-are-the-top-10-emerging-technologies-of-2019/>> [Accessed 2 Apr. 2020].
- World Bank, 2007. *World Development Report 2008 : Agriculture for Development*. [online] Washington, DC: World Bank. Available at: <<https://openknowledge.worldbank.org/handle/10986/5990>> [Accessed 31 Jan. 2020].
- World Bank, 2013. *Urban agriculture : findings from four city case studies*. Urban development series knowledge papers; no. 18. [online] Washington, DC: World Bank. Available at: <<http://documents.worldbank.org/curated/en/434431468331834592/Urban-agriculture-findings-from-four-city-case-studies>> [Accessed 3 Feb. 2020].
- World Commission on Environment and Development, 1987. *1987: Brundtland Report*. [online] Federal Office for Spatial Development ARE. Available at: <[https://www.aren.admin.ch/aren/en/home/nachhaltige-entwicklung/internationale-zusammenarbeit/agenda-2030-fuer-nachhaltige-entwicklung/uno-\\_-meilensteine-zur-nachhaltigen-entwicklung/1987--brundtland-bericht.html](https://www.aren.admin.ch/aren/en/home/nachhaltige-entwicklung/internationale-zusammenarbeit/agenda-2030-fuer-nachhaltige-entwicklung/uno-_-meilensteine-zur-nachhaltigen-entwicklung/1987--brundtland-bericht.html)> [Accessed 13 Feb. 2020].
- World Economic Forum, 2016. *Building Partnerships for Sustainable Agriculture and Food Security*. [online] World Economic Forum. Available at: <<https://www.weforum.org/whitepapers/building-partnerships-for-sustainable-agriculture-and-food-security-a-guide-to-country-led-action/>> [Accessed 11 May 2020].
- Yang, Z., Cai, J. and Sliuzas, R., 2010. Agro-tourism enterprises as a form of multi-functional urban agriculture for peri-urban development in China. *Habitat International*, 34(4), pp.374–385.



APPENDIX A: BUSINESS MODELLING CANVAS

Source: Osterwalder and Pigneur (2010)



drawings by JAM

**Draft Framework for UA development in SA cities**

\*\*Although the framework makes use of 7 steps, the considerations are interdependent and as such, the framework should be considered in its entirety and not as isolated steps\*\*

The Business Modelling Canvas was recommended by Lohrberg et al., (2015) was developed by Osterwalder and Pigneur (2010) : <https://www.strategyzer.com/canvas/business-model-canvas>

Step 1. Consider which approach is best suited		
Key Actions:	Important considerations:	Useful tips:
<ol style="list-style-type: none"> <li>1. Multi-stakeholder engagement will help you identify stakeholders and establish what type of UA may be needed in the community</li> <li>2. Investigate municipal zoning permissions, maps and relevant bylaws</li> <li>3. Consider the <b>strategic focus</b> and the <b>locational dimension</b> of the initiative:</li> </ol> <p><b>Strategic focus:</b></p> <ul style="list-style-type: none"> <li>▪ Is food production going to be primary or secondary objective?</li> <li>▪ Commercial vs non-commercial venture?</li> <li>▪ Single use or multi-use facility?</li> </ul> <p><b>Locational dimension:</b></p> <ul style="list-style-type: none"> <li>▪ What type of growing system will work?</li> <li>▪ City centre vs peri-urban?</li> <li>▪ Soil vs soilless?</li> <li>▪ Outdoor vs indoor?</li> <li>▪ Design new buildings or retrofit old buildings?</li> </ul>	<p>Influences of geographic location:</p> <ol style="list-style-type: none"> <li>1. Practical growing considerations:                             <ul style="list-style-type: none"> <li>▪ Climate</li> <li>▪ soil quality</li> <li>▪ storage techniques</li> <li>▪ access to water, electricity and labour</li> </ul> </li> <li>2. Provincial and municipal frameworks (IDP, SDF, LUS)</li> <li>3. Which local municipal office is involved with UA implementation and their willingness/ perception?</li> <li>4. Community socio-economic status / socio-cultural norms</li> <li>5. Available resources and markets</li> <li>6. Influence of current food system and interdependent key systems (health, trade)</li> <li>7. Related national and provincial policies:                             <ul style="list-style-type: none"> <li>▪ Food security and food resilience strategies</li> <li>▪ LED plans</li> <li>▪ UA strategy</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Involve <b>influential champions and government catalysts</b> to get buy in</li> <li>2. Some municipalities have a <b>UA strategy</b> but not all</li> <li>3. Consider the <b>Triple Bottom Line benefits</b> of UA</li> <li>4. Need to understand the <b>community context</b> and current <b>food system</b></li> </ol> <div style="border: 1px solid orange; padding: 5px; margin-top: 10px;"> <p><b>Different approaches to UA:</b></p> <p><b>1. Community led UA:</b> usually focused on improving food security/ resilience of those involved</p> <p><b>2. Commercial urban farms and Agro-parks:</b> generates income and provides employment</p> <p><b>3. Agro-tourism:</b> combines agriculture with tourism</p> <p><b>4. Eco-education:</b> provides workshops and training</p> <p><b>5. Farm to fork:</b> usually linked to amenities (schools, hospitals, restaurants, vegetable box schemes etc.)</p> <p><b>6. Green infrastructure, architecture and gentrification</b></p> <p><b>7. Circular systems</b> (hydro/ aquaponics, aquaculture, waste to energy concepts)</p> <p><b>8. Precision farming</b></p> <p><b>9. Zero acreage farming</b> (rooftop gardening / indoor farming)</p> </div>

Step 2. Plan the business model(s) of the UA initiative		
Key Actions:	Important considerations:	Useful tips:
<ol style="list-style-type: none"> <li>Use the <b>Business Modelling Canvas</b> to map the following: <ul style="list-style-type: none"> <li>What are the objectives / value propositions / intended outcomes of the initiative?</li> <li>Which market(s) do you intend to reach and how?</li> <li>What activities do you intend to include?</li> <li>Where along the value chain do you plan to act?</li> <li>Who are your key partners or enablers?</li> <li>What/who are your key resources?</li> <li>What is the cost structure?</li> </ul> </li> <li>Identify actors, role players, farmers and linking organisations involved with UA</li> <li>Multi-stakeholder engagement to align conflicts and problem solve collectively</li> </ol>	<ol style="list-style-type: none"> <li>Resources (dealt with more in step 3)</li> <li>Funding options</li> <li>Land sharing / land agreements <ul style="list-style-type: none"> <li>formal vs informal</li> <li>private vs public private partnerships</li> </ul> </li> <li>Legal frameworks <ul style="list-style-type: none"> <li>zoning permits, permissions and bylaws</li> <li>labour legislation</li> </ul> </li> <li>Conflicts of interest with other urban activities/ between stakeholders</li> <li>Proximity to markets and market response, local perceptions of UA</li> </ol>	<ol style="list-style-type: none"> <li>Lots of <b>uncertainties</b> can make it difficult to plan, therefore business models and structures need to be in place, but they also need to have the <b>capacity to adapt and be flexible</b></li> <li>Business Modelling Canvas can be used in <b>NPO's</b> and to <b>manage multiple business models</b></li> <li>Helps <b>develop links and partnerships</b> from your programme to others</li> <li><b>Business incubators</b> may be able to provide support</li> </ol>
Step 3. Map your resources and plan your budget		
Key Actions:	Important considerations:	Useful tips:
<ol style="list-style-type: none"> <li>Establish which resources are readily available</li> <li>Determine which resources will need to be developed, hired or bought</li> <li>Draw up a budget</li> <li>Investigate partnerships or institutions that could provide support</li> </ol>	<ol style="list-style-type: none"> <li>Financial: capital investment for infrastructure, land, operating finance, marketing expenses</li> <li>Human resources: Labour vs. volunteers</li> <li>Intellectual capital: business planning, logistics and marketing, governance structures, technical, agricultural and food processing knowledge</li> <li>Social &amp; natural capitals: interaction with stakeholders and the environment</li> <li>Built (infrastructure) retrofit into old space or redesign new space</li> </ol>	<ol style="list-style-type: none"> <li><b>Knowledge is continually lost at Community UA level</b> as people move onto other jobs</li> </ol>

Step 4. Build links and supportive partnerships		
Key Actions:	Important considerations:	Useful tips:
<ol style="list-style-type: none"> <li>1. Develop multiple business strategies</li> <li>2. Identify opportunities to link with other initiatives which will diversify or add to the services offered</li> <li>3. Approach promising partners</li> </ol>	<ol style="list-style-type: none"> <li>1. Secondary needs of the community or municipality that could also be met with UA</li> <li>2. Additional revenue streams along the food value chain</li> <li>3. Linking with organisations to reach different / bigger markets</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Mutually beneficial partnerships</b> with the local municipality may provide an <b>enabling</b> environment for UA</li> <li>2. Involve <b>change agents</b> who possess <b>entrepreneurial traits</b> who are capable of <b>social networking</b></li> </ol>
Step 5. Consider the local and legislative context and adapt		
Key Actions:	Important considerations:	Useful tips:
<ol style="list-style-type: none"> <li>1. Understand local governance and development frameworks for your area</li> <li>2. Understand the community context and its influence</li> <li>3. Address any conflicts with internal or external parties through multi stakeholder engagement</li> </ol>	<ol style="list-style-type: none"> <li>1. The responsibility to implement UA differs across provinces</li> <li>2. Municipal by laws and LUS controls are specific to each municipal district</li> <li>3. Community participation – socio-cultural norms</li> <li>4. Related local policies</li> </ol>	<ol style="list-style-type: none"> <li>1. The use of <b>local knowledge</b> may be more appropriate than external/ expert knowledge</li> <li>2. NB: to check land use permissions, bylaws and definition of UA for your area</li> <li>3. Provincial and local plans might be at loggerheads (might need to <b>engage municipality to better understand overlap and to collectively seek solutions</b>)</li> </ol>
Step 6. Track and monitor success		
Key Actions:	Important considerations:	Useful tips:
<ol style="list-style-type: none"> <li>1. Conduct impact or process evaluation to track outcomes</li> </ol>	<ol style="list-style-type: none"> <li>1. Compile a <b>repository of information</b> to help future initiatives</li> </ol>	
Step 7. Plan to be sustainable		
Key Actions:	Important considerations:	Useful tips:
<ol style="list-style-type: none"> <li>1. Scale and institutionalize proven models</li> </ol>	<ol style="list-style-type: none"> <li>1. Future proofing</li> <li>2. Diversification and differentiation</li> <li>3. Profitability</li> </ol>	<ol style="list-style-type: none"> <li>1. Involve <b>community drivers</b> who will spearhead the effort</li> </ol>

APPENDIX C: FULL DETAILS OF PARTICIPANTS AND THEIR LINK TO UA

Name of participant	Professional Background	Specific link or interest in UA	Location of experience
<b>R1</b> Anonymous	An academic career in development studies	Runs a farmer's lab which focusses on small farmer and entrepreneur development. Specifically interested in facilitating sustainable enterprise development, social innovation and multi-stakeholder engagements for UA development.	South Africa
<b>R2</b> Chris D'Aiuto	Agricultural value chain consultant at <i>Philippi Economic Development Initiative (PEDI)</i> . Previously worked with <i>Abalimi Bezekhaya</i> and <i>Harvest of Hope</i> .	Developed an AgriHub at PEDI which aims to link small scale farmers to resources (such as inputs and skills training) as well as local markets for their produce. Agricultural background in soils and production.	Cape Town, Western Cape
<b>R3</b> Associate Professor Jane Battersby	Urban geographer, Associate Professor at <i>African Centre for Cities</i>	Headed up Cape Town team of the African Food Security Urban Network project which aimed to document the state of food insecurity in African cities. Specifically interested in how urban governance and urban management shape food security and how these intersect with systemic issues within the food system.	Cape Town, Western Cape
<b>R4</b> Erich Dixon	Project Manager at <i>Urban Dynamics</i> .	Project Manager at Lufhereng macro housing project which aims to develop 600Ha into UA initiatives. Has consulted widely with UA experts on different approaches to developing UA in SA.	Lufhereng, Gauteng
<b>R5</b> Dr Michael Magondo	Chief Idea Surfer and co-founder of <i>Wouldn't it be cool?</i> open innovation idea and business incubator	Emphasis on rooftop gardens in Joburg CBD. <i>Wouldn't it be cool?</i> focusses on entrepreneur development and mentorship, enterprise development and new venture creation for (amongst others) UA entities.	Johannesburg, Gauteng
<b>R6</b> Associate Professor Raymond Auerbach	Research Associate Professor of Soil Science and Plant Production at <i>Nelson Mandela University, George Campus</i> . Member of Centre of Excellence in Food Security and Agricultural Research Council.	Agroecology, organic and sustainable farming, rainwater harvesting. Extensively involved in the Kos en Fynbos Project.	Kwa Zulu Natal and George, Western Cape

<b>A. PERCEPTIONS ON APPROACHES TO DEVELOPING UA IN SA</b>
1. From your experience, do you think UA is a viable strategy to build resilience into local food systems and communities or do you see it succeeding more often when operated as a business entity?
2. Do you have any comments about the types and approaches to UA on page 1 of the framework?
<b>B. CHALLENGES AND OPPORUTNITIES TO UA DEVELOPMENT IN SA</b>
3. Based on your experience, what are some of the challenges of UA development?
4. What do you think enables UA development currently? What could better enable it in the future?
<b>C. RESOURCE CONSIDERATIONS</b>
5. Do you feel there are additional resources that this framework doesn't consider currently?
6. Which resources do you think is the most important for UA developments to secure and or develop? And which is the most challenging?
7. Do you know of any opportunities to apply for funding for UA developments?
8. Can you comment on any opportunities to acquire land for UA developments?
9. Do you know of any opportunities to facilitate development of the different types of knowledge that have been listed?
10. Do you feel that there are more types of knowledge needed for UA other than those listed in the framework?
11. Any additional considerations for the section about resources? Anything that you felt perhaps was irrelevant?
<b>D. ORGANISATIONAL CONSIDERATIONS</b>
12. Are there additional considerations that this framework should consider when it comes to making decisions about which type of UA entity to develop?
13. Do you agree that the business and personal characteristics listed in the framework are likely to be beneficial to the development? Any additional characteristics that you feel may be helpful?
14. The Business Modelling Canvas (by Strategyzer.com) has been suggested to help entities identify their value propositions, their market segments and channels etc. What are your thoughts about using the tool?
15. How important do you think it is to monitor and evaluate the entity or projects success?
16. Do you have any additional comments on this section about organisational design?
<b>E. LOCAL COMMUNITY OR CONTEXT CONSIDERATIONS</b>
17. Have you had any experience that has proven helpful or that has hindered UA when it comes to the local community and local government authorities?
18. Do you see access to markets as a major stumbling block for UA developments?
19. Do you think it is important to consult community stakeholders?
20. Do you have any additional considerations for this section about the local context? Were there any irrelevant concepts in this section?
<b>F. LEGAL CONSIDERATIONS</b>
21. When it comes to legal considerations, what do you consider is important for this framework to include?
22. Do you know if there any laws, policies or frameworks that pertain specifically to UA development?
<b>G. PARTNERSHIP CONSIDERATIONS</b>
23. Have you had any experiences with partnerships that have helped or hindered UA developments?
24. The World Economic Forum suggest the inclusion of 'influential champions' for the development of rural agriculture, do you think it may help in the context of UA?
25. Do you recommend that these partnerships are always formal or do informal partnerships have a place in UA development?
<b>H. QUESTIONS ABOUT THE CONCEPTUAL FRAMEWORK</b>
26. Was the framework easy to make sense of? Please feel free to make any additional comments.



## **PARTICIPANT INFORMED CONSENT**

### **INFORMED CONSENT DECLARATION**

Project Title: *A proposed framework for developing Urban Agriculture in South African cities*

*Nicola Brown* from the Department of Commerce, Rhodes University has requested my permission to participate in the above-mentioned research project.

The nature and the purpose of the research project and of this informed consent declaration have been explained to me in a language that I understand.

I am aware that:

1. The purpose of the research project is to explore enablers and barriers to Urban Agriculture in South African cities.
2. The Rhodes University has given ethical clearance to this research project and I have seen/ may request to see the clearance certificate.
3. By participating in this research project, I will be contributing towards an implementation framework for the development of Urban Agriculture. This framework is intended to be used as a tool to grow the Urban Agriculture sector which will benefit communities and society economically, environmentally and socially and will also contribute towards the Sustainable Development Goals.
4. I will participate in the project by agreeing to be interviewed via Zoom or Skype or WhatsApp video call or phone call and will be available to answer smaller follow up queries via email or the phone.
5. My participation is entirely voluntary and should I at any stage wish to withdraw from participating further, I may do so without any negative consequences.
6. I will not be compensated for participating in the research, but my out-of-pocket expenses will be reimbursed.
7. I am aware that I will be interviewed in my personal capacity and not as a representative of the organisation(s) I am affiliated to.
8. I am aware that the questions asked in the study may explore challenges I have faced in the Urban Agriculture sector. However, I am also aware that the purpose of the study is not to question my competency as an Urban Agriculture implementor/ expert but is

rather, to gain insight from both successful and unsuccessful projects to inform the proposed framework.

- a) I am therefore aware that there may be both constructive and/or adverse impacts on my reputation based on the information I provide.

The following steps have been taken to prevent any adverse impacts:

- 1. anonymity can be provided **(please see permission statement below)**

The chance of adverse risks impacting my reputation has been estimated to have a 5-10% chance of materializing.

- 9. The researcher intends publishing the research results in the form of a mini dissertation Master's Thesis. However, confidentiality and anonymity of records will be maintained, and my name and identity will not be revealed to anyone who has not been involved in the conduct of the research should I ask for anonymity.
- 10. I will receive feedback via email in the form of a report containing recommendations to developing Urban Agriculture and the proposed implementation framework once the study has been completed. I am aware that I can request a copy of the dissertation if I so wish. **(please see permission statement below).**
- 11. Any further questions that I might have concerning the research or my participation will be answered by Nicola Brown [REDACTED]
- 12. By signing this informed consent declaration, I am not waiving any legal claims, rights or remedies.
- 13. A copy of this informed consent declaration will be given to me, and the original will be kept on record.
- 14. The researcher has requested voice recording for this study to be done via Otter.ai. Otter.ai is a programme which records audio and transcribes speech to text **(please see permission statement below).**
- 15. The researcher has also requested that relevant photos and videos be sent to her via email or WhatsApp. **(please see permission statement below).**

I, ..... have read the above information / confirm that the above information has been explained to me in a language that I understand, and I am aware of this document's contents. I have asked all questions that I wished to ask, and these have been answered to my satisfaction. I fully understand what is expected of me during the research.





I have not been pressurised in any way and I voluntarily agree to participate in the above-mentioned project.

I **would/ would not** require that anonymity be provided (Please circle which option you agree to).

I **do/ do not** want a copy of the dissertation once it has been completed and successfully reviewed by Rhodes University (Please circle which option you agree to).

I **do/ do not** give permission for the researcher to take voice recordings of our interactions for the purposes of their research. (Please circle which option you agree to).

I **agree/ do not agree** to send relevant photos and videos to the researcher via email or WhatsApp. (Please circle which option you agree to).

.....  
**Participants signature**

.....  
**Witness**

.....  
**Date**

Rhodes University, Research Office, Ethics  
Ethics Coordinator: [ethics-commitee@ru.ac.za](mailto:ethics-commitee@ru.ac.za)  
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Room 220, Main Admin Building, Drostdy Road, Grahamstown, 6139



## An implementation framework for the development of Urban Agriculture

A consolidation of the major considerations of Urban Agriculture for those designing, implementing & overseeing urban farming in SA cities

### What is Urban Agriculture?

Urban Agriculture (UA) is "an industry located within (intraurban) or on the fringe (periurban) of a town, a city or a metropolis, which grows or raises, processes and distributes a diversity of food and non-food products"  
(Mougeot, 1999)

Non food products relate to the Triple Bottom Line benefits of UA to:

- promote social inclusion
- enhance urban environmental management
- productively reuse urban wastes
- contribute to local economic development
- build food systems resilience
- enhance urban food security
- reduce urban poverty



(RUAf, 2020)

Rather than competing with rural or industrial agriculture, UA is seen to complement it, resulting in a stronger national food system (Mougeot, 1999).

### Types & approaches to developing Urban Agriculture\*

Community UA: focused on improving food security, resilience & community cohesion

Commercial urban farms and Agro-parks: generates income & provides employment

Agro-tourism: combines agriculture with tourism activities

Eco-education: provides workshops & training

Farm to fork: linked to amenities (schools, hospitals, restaurants, vegetable box schemes etc.)

Green infrastructure, architecture & gentrification

Zero acreage farming (rooftop gardening / indoor farming)

Circular systems (waste to energy concepts)

Precision farming

When applied efficiently, UA can increase the access, availability and distribution of food to urban citizens (Games and Primus, 2015)





**An implementation  
framework for  
Urban Agriculture**



**Major considerations for those designing, implementing & overseeing  
urban farming in SA cities**





## RESOURCES

Inputs: land, water, infrastructure (old or new buildings), electricity (load shedding), storage facilities, labour.

Financial: operational costs, start-up investment, finance partners and institutions.

Knowledge: agricultural, production, farm management, technical, food processing, logistics, planning, marketing, business knowledge, government development frameworks and regulations, local government UA authority.

Consider: the use of local knowledge vs expert science and the typical flow of people through UA initiatives as they find new jobs and other opportunities.

## ORGANISATIONAL DESIGN & CHARACTERISTICS

City centre or peri urban, inside or outside, commercial vs. non-commercial entity, single use or multi use facility. Food production = primary or secondary focus

Growing methods and systems, the different approaches and types of UA\*

Use the Business Modelling Canvas to think about the entity's value proposition, customer relationships and segments, distribution channels, revenue streams, cost structure, key partnerships, key activities and key resources



Strategyzer.com

Helpful business characteristics: clearly stated objectives, multiple and complementary business models, flexibility, evaluation

Helpful personal characteristics: problem solvers, flexibility, social networkers, change agents, entrepreneurs



## LOCAL CONTEXT

Multiple stakeholders, community, socio-cultural norms, perceptions, local government, local land use schemes and zoning policies, local food systems (markets and resilience), internal conflicts and in house fighting, external conflicts (treatment of wastes and animals), security (theft and vandalism)

## URBAN POLICIES & GOVERNANCE FRAMEWORKS

NDP, IDP, SPLUMA, SDF, Land Use Schemes, municipal bylaws, zoning regulations, land use policies, local UA authority, development planning frameworks.

## PARTNERSHIPS

Technical partners, training and skills development, business incubators, CSR partners, financial partners and institutions, government partnerships, co-production platforms, land owner collaborations.

Consider: formality of partnerships, influential champions and multi stakeholder engagement

## A conceptual management framework for the development of Urban Agriculture



This guide is a consolidation of the major considerations involved with starting an Urban Agriculture initiative. It is intended to provide guidance to those involved with implementing, managing or supporting urban farming initiatives in SA cities and to create a common language around Urban Agriculture.

### What is Urban Agriculture?

Urban Agriculture (UA) is "an industry located within (intraurban) or on the fringe (periurban) of a town, a city or a metropolis, which grows or raises, processes and distributes a diversity of food and non-food products" (4)

Non-food products relate to the social, environmental and economic possibilities that UA brings. These include opportunities for education and learning; research and development; income from food services, leisure and tourism; social cohesion; healthcare and urban greening (10)

UA can be used as a complementary strategy to:

- promote social inclusion
- enhance urban environmental management
- productively reuse urban wastes
- contribute to local economic development
- build food systems resilience
- enhance urban food security
- reduce urban poverty (7)



Rather than competing with rural or industrial agriculture, UA is seen to complement it, resulting in a stronger national food system (4)

"When applied efficiently, UA can increase the access, availability and distribution of food" to urban citizens (2)

UA is practised by a variety of people in a variety of places and takes many different forms (6). In SA, UA is mostly practised for food production (8) at four levels: *Survival, Subsistence, Livelihood and Commercial* levels (8)

UA initiatives are generally focused on achieving different outcomes and therefore they often follow different models.

Common urban farming models and concepts are listed below (10) - these are often used independently or in combination:

- Community or citizen-led UA usually focuses on growing nutritious food for personal consumption or to sell locally. In SA, this is done at both a household level and on larger scales (i.e. community gardens). In the UK, these types of gardens are called Allotment gardens and in Germany, they are known as Schrebergarten.
- Commercial urban farms can provide employment opportunities and generate income.
- Agrotourism combines tourist activities with farming operations as an additional revenue stream.
- Eco or agro-education farms serve as training facilities.
- Farm-to-fork urban farms can be linked to amenities close by such as schools, hospitals and restaurants to decrease the transportation of food.
- Rooftop gardens or green rooves can help buildings reduce their heating and cooling costs or they can be used to grow food in built-up areas or rented out for events.

Due to the smaller size of urban farms compared to traditional agriculture, UA tends to use innovative technologies to allow cultivation to happen on smaller plots of land or in small spaces (4). Such systems include hydroponics; aquaponics and aquaculture; indoor or vertical farming; underground or tunnel farming and circular systems that reuse waste for energy or compost.



The process of setting up a UA initiative involves thinking about 5 main elements: the *Availability of Resources; Strategic Considerations; Operational Considerations; Partnerships* and *Policies, Laws and Regulations*.

The inner orange ring shows the 3 internal elements which together make up the primary building blocks of a UA initiative.

The outer grey ring shows the 2 external elements which may help or hinder the project or business.

It is worth thinking through all of the elements for both commercial and non-commercial entities because those working in the UA sector in SA have identified them all as either a challenge or an opportunity for UA initiatives.





# A conceptual management framework for the development of Urban Agriculture

The following sections aim to provide UA roleplayers with an opportunity to think through the 5 main elements to setting up a UA initiative in SA.

It is important to note that there are interdependencies between the elements - particularly between the 3 internal factors.

## RESOURCE CONSIDERATIONS

Think about the following resources and consider which you have access to because this may influence how the initiative operates and the impact it has on the people involved, the surrounding community and the environment.

**Inputs and infrastructure:** consider access, supply, cost, necessity and security thereof

- seeds, seedlings, compost, water tanks and pumps, monitoring devices, a toilet on-site, electricity supply, growing systems, machinery, land, water, buildings (build new or retrofit existing spaces), storage facilities, vehicles and security fencing

**Financial capital:** consider the interplay between cost structure and revenue streams

- consider how start-up and operational costs can be minimised by using regenerative or circular systems which recycle water and use waste for energy, compost or as a growing medium
- if starting a commercial entity, consider what the market demand is like and how you will reach those markets
- if the aim is to provide food locally, think about the existing food systems and how the initiative might feed into or conflict with these

**Intellectual capital and knowledge:**

- there are many types of knowledge needed for UA, namely: agricultural knowledge, production know-how, farm management skills, technical and food processing knowledge, logistics and planning skills, marketing, business management practices and an ability to interpret government laws and regulations
- at the lower levels of UA (i.e. *Survival, Subsistence and Livelihood* levels), people don't tend to stay in small-scale agriculture for a long time, so knowledge is often lost. This has been identified as one of the barriers which limit the scaling up of initiatives so it is important to think about how to retain, manage, convert and store knowledge.
- think about strategies to increase and disseminate knowledge with training and development and consider which institutions or partners can help with this (i.e. business incubators, tech development agencies etc.)

**Who is involved:** depending on the focus of the initiative, different groups of people and stakeholders may want to be involved

- younger participants tend to be more interested in financially viable projects while older participants might be more interested in the social or nutritional benefits of urban farming/gardening
- consider how participants will interact with each other as in house fighting has been identified as a major pitfall
- consider how the local community perceives UA and the influence of this on your marketing strategy and revenue streams
- it has been suggested that involving community champions, change agents and government drivers helps to sustain UA initiatives



## STRATEGIC AND ORGANISATIONAL CONSIDERATIONS

It is important to be clear on the intended impact of the UA initiative as this will influence decisions about production, operations and the types of resources needed.

To help think through the strategic and organisational elements, consider using the Business Modelling Canvas to fully conceptualise what it is the initiative intends to do. This canvas acts as a management tool to help organisations identify how they *create, capture and deliver value* using nine building blocks <sup>(5)</sup>

- The strategic focus or the *Value Proposition* of UA initiatives will differ according to the problem they aim to address - e.g. some initiatives aim to generate profits through multiple revenue streams, some focus on providing participants with nutritious food and others aim to decrease food miles.
- When developing the *Value Proposition*, it is important to consider if the initiative will operate commercially and if producing *food* is the **primary** or **secondary** focus of the entity because this will drive numerous elements of the Business Modelling Canvas - such as the *Key Activities* of the organisation, the *Customer Segments*, the *Revenue Streams*, the *Cost Structure* and the *Customer Channels*.
- Initiatives where the focus on food is secondary, may use the UA site as a multi-purpose facility and rather promote other activities such as tourism, education, therapy gardening or social cooking classes as a means of delivering value and meeting their strategic focus.

There are lots of uncertainties within UA, so it is recommended to involve people who can think outside the box, who can network socially and cross-culturally, and who are good at problem-solving. Flexibility within the organisation is also a helpful characteristic due to the uncertainties. Monitoring and evaluation of the project are critical for the improvement of future initiatives.

Business Modelling Canvas Source: Strategyzer.com



### Challenges that need to be considered:

- Uncertain timeframes and informal land agreements affect the scale of operations.
- Risks associated with being in an urban space: contamination of water and soil systems; conflicts with other urban activities and residents; theft and vandalism and negative perceptions towards agriculture in urban spaces.
- Local authority bodies and regulations may prohibit certain activities from happening in urban spaces - limiting operations.
- Technology to increase productive output in a small space is currently limited and can be expensive.



## OPERATIONAL CONSIDERATIONS

With a clear idea of the availability of resources and the intended outcomes of the initiative, you can consider how these link with operational and production decisions


Operational considerations that are important to consider when planning or designing the initiative are:

- climate, location (city centre or periurban), stakeholder involvement, land use laws and zoning permissions

For initiatives where the focus is primarily on food, consider:

- the availability of technology and space to scale production meaningfully and achieve economies of scale
- crop selection for **food nutrition or economic return** (i.e. organic herbs may fetch a higher price but have less nutritional value)
- there is often a long lead time before the first crop can be harvested - generally weeks or months depending on the crop
- the different skills, knowledge and resources required for the various agricultural systems
- externalities associated with producing food - impacts on water, energy and existing infrastructure as well as social and economic impacts on surrounding communities (both positive and negative)

For profit-seeking initiatives, consider:

- how recycling resources may decrease costs (i.e. leaner cost structures) and can be kinder to the environment
- marketing considerations: demand (includes looking at the socio-economic status and socio-cultural perceptions of the market); access and distribution; existing food systems (local or formal markets); customer segments and interaction with customers (being in urban areas allows for more interaction with and transparency of the food supply chains); competitors and competition for resources
- the diversity of the services offered, multiple revenue streams and the knowledge needed for these activities 

The 3 internal elements should rather be considered alongside one another and not in silos as they are interdependent. They will also be influenced by the 2 external elements which are unpacked below.

## PARTNERSHIP OPPORTUNITIES

Partnerships can provide an opportunity to leverage the mutual benefits of UA between organisations and provides an opportunity to capitalise on knowledge and expertise across different sectors

Consider if any of the following partnerships may help your initiative:

- land collaborations (with schools or hospitals) or with building owners (e.g. rooftop farms)
- partnering to increase the diversity of services offered or provide solutions to mutual problems (e.g. reusing urban wastes may help initiatives save on costs and provide municipalities with an opportunity to deal with organic waste)
- utilising established programmes such as *WESSA's eco-schools programme*, *FarmerKidz* and the *Garden of Life* method
- working with education institutes and training partners (e.g. business incubators or universities)
- financial partners
- public-private partnerships
- technical partners to help increase production, output and efficiency
- research and development labs, community hubs, innovation labs and public service labs

Some of the challenges associated with partnerships are:

Differing agendas, ideas and perceptions

Informal partnerships can give you flexibility but they can also cause uncertainties that limit the ability to scale operations up (e.g. informal land tenure agreements).

## POLICIES, LAWS AND REGULATIONS

In SA, UA is overseen by both provincial and local municipalities which means local bylaws and zoning regulations apply. These are specific to towns and cities and will need to be well understood before you start anything as they might restrict certain activities or developments.

There is no clear mandate for UA at local municipal level and it is not overseen by the same municipal office in each of the provinces so it can be difficult to know where to get help. Start by looking at municipal land-use schemes, bylaws and zoning regulations for the area concerned and work with local government to avoid land-use conflicts.

This framework was developed by identifying the current challenges and opportunities facing UA in SA to better understand the management implications for those involved with designing, developing and supporting UA initiatives. It is intended to provide various roleplayers with an opportunity to think through various considerations and serve as a first step to creating an Action Plan for UA development in SA, cities.

## REFERENCES:

1. Cai, J., 2014. Urban agriculture makes China's cities more liveable. [online] Earth Journalism Network. Available at: <<https://earthjournalism.net/stories/urban-agriculture-makes-chinas-cities-more-liveable>>
2. Game, I. and Primus, R., 2015. GSDR 2015 Brief Urban Agriculture. [online] State University of New York College of Forestry and Environmental Science. Available at: <[https://www.academia.edu/17507897/GSDR\\_2015\\_Brief\\_Urban\\_Agriculture](https://www.academia.edu/17507897/GSDR_2015_Brief_Urban_Agriculture)>
3. Hayson, G. and Battersby, J., 2016. Why urban agriculture isn't a panacea for Africa's food crisis. [online] The Conversation. Available at: <<http://theconversation.com/why-urban-agriculture-isnt-a-panacea-for-africas-food-crisis-57680>>
4. Mougout, L.J.A., 2000. Urban Agriculture: Definition, Presence, Potentials and Risks, and Policy Challenges. [online] Cuba: International Development Research Centre. Available at: <<https://idi-bnc-idrc.dspace.org/bitstream/handle/10625/26429/117785.pdf?sequence=12>>
5. Osterwalder, A. and Pigneur, Y., 2010. Business Model Generation: a handbook for visionaries, gamechangers, and challengers. New Jersey: John Wiley & Sons, Inc.
6. Pfeiffer, A., Silva, E. and Colquhoun, J., 2015. Innovation in urban agricultural practices: Responding to diverse production environments. *Renewable Agriculture and Food Systems*, 30(1), p.79.
7. Resource Centre for Urban Agriculture and Forestry, 2020. Urban Agriculture and City Region Food Systems: what and why. [online] RUAUF Urban Agriculture and Food Systems. Available at: <<https://ruauf.org/urban-agriculture-and-city-region-food-systems/>>
8. Small, R., 2007. Can community-based organic micro-farming create food security? *The CSI Handbook*, (8), pp.266-269.
9. Strategyzer AG, 2020. Business Canvas - Business Models & Value Propositions. [online] Strategyzer. Available at: <<https://www.strategyzer.com/canvas/>>
10. Van Tuijl, E., Hoppers, G.-J. and Van Den Berg, L., 2018. Opportunities and Challenges of Urban Agriculture for Sustainable City Development. *European Spatial Research and Policy*, 25(2), pp.5-22.

