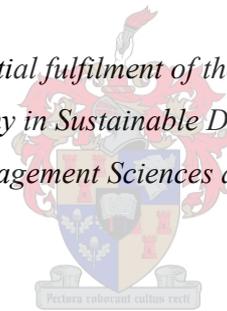


Understanding Cape Town's food system through grassroots innovations and social-technical transitions theory

by

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of Master of Philosophy in Sustainable Development in the Faculty of
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Declaration

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Abstract

The current food system has a negative impact on human wellbeing and on environmental boundaries. Within this context, it is understood that technological fixes will not be enough to address social and environmental inequalities in the food system. Civil society offers context-based innovations to address local inequalities usually overlooked by policy. However, this niche remains understudied, especially in the Global South.

This study aims to contribute to the understanding Cape Town's grassroots efforts to trigger transitions towards greater sustainability in the food system. The study has been structured around the research question of how grassroots actors are developing and adopting technologies to trigger such transitions in the food system. This research was informed by a narrative literature review on socio-technical transitions, food systems transitions and grassroots innovations. This was followed by a case study, where seven grassroots actors were interviewed, and a thematic data analysis was conducted.

Four themes were developed in the thematic analysis: i) support of small-scale farmers, ii) networking and relationships, iii) financial model and viability and iv) innovations and technology. The four themes help us understand the research question, of how grassroots actors are developing and adopting innovations and technologies for a more sustainable food system in Cape Town. The support and development of small-scale urban farming is identified by the grassroots actors as central to triggering greater sustainability in Cape Town's food system. Relationships are key for these grassroots innovations to further develop and establish themselves and are formed with both niche and regime actors. All the grassroots actors are aligned with a progressive food justice agenda. Financial viability is a key challenge, further complicated by the enmeshing of grassroots projects with the need to establish livelihoods for the community involved.

The results show points of resonance and of discrepancy between the literature and the case study. The results agree with the characteristics and challenges typical of grassroots innovations, as well as the centrality of partnerships to the success of innovations. The Cape Town context adds the urgency of creating and supporting livelihoods for grassroots actors. However, the definition of grassroots innovation

includes a strong element of community participation. This case study did not show a strong community element to grassroots innovations.

The alignment of the case study with progressive food movements as per the literature might have been caused by the sampling strategy and the COVID-19 lockdown measures. It created a bias towards grassroots actors with a higher degree with institutionalisation, and perhaps left out more radical movements. Further research directions could include an in-depth study with a bigger sample and in-person interviews.

Opsomming

Die huidige voedselstelsel het 'n negatiewe impak op die welstand van die mens en op omgewingsgrense. Binne hierdie konteks word dit verstaan dat tegnologiese oplossings nie genoeg sal wees om sosiale en omgewingsongelykhede in die voedselstelsel aan te spreek nie. Die burgerlike samelewing bied kontekstgebaseerde innovasies om plaaslike ongelykhede aan te spreek, dit word egter gewoonlik deur beleid oor die hoof gesien. Hierdie “niche” word steeds onderskat, veral in die Globale Suide.

Die doel van hierdie studie is om by te drae tot die begrip van Kaapstad se voetsoolvlakpogings om oorgange na beter volhoubaarheid in die voedselstelsel te veroorsaak. Die studie is gestruktureer rondom die navorsingsvraag oor hoe grondvlak partye tegnologieë ontwikkel en gebruik om sulke oorgange in die voedselstelsel te veroorsaak. Hierdie navorsing is ingelig deur 'n narratiewe oorsig oor sosio-tegniese oorgange, voedselsisteme oorgange en innovasies op grondvlak. Dis gevolg deur 'n gevallestudie waar onderhoude gevoer is met sewe partye op grondvlak en 'n tematiese data-analise was gedoen.

Vier temas word deur hierdie tematiese ontleding ontwikkel: i) ondersteuning van kleinskaalse boere, ii) netwerk en verhoudings, iii) finansiële model en lewensvatbaarheid en iv) innovasie en tegnologie. Hierdie vier temas help om die navorsingsvraag te verstaan; hoe ontwikkel grasvlak partye innovasies en tegnologieë vir 'n meer volhoubare voedselstelsel in Kaapstad? Die ondersteuning en ontwikkeling van kleinskaalse stedelike boerderye word deur die voetsoolvlak geïdentifiseer, dit is belangrik om groter volhoubaarheid in Kaapstad se voedselstelsel te bewerkstellig. Verhoudings is die sleutel vir hierdie grondvlak innovasies, om hulself verder te ontwikkel en te vestig, dit word ook gevorm deur beide “niche” en regimepartye. Die voetsoolvlak is in lyn met 'n progressiewe agenda vir voedselgeregtigheid. Finansiële lewensvatbaarheid is 'n belangrike uitdaging, wat verder bemoeilik word met die integrasie van voetsoolprojekte met die behoefte om lewensonderhoud vir die betrokke gemeenskap te vestig.

Die resultate toon punte van resonansie en teenstrydigheid tussen die literatuur en die gevallestudie. Die resultate stem ooreen met die kenmerke en uitdaginge wat tipies is

van innovasies op grondvlak, sowel as die kern van vennootskappe tot die sukses van innovasies. In die Kaapstad-konteks, voeg dit dringendheid by om lewensonderhoud vir voetsoolvlak te skep en te ondersteun. Alhoewel die definisie van voetsoolvlak-innovasie 'n sterk element van gemeenskapsdeelname bevat, het hierdie gevallestudie nie 'n sterk gemeenskapselement getoon vir innovasies op grondvlak nie.

Die belyning van die gevallestudie met progressiewe voedselbewegings, volgens die literatuur, was moontlik veroorsaak deur die steekproefnemingstrategie en COVID-19-sluitmaatreëls. Dit het 'n vooroordeel geskep teenoor voetsoolvlak partye met organisasies op 'n hoër vlak, en het miskien inisiatiewe met 'n meer radikale oriëntasie uitgelaat. Verdere navorsingsaanwysings kan 'n in-diepte studie met 'n groter steekproef en persoonlike onderhoude insluit.

.

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List of Acronyms and Abbreviations

ICT	Information and communications technology
FAO	Food and Agriculture Organisation
NGO	Non-governmental Organisation
NRF	National Research Foundation
UCT	University of Cape Town
UN	United Nations
UWC	University of the Western Cape
PGS	Participatory Guarantee System
R&D	Research and Development
SDGs	Sustainable Development Goals
SNM	Strategic Niche Management

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Chapter 1 – Introduction

1.1 Overview

This study contributes to the understanding of Cape Town’s transition to sustainability in the food system. In this chapter, I introduce the background that informs my interest in pursuing this research project. The background contextualises the problem statement and the subsequent research objective that guides the research project. I also dedicate a section to clarifying concepts and terms that are frequently used throughout the thesis. Finally, I provide an overview of the research approach, the methodology used, and of the thesis’ structure.

1.2 Background

The notion of a broken global food system has become widespread. The global food system fails to deliver food security or consistent positive health outcomes, while it is also a major driver of global environmental change (Global Panel on Agriculture and Food Systems for Nutrition, 2016; Gordon, Bignet, Crona, Henriksson, Van Holt, *et al.*, 2017). Despite producing enough calories to feed the global population, hunger persists, while diet-related diseases are growing rapidly, especially in lower income countries (Gordon *et al.*, 2017; FAO, 2018). As far as the environmental aspect is concerned, the current global food system is a major contributor of biogeochemical flows alteration, biodiversity rates corrosion, greenhouse gases emissions, and of land systems change (Fan & Ramirez, 2012; Gordon *et al.*, 2017; Campbell, Beare, Bennett, Hall-Spencer, Ingram, *et al.*, 2017). If business as usual in the food system persists, neither food nor nutritional security will be achieved and food systems will drive further biodiversity loss, soil erosion, water pollution, and greenhouse gas emissions, undermining the planet’s resilience (IPES-Food, 2016; WWF, 2016, 2018). Developing countries in particular find themselves at a crossroads, in which they have to simultaneously adapt to and mitigate the impacts of climate change while pursuing food and nutritional security in a rapidly urbanising scenario (Angel, Parent, Civco, Blei, Potere, 2011; Fan & Ramirez, 2012). There is an urgent call to change our food system to a more sustainable one. Within the food system, agriculture, despite being locked-in to an unsustainable regime of energy intensive inputs nonetheless has the potential to

not only reduce greenhouse gas emissions but to sequester carbon, as well as to restore biodiversity (Fan & Ramirez, 2012; IPES-Food, 2016).

My background in evolutionary economics and innovation systems motivated me to further study technological regime shifts. Geels (2004) reflects that the innovation system's literature does not pay enough attention to the transition from one regime to another. The context of a climate crisis presented above steered my research towards sustainability transitions. There are several research approaches to sustainability transitions, one of them being socio-technical transitions. This approach looks to understand the multiple "interactions among technical innovations, the socioeconomic system, and ecosystem functions and services at multiple levels" (Ollivier *et al.*, 2018:1). The multi-level perspective, a framework used to understand past and current socio-technical transitions, breaks socio-technical systems down into three levels: landscape (macro-level), regime (meso) and niche (micro) (Berkhout, Smith & Stirling, 2003; Geels, 2004, 2019). A transition is the process of regime reconfiguration (Ollivier *et al.*, 2018). The niche is a safe space, on the outskirts of the dominant regime, where innovations develop (Geels, 2011; Sorrell, 2018). Innovations may (or may not) scale up, disturbing and shifting the regime into a new pattern of stabilisation (Darnhofer, 2015a; Geels, 2019). In a context of sustainability transitions, a better understanding of the dynamics of transition can help policy makers, researchers, entrepreneurs, and investors to focus where they use their resources.

Those protected niches for innovations can exist within the government, private sector and civil society organisations (Seyfang & Smith, 2007). Through a preliminary literature review, however, using the key terms 'technology' and 'innovation', the results frequently included high-tech¹ solutions to food sustainability aligned with climate-smart agriculture - such as indoor farming, aquaponics, genetically modified organisms, or precision farming². As I read some case studies, it seemed that while those technologies may be able to achieve higher resource efficiency levels, or reduce greenhouse gas emissions, or increase crop yields, they do not fundamentally change the system in which they are embedded . Such technological improvements and

¹ High tech refers to the most advanced technology available.

² Precision farming is the management of variations in the field such as water, soil composition, and climate in order to optimize crop output and reduce production costs and environmental impact.

innovations do not address political issues that surround the food system structures nor do they consider human rights, equality, justice and environmental regeneration. Intellectual property rights, high initial investments and resource intensity maintain power dynamics, impede accessibility, and do not necessarily reverse environmental degradation. I wanted to understand, to a greater extent, the innovations and technologies that can address justice and their role in sustainability transitions. Such technologies do not come from high-investment Research and Development centres, they come from the roots of society, areas often overlooked as sources of innovation, such as local and informal operations and knowledge.

Seyfang and Smith (2007) identify groups of committed ‘grassroot actors’ in civil society that aim to drive sustainability with “a variety of social innovations as well as innovative technologies – new organisational arrangements and new tools”– which they name ‘grassroots innovations’ (2007: 584). Grassroots innovations, thus, stem from groups of people looking for solutions to the challenges they face, often diverging from mainstream practices (Smith, Fressoli & Thomas, 2014; Gernert, El Bilali & Strassner, 2018). These local transitions initiatives, most of which pursue an ideological commitment rather than solely profit, can provide proof of new concepts and organisational and economical structures, creating value for the community (Seyfang & Haxeltine, 2012; Gernert *et al.*, 2018). Grassroots innovations can inspire and motivate changes in lifestyle and other social practices, fostering sustainability transitions through the escalation and uptake of practices by the regime. They amplify citizen’s voices and views, communicating them local and state institutions, and advocate for new models of producing and consuming (Gernert *et al.*, 2018).

Since these grassroots solutions originate from local actors aiming to solve local issues, they are embedded in local and traditional values and knowledge. This particular aspect is the main motivation for me to pursue this research stream. As I will discuss further in chapter 2, my question centres around how grassroot innovations can go hand in hand with social inclusion. Grassroots innovations around food practices are generally promoted by actors on the fringe of the current food regime (Rossi, 2017), aiming towards an environmentally sustainable and socially just food system. In the author’s words “an array of new local food initiatives, strategies, forms of entanglement and

cooperation” (Rossi, 2017:1) are being developed globally to address local food sustainability challenges.

Despite the relevance of sustainability transitions in the food system, Markard, Raven and Truffer (2012) point out that literature on sustainability transitions is primarily based in the Global North. Sustainability transitions studies in food systems remain marginal when compared to energy transitions or mobility (El Bilali *et al.*, 2018). As per my literature survey, I have found relevant literature on socio-technical transitions in food systems from the United Kingdom (e.g. Darnhofer, 2014 and Durrant, 2014), and a literature review on grassroots innovations in the food system using primarily European literature (Gernert, El Bilali & Strassner, 2018). Hossain's (2016) systematic literature review on grassroots innovation concludes that innovation studies from the global South are underrepresented, let alone studies that look at grassroots innovations.

1.3 Problem statement

Despite a growth in the global output of food, food insecurity persists and malnourishment grows (Gordon *et al.*, 2017). The food system is a major contributor to ecological stresses such as greenhouse gas emissions, biodiversity loss, and the disruption of biogeochemical cycles. Technologies and innovations to address these challenges are being developed all over the world, with environmental sustainability and food security outcomes in mind. However, many technological solutions do not fully cater to the most vulnerable populations and their application does not automatically improve vulnerabilities. At the grassroots level, however, people and organisations that form part of civil society come up with innovations and solutions unique to the challenges faced in their context that could shift the logic of the regime.

Literature on grassroots innovations and their role in shifting socio-technical regimes has solidified over the past decades, with several case studies from the Global North. However, a preliminary literature survey shows that there has not been a substantial amount of research dedicated to documenting these innovations in food systems and specifically not in the Global South. With this in mind, this research project seeks to understand how these grassroots innovations are being developed in Cape Town.

1.4 Research aim

This study aims to contribute to the understanding of Cape Town's grassroots efforts to trigger transitions towards sustainability in the food system. The research has been structured to answer the following research question:

How are grassroots organisations adopting and developing innovations to achieve a more sustainable food system in Cape Town?

1.5 Definition of terms and concepts

Below is a clarification of the key terms and concepts that will be used frequently in this document:

Grassroot innovations

Grassroots innovations (GI) are innovations developed by grassroots actors seeking innovations that are socially inclusive towards local communities in terms of the knowledge, processes and outcomes involved.

Food system

In this thesis the food system is described as a complex adaptive system that has interdependency and feedback loops between its social and ecological parts, i.e. between those that grow, process, distribute, acquire, consume and dispose of food.

It includes:

- The physical value chain by which food is produced, processed, distributed, consumed, and disposed of.
- The present and historical cultures, institutions, and policies that shape these activities.
- Health and wellbeing outcomes.
- Environmental sustainability in land-use and biogeochemical flows.

Socio-technical regime

The shared rules, conventions and norms that actors (businesses, workers, consumers, scientists, state agencies, civil society groups) operate by in a determined system (energy, transport, food, etc.).

Socio-technical transition

To undergo, or to cause, a process or a period of changing from one condition (in this case, regime) to another. A transition in the food system toward sustainability involves changing the activities, drivers and outcomes, i.e. the regime of that system.

Multi-level Perspective

A heuristic framework designed to offer tools to understand socio-technical change over time. It splits a socio-technical system into three levels according to their stability: landscape, regime and niche.

1.6 Overview of research approach and strategy

This research was designed to address the proposed objective of understanding grassroots innovations in Cape Town's food system under a constructivist paradigm. Given the exploratory nature of this research, I see this approach as appropriate as it is inclusive to the subjectivity of experiences, as will be further discussed in chapter 3 (Braun & Clarke, 2013). Based on sustainability transitions and food systems literature, I conducted a qualitative case study of grassroots actors in Cape Town's food system (Braun & Clarke, 2013; Flyvbjerg, 2006).

A narrative literature review informed the framework of socio-technical transitions that guided the case study. The case study participants were sampled based on the following criteria, which are explained further in chapter 3. Participants must be:

- (a) operating at a local scale in Cape Town,
- (b) innovatively addressing topics related to social-ecological issues,
- (c) making use of local knowledge to contribute to more sustainable food systems,
- (d) acting out of ideological commitment to attend to a social need, and
- (e) dependant on grants, funds, or other voluntary work.

Following a snowball method, interviewees were asked to share information about other potential actors to include in the study (Tenzek, 2018). This selection of actors did not aspire to be a representative sample. A purposive sampling strategy was chosen to offer insights into the research question (Gentles, Charles, Ploeg & McKibbin, 2015; Fletcher & Plakoyiannaki, 2012). The semi-structured, in-depth interviews were

centred around the actor's story, and the strategy of impact and innovation (Braun & Clarke, 2013).

After the interviews were carried out, they were transcribed and analysed following thematic analysis methods (Braun & Clarke, 2013). Once the main themes were drawn, I analysed them in light of the literature, in order to answer the research question. More details of the research approach will be discussed in chapter 3.

1.7 Thesis outline

The second chapter presents the narrative literature review that was conducted to develop a theoretical framework that informs the research objective. The third chapter explores the context of the case study and discusses the approach, design, and methodology for exploring the research question. The fourth chapter presents a background to the case study, the themes developed, and findings. The fifth and final chapter concludes the research project. It presents a discussion of the overall findings of the study, linking it to literature reviewed, and answering the research question. I also suggest further areas of research based on the limitations occurring during the research process.

1.8 Conclusion

In this chapter, I introduced the main elements of this thesis. The background section contextualised the issues around the unsustainable food system and introduced the field of grassroots innovations. This informed the problem statement and research objective, namely, to understand the innovations and technologies developed and adopted by grassroots actors trying to shift Cape Town's food system.

This chapter also included a section dedicated to clarifying the common terms and concepts used throughout this research and an overview of the research approach and strategy that was adopted. The final section provided an overview of the chapters to follow.

Chapter 2 – Literature review: Socio-technical transitions in the food system

2.1 Introduction

In this chapter, I will present a narrative literature review on socio-technical transitions to sustainability, the multi-level perspective, a framework used to understand transitions, as well as the role of grassroots innovations and how these frameworks apply to food system transitions. The socio-technical transitions literature helps us understand how systemic changes come about, whereas the multi-level perspective framework offers a heuristic framework to unpack each actor and the dynamics that are at play. Within the multi-level perspective, grassroots actors also deliver innovations to a system. This understanding will be used to guide fieldwork in the following chapters.

2.2 Methodology and methods

As briefly discussed in chapter 1, a preliminary literature search using ‘technology’ and ‘innovation’ as search terms returned results mostly related to ‘high-tech’ innovations for agriculture, such as climate-smart agriculture, sustainable intensification, precision agriculture and automated greenhouses. These kinds of innovations are based on the assumption that technology will be key in increasing agricultural productivity and, hence, feeding the world. As I came to find later in my literature research, Smith and Seyfang (2013) agree that sustainable development action is separated into two strands: either that of ‘ecological modernisation and technological innovation’, or that of ‘community action and the social economy’.

My interest was in researching innovations that steer the food regime in a more sustainable direction – that is, towards greater environmental and social justice. High-tech solutions to food system sustainability and food security did not seem to be appropriate methods for changing food system outcomes in South Africa given the link between inequality and food insecurity and the fact that the country is a country deeply affected by inequality. I therefore added the terms ‘social inclusion’ and ‘social innovation’ to my search terms. I came to find three terms that named social movements and that acknowledged socially inclusive innovations: appropriate technology, technologies for social inclusion, and grassroots innovations. The three movements have

the goal of being inclusive of and relevant to local communities in terms of knowledge, processes, and outcomes in common. I limited the literature research to the term ‘grassroot/s innovation/s’ because of its connection to the literature on socio-technical transitions. The term ‘sustainability transitions’ was also included so that the literature review would encompass purposeful transitions, without opposing the literature of socio-technical transitions.

The literature survey was conducted, on and off, between March 2018 and November 2019 on the Scopus, Ebsco Host and Web of Science databases. For building the theoretical framework of this thesis on socio-technical transitions in food systems and grassroots innovations, I used the following search terms:

- “sociotechnical transitions” OR “sustainability transitions” OR “technology” OR “innovation” AND “food systems”,
- “sociotechnical transitions” AND “multilevel perspective” AND “grassroots innovations”,
- “grassroots innovation” AND “sustainab*” AND “food systems” OR “food security” OR “food sovereignty” AND “urban”

After conducting the literature survey, I set up alerts on Google Scholar on the most prominent authors (such as Geels, Smith, and Seyfang) on the topics. Some further and more recent literature on the topics was suggested by such alerts and included in the literature review. The algorithms of Mendeley, the software I used for bibliography management, have also proven to provide valuable suggestions on up-to-date literature based on my digital library.

The literature review has been organised as follows: first, I discuss the theoretical framework of socio-technical transitions in section 2.3. This is followed in 2.4 by a discussion of the analytical framework proposed to understand socio-technical transitions, the multi-level perspective. Section 2.5 focuses on civil society niches, i.e. grassroots innovations. Section 2.6 applies the theoretical and analytical framework to food systems, tying together the theme of this thesis: grassroots innovations for food system transitions.

2.3 Socio-technical transitions to sustainability

2.3.1 Socio-technical systems

To understand how we can shift from this broken food system to a more sustainable one, innovation studies offer an understanding of how technological solutions come about and may shift entire systems to better cater to human wellbeing while at the same time supporting environmental systems (Smith, Voß & Grin, 2010). So-called greener technologies, however, do not necessarily imply shared benefits, leaving populations excluded from wellbeing gains (Swilling & Anneck, 2012; Pattnaik & Dhal, 2015). This calls not only for sustainability transitions, but also just transitions, which encompass climate and social justice goals. Within innovation studies, socio-technical transition studies offer a framework to understand such changes, and this literature is the guiding theoretical framework of this research project.

Socio-technical systems are made up of artefacts, institutions, knowledge, capital, labour, cultural meaning, and is formed by the outcome of human activity in the environment (Geels, 2004). Human actors include companies, industries, users, consumers, public authorities, social organisations, research institutes, which all enjoy relative autonomy and have distinguishing features. Members of these groups usually share perceptions, values, agendas, norms, and so on, and over time, these social groups become specialised. This specialisation and differentiation of social groups has led to detailed social networks that function to provide a societal need. A social-technical system is thus defined in a somewhat abstract, functional manner “as the linkages between elements necessary to fulfil societal functions (e.g. transport, communication, nutrition)” (Geels, 2004:900).

Smith (2003) highlights the use of the ‘socio-technical’ adjective. The term brings to attention three aspects of a system. Firstly, how pervasive technology is in mediating social relations; secondly, how technology has an inherent social nature to it, and thirdly, how the binary differentiation between social and technical is misleading. Seyfang and Longhurst (2016) add to this notion by elucidating that systems are not only made of technological infrastructure, but also of social institutions and knowledge which constantly co-evolve. A socio-technical regime is the ‘rules of the game’ of a

determined social-technical system (Geels, 2004:909). These ‘rules’, aligned to each other, are carried out by social groups that make up the social-technical system.

2.3.2 Socio-technical transitions

The concept of socio-technical transitions derives from socio-technical systems. Simply put, a transition is the process of change from one socio-technical regime to another. It is a non-linear process, set in motion by the co-evolution of technologies, user practices, regulations, governance networks, belief systems and research agendas (Geels & Schot, 2007; Geels, 2004a). This process of change is systemic and non-linear: it involves technology, policy and regulation, consumer practices, infrastructure, culture and scientific knowledge (Markard, Raven & Truffer, 2012; Geels, 2011; Geels & Schot, 2007). It means a shift in how these actors relate in order to fulfil the desired societal function. In the author’s words “transitions are therefore complex and long-term processes comprising multiple actors” (Geels, 2011:24). As these elements change over time, they replace or reconfigure the socio-technical regime. Once a transition is ‘over’, both material and non-material components have been radically transformed (Cohen & Ilieva, 2015).

Socio-technical transitions are, consequently, “relatively rare, long-term macro changes” (Geels, 2011:38). The study of such transitions focusses on understanding how new practices come into place, how they solidify and how other practices fade away. Markard, Raven and Truffer (2012) identify that transitions literature is made up of a combination of four interrelated fields: strategic niche management, multi-level perspective, transition management, and technological innovation systems. This research field focuses on how socio-technological regime transformations emerge from an accumulation of innovations in niche spaces, where radical innovations are tested and developed (Hossain, 2016; Geels, 2011).

2.3.3 Sustainability Transitions

Sustainability transitions are then about socio-technical transitions towards sustainability and regard the interplay between technology, policy, power, politics, markets, culture and public opinion (Geels, 2011). Compared to other historical transitions, which were emergent, sustainability transitions are goal-oriented (Markard, Geels & Raven, 2020; Markard, Raven & Truffer, 2012), aiming at the reduction of the

dependency on the unstable global market, transportation and fossil fuels (Hossain, 2016; Seyfang & Haxeltine, 2012). It implies the re-localisation and diversification of local economies but also proactivity and direct action. There is a particular urgency in socio-technical sustainability transitions in the fields of energy, transport and agri-food, which are dominated by large corporations (Markard, Geels & Raven, 2020; Geels, 2014).

2.3.4 Resistance to transitions and lock-ins

As Geels (2011) understands, sustainability transitions are inherently permeated by tensions due to their end goal being a collective good, sustainability, which implies typical neoclassical microeconomic challenges such as free rider problems³ and prisoner's dilemmas⁴ (Köhler *et al.*, 2019; Geels, 2011).

Moreover, sustainability transitions are met with resistance. Incumbent actors may hold power in the system thanks to its dynamics and they might not be willing to let go (Geels, 2014). Examples are companies in .coal, oil, car, electricity, and agri-food industries that are politically powerful and among the largest in the world (Geels, 2014). Sustainability challenges are further aggravated by path-dependency and systemic lock-ins (Markard, Raven & Truffer, 2012). Established technologies together with user practices, lifestyles, complementary technologies, business models, value chains, organisational structures, regulations, institutional structures, and political structures form a heavily intertwined structure through which socio-technical systems operate. As a result, socio-technical systems grow and evolve through incremental, rather than radical changes. However, Markard, Raven and Truffer (2012) argue that such incremental changes are not enough to deal with the existing sustainability challenges.

Geels (2004) describes how lock-in mechanisms only allow for innovations that add incrementally to the regime, following the same 'rules of the game', and end up shutting out radical innovations. They are entrenched processes of a different nature that lock us into trajectories and lock out sustainable alternatives (Seyfang & Smith, 2007). Geels

³ Free-rider problem is a market failure in neoclassical economics. It occurs when someone benefits from resources, such as a good or a service, but does not pay for it, or underpays. There is no way to exclude the person from the use of public goods or services, e.g. street lights, or clean air.

⁴ Prisoner's dilemma, also from neoclassical economics, refers to a paradox in decision analysis in which incentives steer decisions to a less than optimal outcome for the individuals of the group.

(2019) describes the different natures of lock-in mechanisms, which determine that innovations are mostly incremental to the regime in place and path-dependent⁵. They are:

- Techno-economic, such as sunk investment, economies of scale and accumulated knowledge from learning-by-doing.
- Social and cognitive, such as routines and shared mindsets; accumulated social capital from the alignment of social groups over time; user practices and lifestyles organised around an established technology.
- Institutional and political, such as existing regulations, standards, and policy networks that benefit incumbent technologies and have vested interests in maintaining regulations to favour established institutions.

As Köhler *et al.* (2019) note, transitions, including sustainability transitions, are inherently political processes. Different individual and collective actors will disagree about outcomes, the best way to reach them and the choices to be made. In this process, new actors in the system will push for public support. Politics and power in socio-technical transitions are translated into the regulative, cognitive and normative rules underlying socio-technical regimes, and the power struggles between incumbent regimes and imminent niches (Geels, 2014; Köhler *et al.*, 2019). This will be discussed further in section 2.4.

2.3.5 Critiques to the literature

The literature on socio-technical transitions to sustainability does not come without its critiques. A critique to the study of socio-technical transitions, for example, is that the practices that configure a regime, despite diffusing widely, do not necessarily diffuse evenly: new practices happen in particular places and at a particular time. This happens because not all elements that make up a practice are present everywhere or at all times. Adding to that, available resources and power structures also change from place to place. As summarised by Cohen and Ilieva (2015), as social practices vary spatially, so do socio-technical transitions. Such spatial differences reinforce the need for local and applied studies of transitions.

⁵ Path-dependency refers to how the available choices are determined by choices previously made, explaining technology adoption processes and the evolution of an industry (Nelson & Winter, 1982).

Geels (2019) recognizes that sustainability transitions research often lacks a reasonable assessment of actual sustainability outcomes and impacts. Another critique to sustainability transitions literature is the gap between local initiatives and large-scale transitions towards sustainability. The main reason behind this gap, though, is the relatively few empirical examples of successful regime shifts towards sustainability (Geels, 2019). Socio-technical transitions, nonetheless, is only one theoretical framework to studying sustainability transitions (Köhler *et al.*, 2019). Geels (2019) identifies three approaches to studying sustainability transitions: socio-technical transitions, socio-ecological regime shift, socio-metabolic transitions, and social practice theory. The author describes these four approaches as analytical-descriptive and change-oriented using “substantive, non-prescriptive and theoretically grounded concepts of transformation which identify patterns and units and their relationships” (Geels, 2019:2).

2.3.6 Theoretical frameworks for sustainability transitions

Markard, Raven and Truffer (2012) identify four theoretical frameworks that are prominent for transition studies. They are namely transition management, strategic niche management, technological innovation systems and the multi-level perspective (MLP) on socio-technical transitions. Cohen and Ilieva (2015) add social practice theory as another framework to understand sustainability transitions⁶. For this research, I will use multi-level perspective as a framework to look at Cape Town’s food system transition. The multi-level perspective will be discussed in greater detail in the next section.

In this section I have introduced the theoretical framework that grounds this research project. Given the need for just transitions, I have defined the nature of socio-technical transitions to sustainability, namely sociotechnical systems, sociotechnical regime, regime transitions, purposeful sustainability transitions, and resistance mechanisms. Lastly, I have introduced the analytical framework that will be used to study sociotechnical transitions to sustainability, the focus of the next section.

⁶ While the Multi-level perspective focuses on a service (e.g. energy, food, transport), social practice theory focuses on systems of practice for everyday needs (such as commuting, showering, shopping) (Cohen and Ilieva, 2015).

2.4 The multi-level perspective

The multi-level perspective is an analytical framework to understand socio-technical transitions. It is rooted in innovation studies and builds on concepts from evolutionary economics, sociology of innovation, and institutional theory (Geels 2004, 2019), all stemming from a constructivist epistemology (Geels, 2011). It aims to cater to the calls for the urgent need for fundamental changes in systems and structures and addresses the multi-dimensional nature of systemic change (Geels, 2011). The proposed framework helps interpret the dialectical dynamics of regime transitions through the interactions between three different levels of socio-technical systems, hence the adjective ‘multi-level’ (Geels, 2004). The multi-level perspective, thus, provides a framework to mapping the process of transitions in a ‘global model’ of these three analytical levels and temporal phases of socio-technical transitions. The multi-level perspective has become one of the core frameworks for the Sustainability Transitions Research Network (Geels, 2019).

2.4.1 Landscape, regime and niches

In the multi-level perspective, the unit of analysis is the socio-technical system, defined in 2.2 as the concept of how elements link to each other to fulfil a societal function. Geels (2019) introduces the multi-level perspective’s understanding of regime shifts and transitions as:

“enacted by multiple social groups, (e.g. firms, consumers, social movements, policymakers, researchers, media, investors), who engage in multiple activities (e.g. exploration, learning, debate, negotiation, power struggle, conflict, investment, coalition building, goal-setting) in the context of rules and institutions, including belief conflict, investment, coalition building, goal-setting) in the context of rules and institutions, including belief systems and norms” Geels (2019:187)

The three levels of the multi-level perspective should be understood as three nested levels that “are not necessarily hierarchical” (Geels, 2011:37). These three levels show different levels of stability, and feed into each other (Geels, 2011). Each level is a heterogenous configuration of elements, which have an associated level of stability and alignment among elements (Geels, 2004, 2011, 2019). The three levels are namely: the exogenous landscape, the socio-technical regime, where established practices and

associated rules govern, and the niche, where radical innovations develop (Geels, 2004). In the next section, I will discuss each level in more detail.

a) Landscape

The landscape is associated with a macro scale (Geels, 2004, 2011) and influences both the regime and the niche (Smith, Voß & Grin, 2010). The landscape includes elements that do not change over time, or at least change very slowly, such as demographic trends, political ideologies, macro-economic patterns, weather and the bio-geophysical environment. It encompasses the 'zeitgeist', symbols, values, spatial arrangements and infrastructures of a society at a point in a time (Geels, 2004, 2011), but also rapid external shocks, such as wars (Geels, 2019) and pandemics (Wells *et al.*, 2020). It is the most stable level, with the strongest structuration of activities where changes take the longest to occur. The landscape is somewhat exogenous to the system, it cannot be directly influenced by the regime or the niche actors in the short term (Geels, 2011). The landscape can exert pressure over the regime, either stabilizing or destabilizing it.

b) Regime

The regime is associated with the meso-level. The regime supports the socio-technical system through a somewhat coherent set of rules, guiding the activities of social groups and reproducing the elements of the prevailing system (Geels, 2004). We can understand the set of rules as engineering practices, production technologies, skills, ways of framing challenges, etc, which are embedded in physical infrastructures and institutions. This set of rules is the product of historic interactions between social actors, who actively make use of, interpret, and apply systems of rule. These interactions can vary between cooperation, negotiation, and opposition and take place within the boundaries and pathways enabled by existing structures as they are guided by said structures. In other words, the existing structures foster, coordinate but also limit interactions between actors.

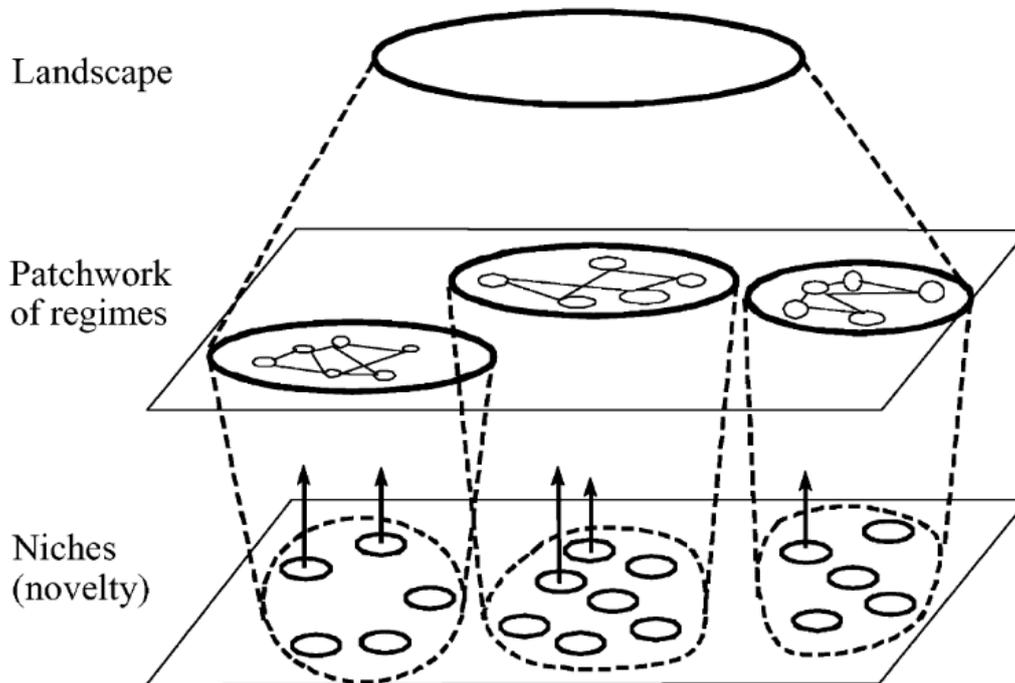
At the same time, social actors act upon such a system through their interactions, reproducing it (Geels, 2004). The reproduction of these shared rule systems across different localities creates the patterns of activity that identify a sociotechnical regime (Geels, 2004). Two main feedback loops give the regime its stability: social learning and actor structuring. According to the author, social learning stands for institutional

and sociological dynamics, e.g. public policies or user preferences, while actor structuring is the interactions between actors affecting their relationship, or, power struggles (Geels, 2004). These feedback loops are continuous, leading to multiple rounds of development, and create path-dependence. Path-dependency, as introduced previously in 2.3.4, is explained through microeconomic theory: sunk investments, economies of scale, and knowledge create incentives for only incremental adjustments which benefit from the existing socio-technological structures. These small, incremental innovations reinforce trajectories in technological, cultural, political or scientific dimensions, creating the so-called ‘lock-ins’(Geels, 2011).

c) Niche

Niches are at micro-level. They are protected spaces, where radical innovations that deviate from existing regimes are developed, such as Research and Development laboratories, small market niches, start-ups, etc (Geels, 2011). These niches are protected from the mainstream mechanisms of selection, through subsidies, public authorities, strategic investments, or experimental projects. In a niche, the rules are less articulated and less solidified, and the uncertainty level is high. A technological niche, despite being protected, is less stable.

The objective for niche actors is for their innovation to be adopted by the regime and scaled up or replace the regime. Niches that radically diverge from the incumbent regime require a large amount of positive feedback in order to escalate (Smith, 2003). Often, niche actors are looking to address a tension or a problem in the existing regime, making niches actually essential to regime transitions, acting as “seeds for systemic change” (Geels, 2011). Smith (2003) suggests understanding niches as a single social entity – an alternative technology sociotechnical network. This network is a collection of experiments linking social and technological innovations. Below is Geels’ (2002) representation of the multi-level perspective to understand socio-technical systems, according to its degrees of stability:

Figure 1: The nested hierarchy of the multi-level perspective (Geels, 2002)

Now that the multilevel perspective has been discussed, I will present the way in which transitions, or regime shifts, take place within that framework.

2.4.2 Innovations and regime shift

In the multilevel perspective, the main source for regime shifts are radical innovations produced in socio-technical niches, and there are several different sources of system innovation, the 'niches' (Geels, 2019). Seyfang and Smith (2007) make the distinction that niches do not offer models or blueprints but are rather potential sources for innovation. Through the interaction between different processes at different levels, a niche-innovation builds momentum while, at the same time, changes in the landscape create a pressure on the socio-technical regime. Such pressures destabilize the regime and open windows for a niche-innovation to occupy.

Geels (2011) highlights that there is no driver to sociotechnical transitions. They are the outcome of processes in multiple dimensions, which link up and enable each other. The landscape's slow development and its shaping of the regime both limit and enable the breakthrough pathways for niche innovations, dictating the relationship between niche and regime (Smith, 2003; Geels, 2019). Changes in the landscape must occur in

order to change the logic behind which niche innovations will destabilize the regime. As Berkhout, Smith and Stirling (2005) stress, regime shifts depend on processes and outcomes beyond the control of niche actors. The role of the niche is to play and experiment with alternatives to try to resolve the regime's contradictions and shortcomings. Transitions, thus, come about through the interplay between processes at the three levels: niche, regime, and landscape in the multi-level perspective.

The general dynamics for transitions are that firstly niche-innovations gradually build up internal momentum, then secondly niche-innovations and landscape changes create pressure on the system and regime, destabilizing it; and lastly, the destabilisation creates windows of opportunity for niche-innovations, which then diffuse and disrupt the existing regime, changing the existing system (Geels, 2019:4).

When applying this analytical framework and dynamic to sustainability transitions, we must consider that they are characterised by its goal to address the socio-environmental shortcomings of the incumbent regime (Smith, 2003). Traditional improvements to products or business practices will not suffice, as Berkhout, Smith and Stirling (2003) discuss that production and consumption systems, in order to achieve the urgent climate action outcomes necessary (such as 'factor 20' resource efficiency, or 60% carbon emission reduction) require radical improvements to achieve goals of that magnitude. Change is needed at regime level.

There are certain common traits in the sustainability niche: an orientation to meet needs through local production, the low use of inputs, particularly non-renewable ones, the use of local resources, the strive for closed cycles, and a high degree of social inclusion (Smith, 2003). Sustainability niches contest the incumbent resource-intensive, carbon-emitting regime, diverging intentionally from the mainstream technological trajectory proposed by the current regime.

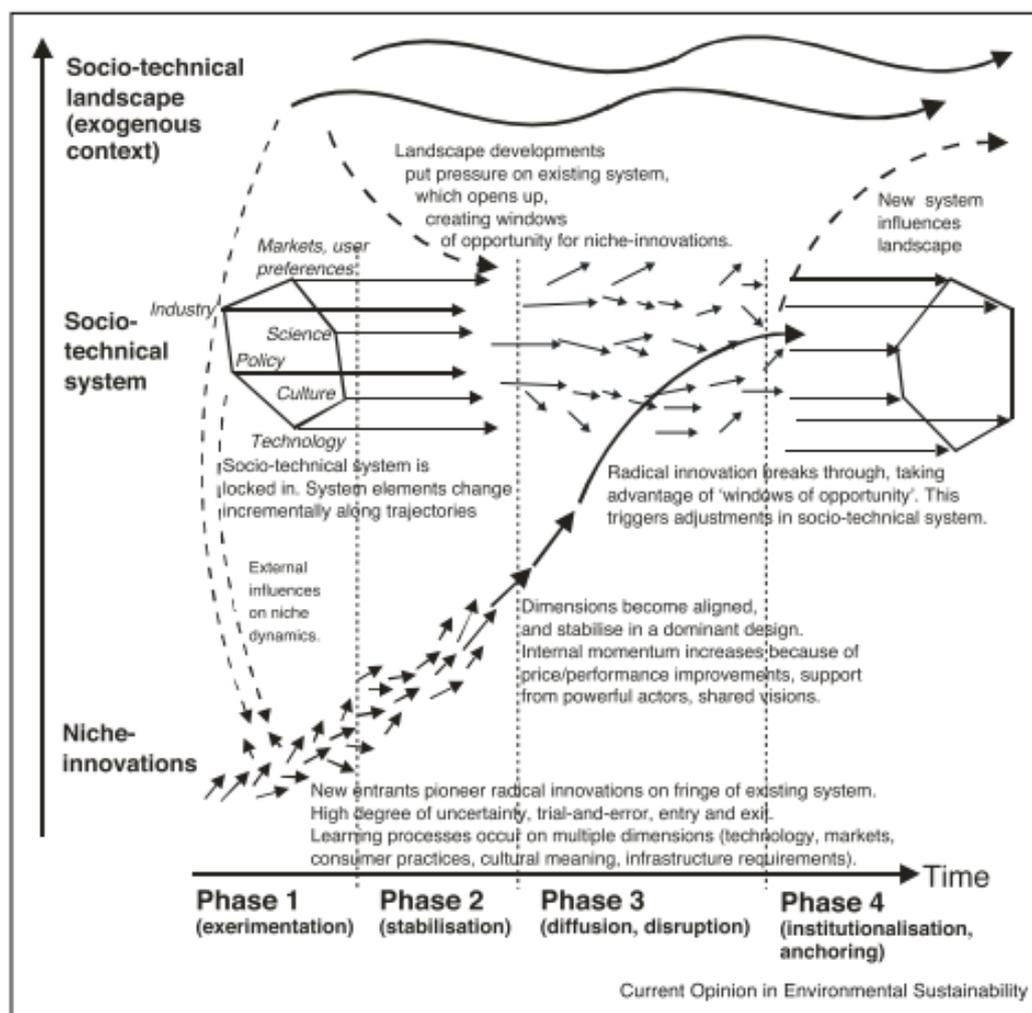
Geels (2019) agrees that there is a plethora of sustainability experiments taking place all over the world, which Smith (2003) highlighted as key to maintain a degree of diversity in sustainable innovations. These experiments are, nonetheless, highly fragmented and it is crucial to overcome this fragmentation and the tendency for experiments to remain isolated or short-lived. This dulls innovation movements

capacity to trigger systemic change. According to Geels (2019), green niche innovations face more challenges, namely:

- A higher price than existing technologies due to the economies of scale.
- Markets that are not ready for the innovations and as such cause users and investors to have to deal with uncertainty.
- Radical innovations that suffer from ‘liability of newness’ – they are perceived as strange, unreliable, unfamiliar, which reduces their cultural legitimacy, social acceptance, and access to financial resources (Geels, 2019).

Geels (2019) offers a schematic presentation of how regime shifts, and systemic change occur:

Figure 2: Socio-technical transitions dynamics (Geels, 2019)



Such socio-technical transitions take place over several decades. The process can be divided into four phases with different core activities and struggles, as explained by Geels (2019). The first phase, experimentation, is where trial-and-error learning happens within the niche. Research and Development (R&D) laboratories, real-world experiments and demonstration projects are the first ‘carriers’ of niche innovations, where pioneers explore techno-economic performance, social and cultural acceptance and the political feasibility of innovations.

The second phase is where an innovation is successful in finding a market niche and stabilises itself in a dominant design and where best practices are built around the innovation. The innovation becomes more established in one or more niches. Dedicated spaces and moments where experiences, learning processes and other activities such as codification, standardisation, and model building accumulate and become best practices. Commonly, engineering communities, standardisation committees and/or industry associations form to create the standards for the innovation and its use in the existing regime (Geels, 2019).

The third phase is when the radical innovation has been diffused in the mainstream market, either driven by niche efforts (such as economy of scale, price competitiveness, the development of complementary technologies), or by landscape pressures that open up windows of opportunity when destabilizing the regime. A characteristic of the third phase, is the struggles between the niche and the regime on multiple dimensions. These struggles may be business struggles between incumbents and new entries; or political and power conflicts over agenda setting; or in policy making, such as subsidies and regulations. Such struggles involve policy actors and wider interest groups, which have different degrees of policy network access. The struggles are similar to what Smith (2003) describes as niche expansion and niche linking.

The fourth phase is considered when an innovation has become institutionalized and anchored in regulatory programmes, user habits, professional standards and technical capabilities, and changed the socio-technical regime to accommodate it (Geels, 2019).

Over the years, the literature has developed different typologies of how socio-technical transitions and regime shifts occur (Köhler et al., 2019). Berkhout, Smith and Stirling,

(2005) distinguish four pathways for socio-technical transitions, characterized by the level of coordination and the resource's origins, namely (a) purposive transition (high coordination, external resources); (b) endogenous renewal (high coordination, internal resources); (c) reorientation of trajectories (low coordination, internal resources); and (d) emergent transformation (low coordination and external resources). Geels and Schot (2007), however, offer four transition pathways, depending on temporality and the kinds of alignment in the multi-level perspective. They are: (a) technological substitution, where competing niche-innovation replaces regime, after landscape pressure destabilizes regime; (b) regime transformation, in which incumbent actors reorient in response to gradually increasing landscape pressure; (c) regime reconfiguration, where symbiotic niche-innovation is incorporated in regime, followed by knock-on effects and innovation cascades that gradually alter the system's architecture; and lastly (d) de-alignment and re-alignment, where rapid landscape pressure destabilizes regime, creating thus space for multiple emerging niche-innovation, followed by the re-alignment of a regime around one of them. Table 1 offers a comparison of the two typologies.

Table 1: Two typologies for transitions pathways

Two typologies for transitions pathways	Berkhout <i>et al</i> (2005)	Geels and Schot (2007)
Key variables that determine the transition pathway:	Coordination (high or low)	Time
	Resources origins (internal or external)	Alignment between levels in the MLP
Transition Pathways	Purposive transition	Technological substitution
	Endogenous renewal	Regime transformation
	Reorientation of trajectories	Regime reconfiguration
	Emergent transformation	De-alignment and re-alignment

Hargreaves, Longhurst and Seyfang (2013) simplify this. In most cases, transitions occur when regimes change incrementally to become more efficient. They result from external 'landscape' pressures (such as climate change, or cultural shifts) on the

incumbent regime (for example the fossil-fuel based energy system) that create opportunity windows for niche innovations (e.g., renewable energy technologies).

The multi-level perspective offers us a heuristic framework for the analysis of multi-dimensional topics: it does not aim to provide a model for transitions. The multi-level perspective explains a socio-technical transition as a process: outcomes are explained in terms of event sequences, timing and conjunctures of event-chains (Geels & Schot, 2007; Geels, 2011). It offers a framework in which we can capture the complex interactions between actors at different levels of stability (innovative niches, dominant regimes, and macro-level landscape pressures) and form a narrative (Geels, 2011; Cohen & Ilieva, 2015). In the author's words, the multi-level perspective is "more used as illustration than a systemic research" (Geels, 2011:36). Moreover, enough literature has been developed which moves away from the initial dichotomies of the multi-level perspective framework. For instance, new entrants develop radical innovations, whereas incumbent actors are limited to incremental innovations. Studies also suggest how incumbent actors can reorient towards radical niche-innovations (cf. Berggren et al., 2015; Penna and Geels, 2015), or that incumbents from different sectors move in to engage with niche-innovations (Köhler *et al.*, 2019).

2.4.3 Shortcomings of the multi-level perspective

The analytical framework proposed by Geels (2004; 2011) does not come without its critiques. The author recognises that one of its shortcomings is that the multi-level perspective misses the understanding of multi-regime interactions and actors because of its focus on systems, such as energy, food, water or transport (Geels, 2011). It also fails to provide a detailed, quantitative assessment of transition impacts (El Bilali, 2019c).

Hargreaves *et al.*, (2011) argue that the multi-level perspective focuses on market actors and overlooks civil society actors. Hargreaves, Longhurst and Seyfang (2013) identify that studies which make use of the multi-level perspective downplay the ways in which technical systems are implicated in how we go on with our daily lives, and often focus on how innovations are shaped by social processes. The same authors also bring attention to the over-researching on how innovations break through stable regimes and the under-researching of the dynamics of stability. Smith, Voß and Grin, (2010), Cohen

and Ilieva (2015), and Koehler et al (2019) add that the multi-level perspective does not include spatial inequalities nor does it study the role of cities in socio-technical transitions enough.

Understanding the role of cities is relevant both to the field due to the concentration of patterns of unsustainable consumption practices, but this critique is also relevant to this thesis, where I aim to use sociotechnical transitions and the multilevel perspective to understand the Cape Town's food transition and understanding the civil society niche.

2.5 Grassroots innovations

2.5.1 Introduction

In this section I present a brief history of the grassroots innovations approach, which helps to position and define it within the sustainability transitions and innovation studies literatures. Next, I discuss the main characteristics of such civil society-driven innovations and their role in sustainability transitions, which includes the benefits and challenges. Lastly, I provide an overview of the conditions required for such transitions to be successfully spread.

2.5.2 Development of grassroots innovation literature

Within innovation studies, several types of niches can offer sustainability solutions. Seyfang and Smith (2007) identify two parallel policy strands for sustainable development, namely that of 'ecological modernisation and technological innovation' and 'community action and social economy'. They argue that this separation does not recognise the potential of civil society to innovate for sustainable development, hence they propose to elevate civil society to a niche as a way to analyse community-level innovative action for sustainability.

In the sustainability transitions research, the term 'grassroots innovations' can be traced to Seyfang and Smith (2007). They defined these as "networks of activists and organisations generating novel bottom-up solutions for sustainable development; solutions that respond to the local situation and the interests and values of the communities involved" (2007:585) and that allow for experimentation with social innovations, besides the use of greener technologies.

Grassroots innovations have been studied under different theories, such as strategic niche management and the multi-level perspective, with a consensus emerging that grassroots innovations are bottom-up approaches to sustainable development (Hossain 2016). In other words, across different bodies of literature, there is a consensus that grassroots innovations are developed by communities for themselves. Often, the term is associated with marginalised communities, which are ignored in government and commercial top-down models of research and development and end up developing their own solutions. (Hossain 2016).

A recent review of the sustainability transitions field, as a whole, identifies two other perspectives from which the role of civil society has been conceptualised and studied (in addition to grassroots innovations) (Köhler *et al.* 2019). The first is a consideration of how civil society can affect the politics of transitions, for example, through resisting certain innovations or building support for them (Köhler *et al.* 2019). The second area investigates how civil society can affect broader cultural changes, like shifting consumer awareness and demands (Köhler *et al.* 2019). While these other perspectives are noted, they are beyond the scope of this research.

2.5.3 Characteristics of grassroots innovations

Seyfang and Smith (2007) compare grassroots innovation niches to market-based innovation niches. Grassroots innovations operate within the civil society niche of the social economy of community activities (Seyfang & Smith, 2007) where surpluses are reinvested back into the community: they are guided by an ideological or social need that affects the community from which they stem (Seyfang & Longhurst, 2016). The communities' values and cohesion, rather than financial subsidies, provide the protection (niche) to safely innovate and experiment (Seyfang & Longhurst, 2016). They operate without the support or interest of the government or business, unlike mainstream innovations (Hossain, 2016). Market-based innovation typically entails technical efficiency and is followed by its commercialisation, disseminating 'top-down' to the population. Grassroots innovations work in the opposite direction: they establish themselves in a community and are then further adopted by other structures, in a

‘bottom-up’ direction (Hossain, 2016). The table below summarises the differences between market-based and grassroots innovations:

Table 2: Comparing the characteristics of market-based and grassroots innovations

	Market-based innovations	Grassroots innovations
Context	Market economy	Social economy
Driving force and values	Profit; Schumpeterian rent; scientific advance	Social need; ideological; social justice
Niche	Market rules are different: tax and subsidies temporarily shelter novelty from full forces of the market	Values are different: alternative social and cultural expressions enabled within niche
Predominant actors and organisational forms	Universities, public labs, commercial firms, public institutions, international funding agencies, firms	Diverse range of organisational types: voluntary associations, co-operatives, informal community groups
Investments and resource base	Income from commercial activity, state/corporate funds, venture capital	Grant funding: voluntary input, mutual exchanges, development aid, community finance, donations, state funding, limited commercial activity
Appropriability	Intellectual property, patents	Not appropriated at individual level – seen as a common good
Sites of innovation	Laboratories, R&D institutes, boardrooms, market-based firms	Community projects, participatory processes, social movements
Predominant knowledge forms	Scientific and technical knowledge	Local, situated knowledge, indigenous knowledge
Emblematic technological fields	Biotechnology, ICTs, nanotechnology	Organic food, small-scale renewable energies, water sanitation

Source: Adapted from Seyfang & Smith (2007:592) and Fressoli *et al.*, (2014:279)

Moreover, grassroots innovations niches are characterised by a heterogeneity of shapes and forms (Seyfang & Smith, 2007; Smith & Seyfang, 2013). The diversity of organisational forms includes cooperatives, voluntary associations, informal community groups and social enterprises. Their resource base is just as diverse: it might

include grants, external donors, commercial activity, and exchanges. Their level of professionalisation, funding and official recognition is just as diverse. In Seyfang and Smith's review (2007), official and semi-official groups work alongside informal, voluntary activities and their relationships can vary from competitive to complementary to collaborative.

Despite this heterogeneity, a characteristic of grassroots innovations that stands out is that, compared to market-based innovations, grassroots innovations are a reaction to perceived social and environmental injustices in the dominant regime (Gernert, El Bilali & Strassner, 2018). Attending to a social and/or environmental need is thus their primary function (Seyfang & Smith, 2007). According to Hossain (2016), grassroots innovations emphasise social, cultural, and ethical values, which are not necessarily prioritised in other innovation niches. Durrant (2014) further distinguishes civic society niches from market and government innovation niches by the underlying presence of a supportive network of other organisations, activists and 'ethical consumers' that share similar values.

Gernert, El Bilali and Strassner (2018) identify grassroots innovations as highly contextual given their enactment by local volunteers and activists, and their origin in moral and collective aspirations to tackle a local problem. Solutions are generated given a context's problems, resource scarcity, embedding local and traditional values and knowledge. Grassroots innovation movements also generate unique knowledge of their context, i.e. how they are locked out of the regime, the solutions to overcome said exclusion and how said solutions are obstructed by the regime. This unique understanding adds value to including the grassroots in innovation policies, guaranteeing more plural and inclusive innovation spaces. Grassroots initiatives in particular can enhance the effectiveness and inclusivity of transition processes and policies (Gernert, El Bilali & Strassner, 2018).

Smith, Fressoli and Thomas (2014) clarify the role of 'outsiders' in grassroots innovations: people and organisations from outside the local community, such as engineers and designers, need not be excluded to maintain the movement's grassroots quality. The only condition is that local knowledge and the local communities remain in the lead of the innovation process (Hossain, 2016). This means grassroots

innovations do not only start from inside and expand outwards, but elements outside of the community may move inwards to mobilise and empower grassroots innovation movements, for example local government bodies or researchers. Outsiders can play several roles, such as initiating projects, interacting with policy makers, providing tools, raising resources or replicating niche projects (Hossain, 2016; Köhler *et al.* 2019).

Grassroots movements form networks to tackle the challenges they face outside the niche in which the innovation is tested and scrutinised. Networking helps to expand the pool of resources, solidify knowledge, lobby, develop standards and institutionalise learning (Hossain, 2016). Intermediaries can also play a key role in connecting the niche to the regime. Intermediaries are the agents that connect a diverse groups of actors in a socio-technical system, and are involved in transition processes, their skills, resources and expectations (Sovacool *et al.*, 2020). The connections and partnerships formed go beyond providing a local solution and actually transform local contexts by creating bridges between local actors, such as neighbours, university researchers, civil society organisations, funding institutions, politicians, etc (Smith, Fressoli & Thomas, 2014). Learning to collaborate between the different parties and institutions deepens and extends a community's capability to organise itself around other pressing issues (Smith, Fressoli & Thomas, 2014).

2.5.4 Benefits of grassroots innovations

Seyfang and Smith described the grassroots as an often-overlooked niche for sustainability innovations, “a source of innovative diversity” (2007:590). According to the authors, they play a role that is as important as formal Research and Development (R&D) departments in innovation systems and are key to maintaining innovative diversity. This lies in the fact that grassroots innovations stem from knowledge, experience and skills that make up local communities, and that are outside of institutions of education and R&D (Hossain, 2016). Grasping community activities as safe innovation spaces can provide society with insights of their potential needs, challenges and solutions. Smith, Fressoli and Thomas (2014) further recognise that grassroots innovation activities uncover knowledge highly relevant for sustainability and innovation policies, and stress, moreover, that grassroots innovations should be part of sustainability policies, based on the argument that active citizenship builds stronger democratic institutions.

Smith, Fressoli and Thomas (2014) elaborate on the importance of grassroots innovations for knowledge generation. Firstly, grassroots innovations embed context-specific, ethnographic knowledge, such as how the regime excludes the population, how market and state shortcomings affect local livelihoods, which local solutions and coping mechanisms can improve circumstances, as well as why such technology is socially inclusive. Secondly, comes instrumental knowledge: the socio-technical practices in a different cultural system; the capabilities and resources necessary; economic, social, and environmental performance and feasibility; and production requirements. The third type of knowledge is of a critical nature and showcases structural impediments to grassroots innovations: “by trying to do things very differently, and in coming from or engaging with the excluded, grassroots innovation movements make very visible the institutional, political and economic injustices” (Smith, Fressoli & Thomas, 2014:122). Lastly, grassroots innovations offer knowledge on how to develop more socially just socio-technical configurations. Grassroots innovation movements offer a foundational knowledge to refine broader social, political and economic processes for institutional reforms and structural change (Smith, Fressoli and Thomas, 2014; Hossain, 2016). Thus, grassroots innovations can provide insights for social development policies.

Grassroots innovations may deliver sustainability benefits that top-down measures cannot create, due to the participatory nature of grassroots niches. The use of contextual and local knowledge leads to a more flexible and more relevant solution to the local population (Smith & Seyfang, 2007). In their review, the authors identify benefits from grassroots innovations of two different types, which overlap (Seyfang & Smith, 2007). They refer, firstly, to intrinsic benefits as the direct socio-environmental benefits that form the basis of the niche, such as lower carbon footprint through car sharing, or skills development. Secondly, diffusion benefits are the benefits that arise from the grassroots attempt to transform the regime, by creating cohesive communities, environmental awareness and building capacity, focusing the attention of policy makers, and developing new ways of thinking and working together (Seyfang & Smith, 2007). The knowledge production of grassroots niches is meant to be intensive, and empowering (Smith, Fressoli & Thomas, 2014).

2.5.5 Challenges of grassroots innovations

Discussions around the limitations or challenges faced by grassroots innovations tend to divide these into internal and external or diffusion challenges (Seyfang & Smith 2007; Geels, 2019). The intrinsic, or internal, challenges centre around resources, skills and knowledge. Resourcing the innovation is an ongoing challenge, and a great deal of time and energy can be spent merely surviving (Hossain 2016). The short-term nature of many funding streams means that much time is required just to apply to various funds (Gernert, El Bilali & Strassner, 2018). Due to their ideological commitment to alternative values and their newness, grassroots innovations may also be perceived as risky, deterring policy makers and investors. This brings limitations due to limited funding and social buy-in (Seyfang & Smith, 2007; Geels, 2019).

This constant struggle for resources can lead to high human resource turnover, especially when activists must work as volunteers. Even when there is funding, burnout can be an issue (Hossain, 2016); grassroots innovations try “to enact societal change by counteracting the mainstream”, which can cause high levels of “stress” (Gernert, El Bilali & Strassner, 2018:12). Finding people with the particular set of skills needed and maintaining leadership is also a common challenge (Hossain 2016).

Another outcome of the constant search for resources and resulting high staff turnover is that consolidating knowledge and best practices within the organisation is almost impossible (Geels 2019). New recruits must relearn past mistakes, growth is slowed and the ability of others to learn from the organisation is limited (Hossain 2016)

The very nature and differentiation of grassroots innovations undermine their diffusion: they aim to attend to highly local specificities (Smith, Fressoli & Thomas, 2014; Gernert, El Bilali & Strassner, 2019). Some do not desire to scale up or out, while others are not appropriate beyond their own context.

Moreover, grassroots innovations must be appropriate to the context that they aim to transform, hence they must fit within existing power and representation structures in order to alter it and ensure the vision of justice they carry (Smith, Fressoli & Thomas, 2014). The authors bring to attention that this is a point of tension within the niche

literature in the MLP, where innovations require a certain degree of congruence with regime practices in order to scale up and out.

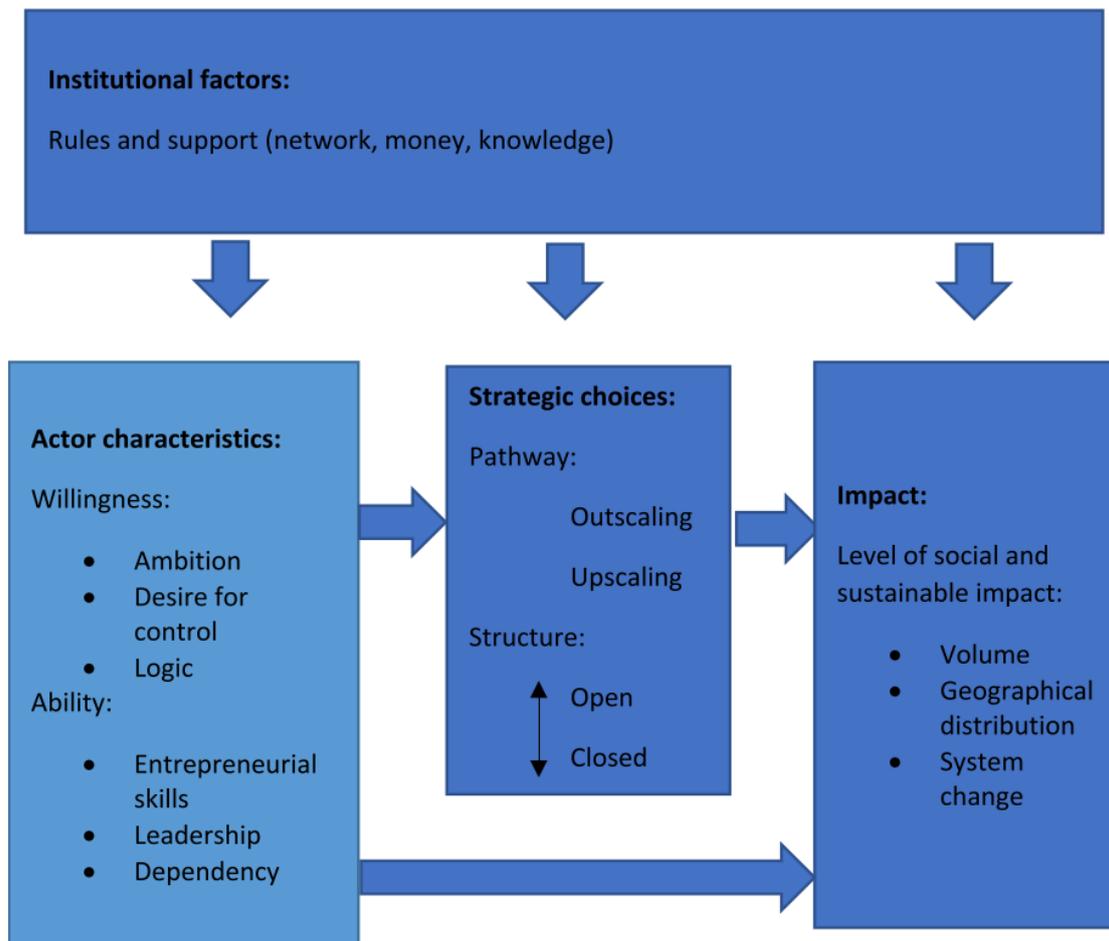
Current grassroots movements have witnessed a rise of social entrepreneurship in order to achieve financial independence (Smith, Fressoli & Thomas, 2014; Van Lunenburg, Geuijen & Meijer, 2020). However, by subjecting to market logic, they risk sacrificing the more radical aspects of the grassroots innovation, such as participatory and empowerment elements (Smith, Fressoli & Thomas, 2014; Hossain 2016).

2.5.6 Success of grassroots innovations

According to Seyfang and Longhurst (2016), strategic niche management (SNM) literature engages in understanding the conditions for the successful spread of niche innovations into the regime. It focuses upon the social networks, learning processes, expectations and enrolment of actors and resources in emerging niche practices (Seyfang & Smith, 2007; Hossain, 2016). As with any niche, the grassroots niche plays differently than the regime. While market-based sustainability niche innovations prosper if they show profitability potential and lock in investment, this is not the case for the grassroots niche (Seyfang & Smith, 2007).

Little research has been done to quantify impacts of the grassroots innovations for sustainable transitions (Feola & Nunes, 2014). Grassroots innovations' success can be measured in two factors: firstly, the empowerment of local actors and communities, and secondly, the external impact to improved environmental performance. However, these two elements are interdependent of global action networks, and cooperation with other actors such as local authorities and businesses is essential to success (Feola & Nunes, 2014). Van Lunenburg, Geuijen and Meijer (2020) offer a systematic review of the conditions for positive scaling of the social environmental impact of bottom-up initiatives for sustainability transitions. It depends on three aspects, which influence each other. The three aspects are: actor's characteristics, strategic choices, and institutional factors. Van Lunenburg, Geuijen and Meijer (2020) illustrate the conditions for positive impact of grassroots innovations:

Figure 3: Conditions for positive impact of grassroots innovations



Source: Van Lunenburg, Geuijen and Meijer (2020)

In terms of actors' characteristics, the authors identify willingness and ability to scale. Willingness to scale depends on an actor's ambition to do so, its desire for control, and the logic that dominates the initiative's operations, namely financial or social logic. An actor's ability to scale depends positively and directly on their entrepreneurial skills and a proactive leadership, but indirectly on their dependency on external resources. The actor's characteristics also determines the strategic choices, but literature is inconclusive on influence.

The authors identify two main strategic choices for grassroots organizations. Firstly, the organization has two pathways for greater impact. The first pathway is to scale out, which means prioritizing the efforts to reach a larger number of people or geographical area. The second pathway is scaling up, which refers to prioritizing influencing local or even international political agendas. The second strategic choice regards the organisational form to be adopted, a common theme in the social-entrepreneurship

literature. Actors can choose to operate in a more closed or open structure, such as branching or creating informal networks, which determine the amount of control that the organisation will have.

The third and last aspect are the institutional factors. These lie outside of the initiatives control. They encompass rules, e.g. legislation, and support, networks, government grants, NGOS, and philanthropy, which stimulate bottom-up initiatives with resources, such as knowledge, funds, and access to networks (van Lunenburg, Geuijen and Meijer, 2020). Institutional factors are factors from the regime and landscape levels of socio-technical systems. Institutional factors affect the actor's characteristics, their strategic choices and the impact they can infer.

As the framework proposed by Van Lunenburg, Geuijen and Meijer (2020), the diffusion and success of grassroots innovations depends on variables beyond the grassroots actor's agency (Berkhout, Smith and Stirling, 2003). This is in line with the multi-level-perspective understanding that regime shifts occur when landscape pressures create windows of opportunity for innovations to occupy.

2.5.7 Conclusion

Seyfang and Smith (2007) conclude that grassroots innovations movements are good at forming alternative pathways for sustainable development. However they do not forcefully connect with the dominant socio-technical regime. Grassroots innovations are not meant to provide a blueprint for sustainable development projects, but their value is in its contribution to a diversity of possible socio-technological futures and social change because they challenge the regime (Smith, Fressoli & Thomas, 2014).

This section discussed what grassroots innovation niches are, how their ideological commitments set them apart from market-based niches, how they innovate and grow, its benefits to a socio-technical system, the challenges and pathways to diffusion, the aspects that influence an initiative's impact, the singular knowledges grassroots movements generate, its value for policy making and how networking is key for grassroots innovation movements. It cannot be forgotten, though, that grassroots are only a small niche within the wider system, and sustainability transitions are the process of co-evolution and multi-actor dynamics (Köhler *et al.*, 2019).

2.6 Food System Transitions

2.6.1 Introduction

Section 2.3 has introduced the theoretical framework of this research project. Transitions to sustainability can be studied under socio-technical systems, that is, understanding how technologies and social dynamics shape each other. Section 2.3 introduced the analytical framework of socio-technical transitions, and section 2.4 introduced the multi-level perspective, a heuristic framework that supports the understanding of sociotechnical transitions to sustainability. Section 2.5 offered a look into grassroots innovations, that is, how a civil society niche can contribute to sustainability transitions.

Food systems transitions studies encompass the study of socio-technical transitions in food systems (El Bilali, 2019a). The term food system offers us a framework for studying the multiple interactions that make up how we produce, distribute and eat food, and includes the social and environmental realms (Ericksen, 2008; Ingram, 2011). It brings together the literature of food security, ecosystem services and social welfare. Ericksen (2008) divides the food system into four main activities: food production; processing and packaging; distribution and retail; and lastly consumption. These four activities lead to systemic outcomes related to food security, environmental safety, and other societal interests. Such activities are also impacted by ecological drivers (climate, water availability, biodiversity, etc) and socio-economic drivers (demographics, science and technology, socio-political context, etc). There are multiple feedback loops between drivers, activities and outcomes, as well as trade-offs in the short and long term (Ingram, 2011). FAO offers the following definition of food systems:

“A food system gathers all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the outputs of these activities, including socio-economic and environmental outcomes” (HLPE, 2014:29)

This section will build on the previous literature and discuss how this applies specifically to food systems, drawing from different bodies of literature beyond those previously discussed. After introducing the term food system, section 2.6.2 will discuss

the modern food regime, and section 2.6.3 will discuss alternatives to the modern food regime. Section 2.6.4 will discuss food regime transitions and section 2.6.5 will discuss the role of grassroots innovations for food system transitions.

2.6.2 The modern agri-food regime

To understand food system transitions, I will first discuss the current food regime, that is, the rules that structure the production and consumption of food at global scale.

Despite different theoretical roots, Friedmann applies the word ‘regime’ to food systems to refer to “constellations of class relations, geographical specialisation and interstate power”, where “international relations of food production and consumption” link to “periods of capitalist accumulation” (Friedmann, 2009:335). Regimes are identified by a stable and easy to identify set of tensions, made up of these constellations. As in the multi-level perspective, food regimes are also governed by certain ‘rules’ that can be inferred through a consistent pattern of behaviour between relevant actors, such as governments, corporations, social movements, consumers and researchers (Friedmann, 2009). The concept of food regimes helps in analysing the relations that establish how food is produced and consumed, and how capital is accumulated in the regime, and understanding regimes is also key to understanding its crisis and transitions (Levidow, 2015).

The modern food regime is characterised by 1) intensification of agriculture accompanied by a concentration in the control of agricultural inputs, by larger farm sizes and by hired labour; 2) increase in value-added activities, such as processing and packaging into food products, making farming no longer the dominant economic activity in the food system; 3) the globalisation of distribution and retail, and lastly, on the consumption side 4) a dietary change to higher meat and dairy intake as well as sugars and oils, leading to an increase in malnutrition and obesity, together with a global urbanisation trend leading to more urban consumers (Friedmann, 2005; Holt Giménez & Shattuck, 2011; Gaitán-Cremaschi *et al.*, 2019).

The modern food regime has been referred to as a global corporate regime (McMichael, 2009; Holt-Giménez & Shattuck, 2011; Levidow, 2015). This market-driven corporate regime developed and established itself in the 1980. It operates based on economies of

scale, and induces agriculture to adopt production methods that are intensive in external inputs, such as fertilizers, herbicides, pesticides, genetically modified seeds, tractors, ploughing machines, etc., to adopt single crops, and to sell the produce to a globalised market (Friedmann, 2005; Holt-Giménez & Shattuck, 2011).

In industrial agriculture, the cornerstone of the dominant food regime, the use of fossil fuels as a key primary resources deeply entwines food and energy systems (Friedmann, 2009). The intensive use of petrochemicals on the soil also generates environmental harm over time and triggers social inequalities, particularly in lower income countries. These environmental externalities weaken both the resource base of industrial agriculture and people's livelihoods (Fan & Ramirez, 2012; FAO, 2016; Gordon *et al.*, 2017; Campbell, *et al.*, 2017).

This food regime is supported by global north finance and development institutions, such as the International Monetary Fund, World Trade Organization, World Bank, and major agri-food monopolies, such as Cargill, Carrefour, Walmart as well as philanthropic capital, such as the Bill and Melinda Gates Foundation (Holt Giménez & Shattuck, 2011). In Friedmann's analysis (2017), the dominant, corporate food regime is supported by paradigms of growth, cost reduction and efficiency. Agro-industrial methods, aimed at maximizing single-crop yield and generating a surplus, gain subsidies for global export, in line with the globalisation project. Agricultural and food corporations have organizing stable conditions for production and consumption as their major focus, which leads them to plan investment, sourcing of inputs and marketing (Friedmann, 2005).

This competitiveness undermines less-intensive methods (Friedmann, 2005). Kuokkanen, Mikkilä, Kuisma, *et al.*, (2017), Friedmann (2017), and Vanloqueren and Baret (2017) identify lock-ins in the food system, such as subsidies, policies, or business models that rely on input sales to farmers that have disconnected from practices that rely on internal inputs, or consumers that live on the expectation of convenient and cheap food, or research systems that are limited to a reductionist approach to agriculture and food. In this regime, innovation follows the logic of yield maximisation, with genetic modification used not only to enhance output and productivity in adverse conditions, such as drier soils or pest contamination, and even

limiting environmental damage, but also to enhance nutritional contents or taste (Friedmann, 2017; Sonnino, Tegoni & De Cunto, 2019; (Gaitán-Cremaschi *et al.*, 2019). Such innovations enmesh agriculture, food production and environmental concerns. This path suggested an ecological modernization of the food regime, and pushes forward solutions such as sustainable intensification, input-substitution production systems, climate-smart agriculture, precision agriculture, eco-efficiency, environmental-friendly food processing technologies and packaging alternatives. However, these innovations are only incremental to the existing food regime, suggesting a corporate environmental food regime (Friedmann, 2005). Sonnino, Tegoni and De Cunto (2019) bring to attention to the notion that this approach to research innovation assumes that once supply side of the food system is fixed, market mechanisms will solve other issues, such as inequalities and negative environmental impacts. Within the corporate food regime, regime-incumbent innovations address the two interdependent goals of food security and negative environmental impact (Gaffney, *et al.*, 2019).

Moreover, Friedmann (2009) suggests that the modern food regime is following a path of financialization, following the wider trend of the whole economy. After a wave of power concentration in the food system in the 1980s, e.g. supermarkets, from the 1990s onwards power was reorganized in the food regime, shifting from supermarkets to financial conglomerates through private equity takeovers, which consolidated power even further, particularly in the global North (Friedmann, 2009). Anecdotally, the end consumer can witness that through the offer of financial services in supermarkets. In Friedmann's evaluation, the agri-food system as a whole has gone through a horizontal and vertical re-structuring. Examples are agro-chemical companies buying seed companies, livestock and fish breeders integrating with animal pharmaceutical companies, farm machinery buying into big data, robotics and artificial intelligence, commodity trading companies integrating food processing activities at global scale, and food retailers going through another mergers and acquisitions wave. More recently, big data has become a common key element to all areas in the food system, from seeds to retail delivery, and hence, the key driver to consolidation in the food system in the 20th century. This consolidation and integration trend is observed throughout the food system (IPES-Food, 2017). These trends corroborate with what Friedmann (2009)

called a ‘financialized food regime’, where more and more institutions are advancing towards more of the same: monocultures, commodity crops and specialized cultivars.

Due to its significant role in ecosystem degradation and climate change contribution, it is key that agriculture and the wider food system are part of the transition to sustainability (Friedmann, 2017). The modern food system is having very negative outcomes on the environment, while also not doing much for food and nutrition security. Therefore, changing the way we produce, process, distribute and even dispose of food is key if we want to transition to a more sustainable way of living on the planet. Alternatives to the corporate food regime have been proposed and organized at local and transnational levels, by farmers, environmentalists, academia, policy bodies and consumers, which will be discussed in the next section (Friedmann, 2009).

2.6.3 Alternative food systems

Now that we have described the dominant food regime and its pitfalls, we will look into alternative food systems. These fall outside the scope and logic of the conventional food system and are aligned with ideals of transforming the food system around wider principles of sustainability, so it better caters for social and environmental issues.

Alternative food systems are based on different paradigms for food systems. They offer a myriad of technological and non-technological innovations to foster sustainability transition pathways to inspire and enable the redesign of the modern food regime (Gaitán-Cremaschi *et al.*, 2019). It is innovations suggest that sustainability in the food system can be achieved through systems such as multi-functional and ecological agricultural production systems and decentralised and localised value chains. It is also supported by values such as trust, tradition, and place. Alternative food systems propose transforming the food system’s technical and social dynamics. Examples in this stream include ecological intensification for food production, biodiversity-based agriculture, alternative food networks such as community supported agriculture, food cooperatives, farmers’ markets and box schemes (Holt-Giménez & Shattuck, 2011; Gaitán-Cremaschi *et al.*, 2019). These alternatives co-exist parallel to the dominant food regime (Holt-Giménez & Shattuck, 2011; Levidow, 2015; IPES-Food, 2016; Gaitán-

Cremaschi *et al.*, 2019), and oppose the corporate regime by valuing local knowledge, agroecological methods and farmers' knowledge (Levidow, 2015).

This alternative food production niche shows some cohesion under the broader term of organic agriculture (Levidow, 2015). The author identifies agroecological⁷ principles, meaning the use of ecological sciences in agriculture (Altieri, 1996), as roots for the organic agriculture movement, and uses it as an example of production methods that follow a low-external input model. As a result, market transactions are minimised, which, in turn, undermine the capital accumulation patterns of the corporate food regime (Levidow, 2015). Agricultural practices and innovations include eco-functional intensification, in-farm nutrient flow management, biological control of pests, agroforestry, permaculture, crop rotations, mixed crop and livestock management (Altieri, 1996; IPES-Food, 2016; Vanloqueren & Baret, 2017). As actors, Levidow (2015) identifies local farmers, research and dissemination as well as other support organisations for innovations in the science of organic agriculture, organic farming techniques and technologies, local food consumers, and entrepreneurial 'system builders', who help link the niche elements together to promote the niche.

The organic banner does not come without its limitations. For example, organic food, as is, is identifiable through third-body certification, generating a price premium. Alone, this system reinforces the corporate food regime. However, as a niche, the term organic raises consumers awareness towards greener food choices (Levidow, 2015).

Beyond food production, alternative food systems also include alternatives to the value chain. Alternative value chains include principles such as social and/or geographical proximity, and work under names such as alternative food networks, local food, low-mileage food, and food re-localisation (Levidow, 2015). Such arrangements also prioritize agroecological production methods and build civic support for agroecology farmers, fostering their independence from the agri-food regime. Transparency, traceability, community-supported agriculture and Participatory Guarantee Systems⁸

⁷ Agroecology can be broken down into its three forms, namely a scientific discipline, an agricultural practice and as a social political movement (Levidow, Pimbert & Vanloqueren, 2014). At this point, I refer to the agricultural practice.

⁸ Participatory Guarantee System is an organic quality assurance system adapted to the local context and it offers an alternative to third-party certification. It is supported by trust, knowledge exchange, social networking and on active participation of all stakeholders. It offers a short value-chain and direct

that certify agroecological or organic production methods further deepen producer-consumer relations.

Agreecology also refers to the social movement led by farmers groups, civil society organizations and research groups as an alternative to the corporate food regime as a whole. It aims to achieve wider system transformation and shift political power and capital. Its agricultural production model proposes a flow of capital opposite to the one in the corporate food regime, and its innovation practice includes know-how, organizational, social and technological innovations, always integrating farmer's knowledge (Levidow, Pimbert and Vanloqueren, 2014). Geopolitically, agroecology in the global South has also been adopted as a political agenda, dissociating from the organic food due to its association with elite markets (Levidow, 2015). Other political proponents of alternative food system include food justice, food democracy and food sovereignty movements, which also have their grounding in agroecological production methods (Holt-Giménez & Shattuck, 2011; Holt-Giménez & Altieri, 2013).

Alternative food systems must also be measured and monitored according to different standards, beyond caloric output or efficiency (IPES-Food, 2016), which reflect environmental stewardship and goes beyond food security. It's important to note that alternative food systems co-exist with the dominant food regime and sometimes even benefit from the same structures (Gaitán-Cremaschi *et al.*, 2019), so such systems do not have a clear boundary. Alternative innovation practices and solutions can also be used in different regimes, conforming to its logic or transforming it (Levidow, Pimbert & Vanloqueren, 2014). The next section will discuss food regime transitions and the tensions that derive from it.

2.6.4 Food Regime transitions

The goal of a food regime transition is to achieve sustainability within agri-food systems. In FAO's definition, a "sustainable food system is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised" (HLPE, 2014:31). Based on the socio-technical transitions literature,

relationship between producer and consumers, increasing enabling decent livelihoods for the farmers and improving community cohesion, beyond the environmental benefits.

food regime transitions, thus, refer to “long-lasting socio-technical transformation processes that guide food practices towards sustainability” (El Bilali, 2019b:561). The term concerns structural change processes that give rise to new, more sustainable production, processing, distribution, consumption and disposal practices (El Bilali, 2019b).

De Schutter (2017) explains how rising labour costs, subsidies to fossil fuel energy and large-scale agricultural production is competitive compared to smaller, diversified farming. El Bilali *et al.*, (2018) identify three approaches to food system transitions in the literature, namely an efficiency increase (e.g., sustainable intensification), a demand restraint (such as sustainable diets), and food systems transformation (i.e. alternative food systems). In his systematic literature review, El Bilali (2019b) identifies that food production is the most addressed stage of the food chain in the literature, which is primarily based in European institutions, and few address processing, distribution, procurement, consumption or waste, and research. The author suggests that the ‘food systems transformation’ stream englobes changes in whole system functioning and governance, and understands there is an imbalance between production and consumption in terms of the relationships among food system actors when the four dimensions of food security are considered (availability, access, utilisation or stability) (El Bilali, 2019b).

Friedmann (2009) recognises that the period of transition between regimes is characterised by a multitude of unresolved experiments, contestation, and endless possibilities. As transitions take place, several constellations of relationships between governments, individuals, corporations, and civil society actors in the food systems are constantly rearranging, conferring higher instability to the system (Friedmann, 2009), and it is harder to recognise a stable set of tensions (Friedmann, 2005, 2009). Despite different theoretical roots, this understanding of stability and transitions is also aligned with the multi-level perspective’s understanding of regime transitions. Moreover, Friedmann (2009) identifies how conflicts and tensions name the aspects of the regime that are not acceptable anymore, delegitimizing what was previously acceptable. It is in the period of transitions that structures are proposed to address the delegitimized aspects (Friedmann, 2005).

Regime transitions regard dynamic processes, where as a diversity of possibilities are engaging and trying to gain ground. Understanding transition ‘as a period of unresolved experimentation and contestation’, food-regime theory understands there is room for open, plural trajectories. Social conflicts bring to attention the shortcomings of the food regime, and raise possibilities in addressing it (Levidow, 2015). Levidow, Pimbert and Vanloqueren (2014) point out that alternative niches are not enough to transform a system, as the multi-level-perspective suggests.

The agroecological alternative, for example, either conforms to the dominant food regime (corporations adopting organic systems, commoditization of biological inputs and creating farmers dependence on input suppliers, the search for higher yields) or transforms the regime, as it proposes to. Lamine, Darnhofer and Marsden (2019) agree with that perception, naming how processes or the outcomes of alternative food systems (such as organic farming or agroecology) do not necessarily address democracy⁹, justice¹⁰ or sovereignty¹¹ in the food system. Therefore, such concepts of politics must be included in the food systems transitions literature.

Reconfiguration of the regime occurs when grassroots actors enrol new actors into their activities, as a gradual process (El Bilali, 2019a). This reconfiguration would take place through two mechanisms, that of building a new shared vision of a local agri-food system and embedding this new vision through local public action and policies. The author also pinpoints that these dynamics, as well as the outcomes, are context-specific – structural and other contextual conditions such as infrastructure, policies, capabilities, and available resources are context-dependent. Hence, one successful story may not be transferred into a different context. Governance and institutional context are crucial for successful sustainability transitions.

Gaitán-Cremaschi *et al.* (2019) point out how the boundaries between the dominant regime and niche food systems are “blurry and permeable”, hence what we actually witness is a hybrid food system, made up by a “mix of regime-induced and niche-

⁹ Food democracy refers to how consumers, producers and citizens participate in decision making processes in the food system (Lamine, Darnhofer & Marsden, 2019)

¹⁰ Food justice refers to how social groups and categories are included or excluded from food systems transitions (Lamine, Darnhofer & Marsden, 2019)

¹¹ Food sovereignty refers to the right of the people who produce, distribute and consume food control the mechanisms and policies of food production and distribution (Patel, 2009)

induced innovations” (p. 6). Alternatives exist at the crossroads of the food regime and niche systems, and involve actors that play in both systems: the dominant regime and the niche alternatives (Darnhofer et al., 2015; Bui *et al.*, 2016; Lamine and Dawson, 2018; Lamine, Darnhofer and Marsden, 2019).

A couple of authors have attempted to identify if we are undergoing a transition in the food regime. In Friedmann’s (2005) analysis we are witnessing a transition in the food system, from a corporate food regime to a “corporate environmental” food regime (Friedmann, 2005:228). Friedmann (2009) suggests that the corporate environmental food regime is made up of two parallel food systems. The first being of fully traceable, fresh, quality foods along transnational food chains available for globalised consumers across the world. Concomitantly, chemically reconstituted, nutrient-infused industrial food will be within reach of the lowest income consumers. This is followed by the displacement of agricultural systems in the global South to cater for the global North’s needs. Both systems reinforce corporate power (Friedmann, 2009; Levidow, 2015).

The main difference between the corporate food regime and the proposed corporate environmental food regime is the incorporation of practices and technologies to reduce harmful environmental consequences in agro-industrial production methods. This regime maintains the commodity relations in agriculture. This new regime emerges from the possibility of capitalising on the selective appropriation of consumers demands carried by alternative labels such as fair trade, animal welfare, or healthy foodstuffs (Friedmann, 2005). Levidow (2015) agrees that the appropriation of certain elements originated from alternatives to the corporate-industrial food regime, such as organics and functional foods, and terms such as ‘bioeconomy’ and ‘sustainable intensification’ illustrate this nascent ‘corporate-environmental food regime’, where efficiency and output is prized while concomitantly minimizing pressure on land and natural resources. This nascent corporate-environmental food regime is nonetheless still contested by the movements it has appropriated (Levidow, 2015).

The second possible regime is of a regionally organised, ecologically resilient agri-food system, nested into a global system which holds into account multiple ecological dimensions (Friedmann, 2009). This ecologically integrated paradigm seeks to enhance biodiversity in agricultural environments as a means to improve crop protection,

productivity, nutritional quality and resource conservation, empowering farmers and their knowledge (Levidow, 2015). According to (Friedmann, 2017), this transition to sustainability requires also a transition in how different knowledge bodies are valued and shared. The author identifies social movements and networks such as Slow Food and La Via Campesina as proponents of an alternative food regime of regionally embedded agri-food systems, and built on the critique of the corporate food regime (Friedmann, 2009).

In Lamine, Darnhofer and Marsden's (2019) analysis, the corporate food regime is not declining in significance. De Schutter (2017) explains how rising labour costs and subsidies to fossil fuel energy, large-scale agricultural production is competitive compared to smaller, diversified farming, further supported by a neo-malthusian discourse. A dynamic of contestation occurs “between a conventional and commodity-based food system” and processes “based upon a re-territorialised and ecologically more sensitive set of principles” at global level (Lamine, Darnhofer & Marsden, 2019:146). The authors recognise a substantial and widespread agrifood transition, yet there is a lack in the vocabulary necessary to address all the diversities that are coming out of this transition. The authors further claim that the binary understanding of a conventional versus an alternative food system does cater to all realities that are sprouting.

Food regimes help us thus understand potential transitions. Landscape pressures such as the 2007-2008 food crises, climate change and now the Coronavirus-19 pandemic have opened the way for alternatives and oppositional agendas, while at the same time fostering regime variations (Marsden, 2013; Levidow, 2015). In order to maintain its power, the corporate food regime has been incorporating ‘green’ or ‘quality’ elements to absorb landscape pressures previously associated with alternative social movements. Transitions in food systems is a gradual process of system reconfiguration generated by a multitude of interactive processes in multiple sources (El Bilali, 2019a). De Schutter (2017) understands that business and government are limited in driving food system transitions. As discussed in 2.3, however, as transitions are a process of fundamental change that take place over the long term, so it is too soon to assert if we have indeed witnessed a food regime transition.

2.6.5 Grassroot innovations in food regime transitions

2.6.5.1 Introduction

Local efforts to drive food system transitions offer a rich ground for understanding how social groups trigger socio-technical transitions (Cohen & Illieva, 2015). Nonetheless, the role of grassroots innovations and civil society movements is underserved in the agri-food transition literature (Hargreaves *et al.*, 2011) despite being widely recognised as “the backbone of alternative food systems” (El Bilali, 2019a:361). This section mirrors the structure used in discussing the literature on grassroots innovations in section 2.5, to explore the literature on grassroots innovations in food systems transitions.

2.6.5.1 Characteristics

Grassroots movements contest the dominant food regime and its shortcomings while reacting to pressures of socio-economic inequality and resilience in a context of climate change. There are several niches within grassroots innovations, such as agroecology, permaculture, conservation agriculture, integrated farming, community-supported agriculture, and alternative food networks (El Bilali, 2020).

Grassroots innovations comprise a range of changes in attitudes, behaviours, perceptions and collaborative action, seeking to integrate new or overlooked actors, issues, locations, networks, processes, or values into the food system. As discussed, they are informed by ideas in the community, collective action, participatory research, action research and voluntary organizations. In their commitment to help communities access the tools for building alternatives that improves their wellbeing, they advance the interlinked themes of food security, food sovereignty, justice and sustainability (Gernert, El Bilali & Strassner, 2018).

Geels (2019) brings to attention the fact that certain labels, such as agroecology, or alternative food networks, are beyond just a technical or social practice, they may also refer to both or to a system of practices. Lara *et al.*, (2019) adds the use of traditional ecological knowledge to the list. Such grassroots innovations around sustainable food propose new norms to the regime, including respect, transparency, solidarity, equality

and fairness, which, in turn, have also promoted new forms of interacting, such as the participation in material and immaterial processes (El Bilali, 2019c; Rossi, 2017).

Gernert, El Bilali and Strassner also point out that there is no clear boundary between grassroots innovations and market-based innovations from conventional institutions. Grassroots initiatives can make use of technologies developed and sold by regime-incumbent institutions, and the same institutions may appropriate ideas and practices developed by grassroots movements. In Rossi's (2007) understanding, the re-appropriation of the collective and the social dimension of food production and consumption practices, distinguish food grassroots innovations from other niches.

The involvement of public opinion, businesses, institutions, politics, and culture in alternative pathways ratifies that the fact that grassroots movements have already triggered change in the food system (Rossi, 2017).

2.6.5.2 Benefits of grassroots innovations to sustainable food systems transitions

Gernert, El Bilali and Strassner (2018) categorise the contribution of grassroots innovations for sustainable food systems into four groups.

Firstly, grassroots innovations offer diversity to what sustainability means. This diversity of sustainable food practices can be recognized in many forms, from technical innovations such as labour organisation, supply chain coordination, relationship with firms and under a diversity of labels such as agroecology, organics, permaculture, urban agriculture, rewilding, conservation agriculture, integrated farming, agro-forestry, urban farming, short supply chains, nested markets, values-based supply chain, alternative food networks, less-meat initiatives, organic food cooperatives, farmers' markets, community-supported agriculture (CSA), garden sharing, allotments, seed swapping, agroecology, cycle networks as well as countless other ideas and practices (El Bilali, 2019c; Rossi, 2017).

These include the different forms of increasing the availability and accessibility of food in cities, enhancing food and nutritional security, as well as strengthening local economies and local food systems (Gernert, El Bilali & Strassner, 2018).

Because of their niche, protected by the values and goals of social and environmental justice, grassroots actors have a freedom to innovate beyond commercial and policy logics. Such innovations can better cater to local specificities of the food system (Gernert, El Bilali & Strassner, 2018). Pulverised efforts repeated over and over may trigger significant social and environmental improvements. Such innovations are also often “open source” and scalable, which means they can easily be picked up and reproduced by others and adapted to the local context (Gernert, El Bilali & Strassner, 2018).

Secondly, grassroots innovations can trigger regime reconfigurations. Because grassroots movements develop beyond technological innovations, but also organizational and social innovations such as coordination forms sharpened to cater to the local conditions, they contribute to a collective vision of the desired food system. Moreover, grassroots movements can act as a mediator between communities and local institutions. In a sense, grassroots innovations help coordinate individual action into collective political activity: it changes social relationships at a local level and between community and other actors of the food system, changing the governance structures (Gernert, El Bilali & Strassner, 2018).

Thirdly, grassroots innovations foster food democratisation, social inclusion, and participation due to their use of contextual knowledge, focus on community needs and development of solutions for the specific context. The growth in interest in ‘sustainable food’ has started the diversification of food practices, in the direction of greater food democracy (Rossi, 2017). Lastly, grassroots innovations on food by focusing on sufficiency and on decommodification of food, create a deep change in consumption. They change individual behaviour and collective practices, building the capacity for local expressions of sustainable development.

Moreover, Sonnino, Tegoni and De Cunto (2019) recognise food systems’ pervasive role in multiple systems. This opens a pathway for multiple partnerships and collaborations for grassroots movements, who can thus collaborate with other actors under different themes, “such as sustainability, urban development, rural development, social inclusion, economic empowerment, public procurement, education, health, food culture, food sovereignty” (Rossi, 2017:15). This pervasive role makes food a great

leverage point for social inclusion, without downplaying the role of the state or of corporations in the food system. Public and private sectors can also foster niches for sustainable transitions (Sonnino, Tegoni and De Cunto, 2019)

2.6.5.3 Challenges

Beyond the general challenges of grassroots innovation described in 2.5.4, Rossi (2017) translates it into the specificities of the food system. Firstly, the dilemma of the economic value of food, where the food regime creates the expectation of cheap, subsidised food. Alternative food movements face the critique of being elitist or exclusive, incoherent with social justice goals. According to the author, however, a rebate for this argument is that this critique comes from a reductive view of social justice. To the author's understanding, the role of alternative food movements is to question the food regime. Developing a new food culture, together with a new food ethics, is the first challenge but also the major contribution for grassroots food movements (Rossi, 2017).

A second challenge related to grassroots food movements is the design and testing of different relationship models between food practices and society. This would entail meddling in how actors engage around food, redefining how to produce and consume food, and above all how to relate to food (Rossi, 2017), which is deeply engrained in cultural identification. The new interactions help create the “favourable institutional, political, legal and cultural aspects to trigger regime transitions”, mentioned in section 2.6.5.2. (Rossi, 2017:18).

The ultimate challenge for grassroots movements is how to translate this new food culture and ethical norms into practices - it requires an active engagement of multiple, diverse stakeholders at multiple domains (Rossi, 2017). It encompasses firm management, consumer's values, approach to food, organisational models, power relations, pricing mechanisms, roles, identities, engagement with institutions, etc., which require collective learning. At the same time, for new practices to be adopted by a wider community, they must mirror the present diversity (Gernert, El Bilali and Strassner, 2018; Geels, 2019) – grassroots innovations must always be close to the ground.

In their case study, Wittenberg, Bilali and Strassner (2019) question whether a grassroots innovation has indeed a transformative potential if it works together with the regime. They assess, for example, that urban food gardens are somewhat compatible to the regime, with great potential to influence the understanding of food systems, beliefs and value systems and may feed into sustainability transitions through the influence of social practices.

Further challenges arise in the process of outscaling and up-scaling of grassroots innovations, such as the distributed agency of multiple actor groups, which weakens grassroots agendas (Hermans, Roep & Klerkx, 2016). In their encounters with the mainstream, grassroots innovations, as well the values that they embed, are faced with the operative norms of efficiency and growth of the food regime (Rossi, 2017).

2.6.5.4 Success and diffusion

Gernert, El Bilali and Strassner (2017) remind us that the diffusion of grassroots innovations is a complex, multi-actor process, beyond the agency of grassroots actors. Beyond scaling out (dissemination or reproduction) and scaling up (changing the institutions), Lara *et al.* (2019) add to that, evaluating that grassroots innovations can also scale deep, that is, changing values.

Rossi (2017) identifies the relationship between grassroots food movements and the dominant agri-food actors, i.e. the dynamics between niche and regime, as another space of experimentation. Once stable, these new relationships may trigger broader changes in the food regime by scaling up (Rossi, 2017). Scaling up entails coordinating with other actors and is supported by management models and/or digital technologies. Examples are alternative price agreements between producers and consumers, to guarantee profitability and affordability, the shared use of equipment and structures, network agreements, commercial intermediation, community-supported agriculture, direct involvement of consumers in supply chain management, pre-payment, pre-financing and crowdfunding as well as socializing the risks and costs of food production, etc (Rossi, 2017).

Rossi (2017) pinpoints that, in order not to lose touch with its social and environmental justice when making use of conventional market and business approaches, grassroots innovations must walk hand-in-hand with strengthening local communities, for example by maintaining transparency. Lara *et al.*, (2019) expands this thought, finding that grassroots innovations principles and values must be used from farm to fork, from agricultural to gastronomic knowledge as well as processing and distribution, in order to really trigger a transition in the food system.

Wittenberg, Bilali and Strassner (2019) provide an example of a grassroots innovation project and its transition pathway, that of an urban gardening project which changes regime insiders' perceptions. In the case study, the adoption of a niche innovation prompts additional adjustments within the regime which, in turn, further adopt other niche innovations, i.e., the reconfiguration pathway (cf. Geels & Schot, 2007). As the authors explain, the compatibility between regime and niche might make a niche less radical, and more likely to succeed and scale out.

Hermans, Roep and Klerkx (2016) add that “grassroots innovations can substantially change in configuration and meaning” because of upscaling and outscaling processes. This is inherent in the process of being locally specific yet also aiming to become widely applicable, and thus, extend its impact. This leads to parallel pathways of change.

2.6.5.5 Conclusion

Hargreaves, Longhurst and Seyfang (2013) still identify in the multi-level perspective limitations when addressing socio-technical transitions in the food system. For instance, social practices such as building design and architecture, working practices, or cooking practices, fall outside of the food system, but nonetheless are still closely interconnected to it. Moreover, the multi-level-perspective understands transitions as regime change. As it has been discussed, several systems can co-exist. Ingram (2015) also suggests that transition might better be explained as a “complex of interactive processes leading to a series of adaptive changes, rather than as regime change” (Ingram, 2015:55).

In section 2.6.5, I have discussed the applied literature of grassroots innovations and the multi-level perspective to food systems transitions. Their contribution to food

system transitions lies particularly in bringing and institutionalising skills and knowledge to anchor local versions of sustainable development. The role of food grassroots movements is not in producing more food, but rather in creating a new agreement around food, as well as actors' rights and responsibilities.

2.7 Conclusion

Chapter 2 has offered a narrative literature review on grassroots innovations for sustainable food systems. After an overview of chapter 2 in section 2.1 and an overview of the research methods for the literature review in section 2.2, section 2.3 offered the theoretical framework for sustainability transitions, that of socio-technical systems. The multi-level perspective is discussed in section 2.4. It offers a flexible heuristic framework to explore socio-technical transitions (Geels, 2011).

However, socio-technical transitions and the multi-level perspective have been criticised to give emphasis to technological innovations and niches and overlook landscape pressures and power structures (cf. Ollivier et al., 2018; Lawhon & Murphy, 2012). Section 2.5 steers towards the body of literature that builds on that literature gap of the role of civil society niches, that is, grassroots innovations (cf. Seyfang and Smith, 2007). Section 2.6 builds on the previous literature of socio-technical transitions, the multi-level perspective and grassroots innovations, and finally connects it to food systems and food systems transitions literature.

With this, this chapter argues the following: within the multi-level perspective, we understand there is an enormous amount of pressure on our food system to deliver greater food security within a context of ecosystem degradation, human population growth, and climate change. Moreover, our food system is deeply connected to environmental, social and economic problems systems (El Bilali, 2019b). Social challenges such as food insecurity and malnutrition are common in the global South as well as the global North. The literature also argues that there is a reciprocal positive between food security and food sustainability, where one is reinforced by the other (El Bilali, 2019b). Therefore, upgrades in environmental practices are not enough to tackle the environmental and social injustices of the food regime, as both need to be addressed.

Civil society niches can offer options to food sustainability and a global shift in socio-technical regimes. These niche, grassroots innovations, differ from market and government niches, they are supported by an underlying network of other organisations, activists and ‘ethical consumers’ that share similar values. There is a multitude of grassroots experiments, each reflecting its locale’s uniqueness and creating socio-diversity in the food system, which might be enough to trigger food systems transitions (De Schutter, 2017). As Darnhofer (2014) and Rossi (2017) point out, if we are witnessing a transition in food systems, it is not primarily technology-driven, but rather stems from grassroots innovations. If such values are being co-opted by the regime, or changing the regime, it remains to be seen, as transitions are long-term processes.

Chapter 3 will discuss my approach to the research of grassroots innovations in Cape Town. Chapter 4 will present the findings of this research project. The arguments developed here will inform chapter 5, which will discuss the fieldwork findings in the light of the literature.

Chapter 3 – Research approach and design

3.1 Introduction

In this chapter, I describe how I designed and undertook the research to fulfil the research objective introduced previously. In a broken global food system, both the environment and vulnerable populations are at risk. The purpose of this research is to better understand how grassroots actors are developing and/or adopting innovations and technologies that could change Cape Town's food regime into a more socially and environmentally sustainable one.

Firstly, I describe the constructivist research paradigm that guided this research project, followed by the qualitative research design, and the research methods that were used to collect and analyse the data. I also include the strategies adopted in order to adapt to the lockdown imposed as a result of to the coronavirus pandemic. I end this chapter by describing the ethical considerations of the project.

3.2 Research paradigm: Interpretivism

A research paradigm, as Corbetta (2011) explains, is the perspective which steers the way in which a research project is conducted. This research project took place under an interpretivist paradigm. In this section, I unpack what makes up the interpretivist research paradigm using the 'building blocks' of research paradigms: i) the existence of social reality (ontology); ii) if it is knowable (epistemology); and iii) how we can acquire knowledge about it (methodology and methods); and explain why this paradigm was chosen for this research project.

The first building block, ontology, addresses the nature of social phenomena, that is, if social phenomena are "things in their own right" or "representations of things" (Corbetta, 2011:18). Unlike a realist ontology, in which there is an understanding that an independent truth exists, I agree with the notion of relativism (i.e. interpretivism): that realities are merely personal representations, and hence they vary from person to person (Braun & Clarke, 2013). When studying social phenomena, we are studying systems made up by the human mind that follow rules agreed upon by large communities (such as nations, religions, academic communities) (Harari, 2014). These systems are narratives believed in by the community that developed them. I agree with

the interpretivist notion that social phenomena, therefore, do not have an autonomous existence outside human narratives. The same phenomena can have different meanings according to the different communities that interpret them, since each community has developed their own set of beliefs, tacit agreements and unspoken rules. The interpretivist approach refuses, thus, the idea that one universal social reality exists (Corbetta, 2011).

The second building block, epistemology, regards the nature of knowledge and if one can actually know social reality. Epistemology also raises the question of the relationship between the observer/researcher and the reality/social phenomena observed (Corbetta, 2011). An objectivist approach to the scientific process recognises reality as objective and requires (and believes possible) full detachment between observer and what is observed for the scientific process (Corbetta, 2011). However, given that social phenomena have the meaning we attach to them, the researcher's own story will naturally influence how they interpret and analyse what is being observed. This leads us to a relativist/constructionist epistemology, which recognises that there is no such thing as social research free from values or biases (Braun & Clarke, 2013). Knowledge is thus a result of the social world we live in, an artefact that embeds social, cultural, moral, ideological, and political aspects (Braun & Clarke, 2013). There is no one truth, but the way in which the world is seen is related to specific social and cultural contexts, leading to 'knowledges', not knowledge. Each social actor observed also has his or her own story, hence also their "own inner rationality (...) and interior sense" and attaches their own interpretation and meaning to their behaviour (Corbetta, 2011:42). Since knowledge derives from a personal perspective, a singular absolute truth is impossible (Braun & Clarke, 2013). Consequently, we can only know interpretations of reality, which are created through the process of research (Braun & Clarke, 2013).

The third building block relates to methodology, or how we can know social realities. Since the aim of social research is to uncover the meaning social actors give to the interactions they take part in, the best the researcher can do is to try to put herself in the social actors' shoes and communicate their interpretations (Corbetta, 2011). The constructs of reality are drawn out through the interaction between researcher and social actor. Knowledge is then obtained through an inductive process: it surfaces as the researcher navigates the social actors' reality (Corbetta, 2011, Creswell 2007). Words

are the carriers for meaning, and thus, make up the data that are collected for analysis (Braun & Clarke, 2013). A qualitative research methodology, then, seeks to understand local meanings, it recognises that data is gathered in a specific context, and produces knowledge that contributes to general understandings. Rich data and thick descriptions allow exploration of divergent data; while also tending to be theory generating, i.e. inductive. A qualitative approach works up from the data and assumes there is no correct version of reality or of knowledge (Braun & Clarke, 2013). Knowledge should always be considered as part of the context in which it was generated, from the interview to the broader sociocultural and political context of the research (Braun & Clarke, 2013). The elements attached to the qualitative paradigm are:

- The use of data which is not reducible to numbers.
- The use of naturally occurring data collection methods.
- The interest in meanings.
- The recognition that researchers bring their subjectivity.

The qualitative methodology was, therefore, a natural fit with the interpretivist paradigm, but also appropriate to the research objective, which was an exploratory one. Because of the lack of research on grassroots innovations in food systems in the Global South, the research first needed to provide a description of these innovations. The qualitative approach allowed this research project to focus on people's framing around social issues and to include the contradictions in these.

The final product of this research project cannot purport to paint a *bone fide* picture of reality, because reality "is much more complex, contradictory and disorderly" (Corbetta, 2011:44). Institutions, individual behaviour and social structures are all logical constructs, with a heuristic function - that is, to illustrate reality and to aid in the interpretation of what is observed. As such, our models do not translate all nuances of social phenomena. As argued before, due to the subjective quality of reality, the phenomena studied here might be understood differently by other researchers. The aim in this chapter, however, is to present a detailed account of how I undertook the research, to allow others to assess whether they would have drawn similar conclusions from the data collected.

In this section, I have clarified what makes up an interpretivist (constructivist) research paradigm and why I think this approach was valuable for this research project. As discussed, qualitative research does not belong to a particular theory or paradigm and does not come with its particular set of methods and practices, and different interpretive practices may be used, even at the same time. Next, I will delineate how the chosen qualitative research paradigm informed the case study research design and shaped the research journey.

3.3 Research design: Case study

Creswell (2014) defines research design as the type of study the researcher chooses in order to undertake a specific inquiry under the chosen paradigm. As per the research objective, my goal is to explore with a constructivist, qualitative approach what grassroots innovations are sprouting in Cape Town for a more sustainable food system, where, as Braun and Clarke explain (2013), qualitative refers to both the research paradigm but also the technique.

With that in mind, it seemed fitting to choose a case study design to guide my research objective of exploring grassroots innovations towards sustainability in Cape Town's food system. According to Yin (2018), a case study is appropriate when the following conditions are observed: the research question is structured around 'how' and 'why', it requires no control over behavioural events, and it focuses on contemporary events. These three conditions apply to this research project, namely the research questions is structured around 'how', it requires no control over the event and it focuses on a cotemporary event. A case study is an empirical method to investigate contemporary phenomenon within their real-world context (Yin, 2018). Case study design allows for numerous data collection methods in the search of patterns, commonalities and reoccurring themes while aiming to develop an in-depth understanding of phenomena. The reasoning behind choosing case study design is to find information-rich cases for an in-depth understanding of Cape Town's transitions towards food system sustainability. A case study is not necessarily restricted to a single person or entity but can be a system of interest. It can be bound by time and place, or by time and activity, or by definition and context (Baxter & Jack, 2008). In this research project, the boundary is defined by grassroots actors active at the present (2020) within the

boundaries of the city of Cape Town. It was not necessary to resort to a multiple case study design since the aim of this research was not to compare experiences.

Despite popular opinion, Flyvbjerg (2006) argues that case studies are a useful tool for building knowledge because they provide in-depth explorations of context-specific phenomena. Case study learning happens on the ground: the proximity between researcher and social phenomena shortens the feedback path, allowing a more dynamic learning process (Flyvbjerg, 2006). As field research progresses, so will adjustments to the original research plan be made. This dynamic learning process, the proximity to the phenomena and the in-depth study make case study a methodology that actually encourages shedding preconceived notions from the researcher's side, and also acknowledges and makes space for the complexities and ambiguities of social phenomena (Flyvbjerg, 2006).

Drawing from the interpretivist research paradigm discussed in the previous section, all knowledge is context-dependant. In order to allow the relativity of realities to emerge, a case study design was chosen. Case study is especially well suited to produce relative, context-dependant knowledge, dedicated to praising the complexity of social phenomena and its context. By choosing to use a case study design to this research, I committed myself to contribute to practical knowledge of the global South and knowledge generation in the global South.

3.4 Literature review: narrative literature review

Before beginning my field research, I conducted a narrative literature review on socio-technical transitions and grassroots innovation in food systems that was presented in chapter 2. This was not a literature review used as a specific research method to answer a research question, but rather the standard literature review used to contextualise the research question of a thesis. However, I felt it best to explain my approach to the literature to ensure reliability.

Throughout a preliminary literature survey, I came across several terms that touched the subject that I wanted to understand better namely, environmentally responsible and socially inclusive solutions to sustainability in the local food system of Cape Town.

These terms included ‘appropriate technology’, ‘intermediate technology’, ‘technology for social inclusion’, and ‘grassroot innovation’. These terms have the goal of being inclusive to local communities in terms of knowledge, processes, and outcomes in common. Other terms such as ‘social movement’ or ‘civil-society organization’ were not used, which implies that contributions with similar research interests, yet different terminology, may have been excluded. I chose to stick to the term ‘grassroots innovations’ because of its connection with the literature of socio-technical transitions, the chosen framework for the narrative.

The literature review followed from a literature survey on the databases Scopus, Ebsco Host and Web of Science. For building the theoretical framework of this thesis on sociotechnical transitions in food systems, I used the following search terms:

- “sociotechnical transitions” AND “multilevel perspective” AND “grassroots innovations”;
- “sociotechnical transitions” OR “technology” OR “innovation” AND “food systems”;
- “grassroots innovation” AND “sustainab*” AND “food systems” OR “food security” OR “food sovereignty” AND “urban”.

The articles were read and analysed for key concepts that are relevant to my research objective. The literature review was organised by historical development, to provide more background to the development of the field of sustainability transition approaches, food system transitions, and grassroots innovations. It was then organised by themes so as to highlight the issues to be explored during the field work.

3.5 Research method: Semi-structured interviews and Thematic Analysis

3.5.1 Introduction

The methods employed for the literature review have been explained in 3.4 and this section explains the methods applied to field research. For the study of grassroots innovations in Cape Town’s food system, the research methods will consist of two main

tools: 1) snowball sampling; and 2) semi-structured interviews with actors of Cape Town's food grassroots initiatives.

3.5.2 Field research: Snowball sampling

In this section, I present my data collection strategy and methods, including sampling, interviewing and the adaptations to this plan that became necessary as a result of COVID-19.

Sampling, or the selection of the interviewees for the case study, started with a previously identified set of grassroots organisations in the food system (production, distribution, packaging, retailing, disposal, amongst others) of Cape Town. Some organisations and movements were already known to me due to work, studies, and conferences in Cape Town. This initial sample was strategically chosen to support the research objectives stated above, i.e. purposive sampling was used (Bryman & Bell, 2014). Purposive sample refers to selecting the units based on the specific research question, commonly used in qualitative research (Creswell, 2014).

In order to find other case studies, I used snowball sampling, a non-random sampling strategy (Tenzek, 2018). As the first participants were interviewed, they were also asked to name other food grassroots actors. Subsequently, as the new food grassroots actors were interviewed, they were asked to name other grassroots food actors. Eventually, the names started to be repeated, and a comprehensive list of stakeholders had taken shape. The selection process can be wrapped up when either no new names are given or if the selection process reaches a number of potential participants bigger than what can be feasibly studied (Tenzek, 2018). In this research process, most of the names suggested by the interviewees were already listed in my initial sample, so the snowball sampling method did not advance my sample by much, and I drew it to a close in the last interview.

Snowball sampling is suggested by Bryman and Bell (2014) in contexts where there is no sampling frame - that is, when there is no list or catalogue of the population of interest from a third party. The method relies on the social networks of the grassroots actors, which resonates with qualitative research of an exploratory nature according to Tenzek (2018). The use of social actor's networks allows potential access to other hard-

to-reach and underrepresented populations (Tenzek, 2018), but it may also stall the research process if the participants are not well connected. Another disadvantage pointed out by the author (2018) is that because the participants are in the same network, they might share similar beliefs and experiences. This was confirmed in my research, as the interviewees suggested other actors that I had already in my initial sample. The interviewed actors all have connections with each other, as will be discussed further in chapter 4.

The final, purposive sample does not aim to be representative of the system, but rather aims to provide a variety of participants (from established grassroots organisations to informal networks). Their inclusion in this research was based on the definitions of grassroots actors developed from the literature reviewed, as well as availability, willingness to participate, and the expectation of richness of information (Flyvbjerg, 2006).

There is also the assumption that informal networks can be better accessed by other participants of the network. Grassroots actors vary greatly in terms of the size, formality, and institutionalisation of their activities, and many of them may not have been picked up using other sampling methods. The grassroots actors were selected for interviews according to criteria developed from the literature review (Seyfang & Longhurst, 2016; Lara *et al.*, 2019; Wittenberg, Bilali & Strassner, 2019). The actors to be included for interviews had to meet the following criteria:

- (a) innovatively addressing sustainability around agri-food systems and fisheries;
- (b) operating at local scale, in and around Cape Town;
- (c) making use of local knowledge as a means to contribute to more sustainable food systems;
- (d) recognizing a social need as a driving force and acting out of ideological commitment; and
- (e) dependant on voluntary labour, and/or grants, and/or mutual exchange.

I sought out various social entities, individuals, groups of individuals, organisations and institutions that I perceived to be working in ‘changing’ Cape Town’s agri-food system, which could include chefs, farmers, social enterprises and other networks. My initial sample comprised of 33 grassroots actors that I encountered in my work, studies and

leisure time over the past four years. My original plan was to reach out to them via e-mail and/or phone call and/or visit their physical space. Out of the 33 actors mentioned, I only knew the physical space occupied by five of them, but I did not have any contact details. They also did not have any websites or social media presence, such as a curb side community garden. For those five actors, my plan was to visit them at their project's space and see who I could chat to and secure a face to face interview. However, as the COVID-19 pandemic spread in the beginning of the year, social and physical distancing measures were encouraged, and lockdown was declared. This meant that for two months non-essential movement was not allowed, so I had to exclude those five actors due to inability of accessing them to secure an interview. Therefore, out of the 33 grassroots actors, my initial sample was downsized to 28, creating a bias of grassroots actors who had a higher degree of institutionalisation.

After desktop research on those 28 actors, I chose to exclude five as it seemed to me that they did not qualify as grassroots actors according to the criteria presented above, leaving me with 23. For example, I excluded from the sample a local business that builds home gardens based on permaculture design, which did not depend on grants or voluntary labour. I also excluded a start-up business that developed a payment system for informal traders because they did not address sustainability explicitly. Another six actors that I had initially scouted in the beginning of my studies seemed to be inactive as they had, for example, no recent blog or social media posts in the past nine months, leaving me with 17 possible actors to interview.

As I reached out to the remaining potential interviewees, via phone calls or e-mail, I encountered a higher than expected rate of negative responses. No replies after several attempts of contact could mean either that the organisation was not operating at the moment, or that the contact details are outdated, or that they were not interested in or willing to participate in the research project. I believe it was easier for the grassroots actors to withhold their availability over telecommunications than in-presence queries, or simply forget to return a call or message. Another three potential interviewees declined to participate claiming they were overwhelmed with activities during lockdown, were struggling to stay afloat and could not afford to share their time. I believe it is important to recognise that besides the general panic caused by the uncertainty of the initial pandemic stages, food actors were some of the few allowed to

operate during the strictest levels of lockdown, explaining the incapacity of some actors to offer their time.

As I started my interviews, most of the ‘snowballed’ grassroots actors were already included in my original sample of 17, with only three new actors being added, to a total of 20 potential case studies. The suggestion of actors that were already in my initial sample by the interviewed participants confirmed my initial ideas and served as a guideline for prioritising the interviews.

3.5.3 Data collection: Semi-structured interviews

Data for the case studies were collected through semi-structured interviews; interviews without a script but guided by open-ended questions and adapted to appropriate styles in each interaction (Ayres, 2012). I chose to apply semi-structured interviews due to their “emphasis on what the interviewee sees as relevant” (Bryman & Bell, 2014:225), because I am hoping to explore new ways of seeing and understanding grassroots innovations. The interview guide remained the same for all actors. The interviews were meant to take place face-to-face and in their working space, which I hoped would allow me to better understand the context and setting of each grassroots actor, as suggested by Flyvbjerg (2006). However, because of national lockdown measures, all but one of my interviews had to take place over communications technologies, such as phone calls and online meeting platforms (Skype or Zoom). Before the interview started, I shared with the research participants the consent form one day before the scheduled interview and before the interview started, we discussed it and they shared their consent, including consent to be mentioned by name and for the interview to be recorded. The table below sums up the research participants:

Table 3: Research participants

Organisation’s name	Participant’s name	Interview date	Location	Domain activity
Oribi Village	Félix Wauquiez	9 March 2020	Head Office	Incubator
Food Flow	Ashlee Newell	22 May 2020	Zoom	Food aid
Making Kos	Loubie Rusch	15 May 2020	Skype	Consultant

Ubhle Bendalo	Ria Schuurman	12 June 2020	Skype	Food Garden
PEDI Agri-hub	Chris D’Aiuto	26 May 2020	Skype	Aggregator
Green Ranger	Xola Kwesna	16 June 2020	Zoom	Farmer
Abalimi Bezekhaya	Grace Stead	20 June 2020	Zoom	Small-scale Farmer support

I asked social actors if we could have a conversation about their organisations and their practices, supported by an interview guide of open-ended questions. I also strived to provide flexibility in the discussion to allow social actors to voice their perspectives. The interview guide was divided into three main blocks:

- (1) exploring the main characteristics (organizational structure, understanding of its role in the agri-food system, activities along the agri-food system) of the actors,
- (2) telling the story of the actors, from its foundation to the development of the initiative, including challenges, and strategies,
- (3) describing the adopted and emerging innovative features of the initiative (including aspects of inclusivity, gender, and knowledge).

For block 1 and 2 of the interviews, the goal was to better understand the actor’s history, the enabling factors for the foundation, barriers, as well as their organizational structures, the type of agri-food activities and their understanding of how they would like to change the local food system. For the third block I was interested in learning how the agri-food initiatives were implementing innovations (technical, organizational, cultural, etc) by identifying their different practices, values and beliefs along the different stages of activities within the food chain and assessing their innovative features. Appendix A provides a detailed interview guide, while appendix B provides the interview guide that was used. I used interview guide B, and if I felt the data was not rich enough, I asked more direct questions from interview guide A.

All interviews were recorded in audio and transcribed by myself for analysis, which I will cover in the next section.

3.5 Data analysis: Thematic analysis

Once the interviews were carried over, recorded, and transcribed, I proceeded to carry out a thematic analysis of the interviews aiming to answer the research question. This method, thematic analysis, involves searching for patterns that repeat themselves throughout the dataset (Braun & Clarke, 2013). According to Braun and Clarke (2013) thematic analysis is suited for research that is based on both realist or constructionist paradigms, in an inductive or deductive context, and that aims to analyse narrative data by describing and interpreting, emphasizing context. In other words, thematic analysis offers flexibility to be used across different research paradigms, as well as providing a simple way to convey complex and subjective ideas. However, the authors also highlight how thematic analysis can be limited when used without an accompanying theoretical framework, and how the researcher must engage in an active role to identify such patterns and emerging themes. Ultimately, the researcher must be explicit about the decisions made regarding the thematic analysis.

Qualitative data analysis looks for patterns, interactions, stories and meaning (Braun & Clarke, 2013). There is more than one way of making sense from the analysed data, and the data tells one of the many possible stories, reinforcing how data analyses are partial and subjective. Data is no more than an account produced in a particular context. Thus, we recognise that biases exist, and this should be incorporated into the analysis. Knowledge is contextual and partial. In other words, qualitative research does not treat subjectivity as a bias to be eliminated, but rather it informs a contextualised analysis, which takes subjectivity into account. It is exploratory, open ended and organic (Braun & Clarke, 2013).

I see thematic analysis as a relevant method for this research project given my constructivist approach to the case study, and how important I see the context (complex with social, political, economic, and ecological components) as part of the answer to the research question. My strategy with data analysis was to firstly get a description of the setting according to the grassroots actors, and then to search the data for themes that would address the research question.

Below, I delineate the steps I followed for data analysis, namely i) data organisation, ii) data coding, iii) theme development and iv) theme interpretation and literature discussion. These steps informed my data analysis strategy.

i) Data organisation

The interview audio files were saved in a respective folder on my password protected computer. Each interview was completely transcribed by myself, as I managed to carry out the interviews. Each folder contained the interview audio file and the transcription document. The folders were backed-up on my personal cloud system. Doing the full transcription allowed me to get acquainted with the data I would code and analyse later on.

i) Data coding

To assist me with data coding, I chose to use a computer-assisted qualitative data analysis software (CAQDAS). I chose the software Quirkos (version 2.0) due to its accessibility, both in price and in the trainings available online. Coding with software assisted me in understanding the relationship between the codes I created through visualisation, when compared to my attempt to hand code. I took into consideration that the frequency of codes does not necessarily imply greater importance, and that analysis is ultimately done by myself, the researcher, not the software (Braun & Clarke, 2013).

I strived to stick to a data-driven approach when coding aligned with my constructionist research approach, in order to honour each participant's voice, experience and understanding of their work (Braun & Clarke, 2013). However, my own views and understanding of the topics had already been influenced by the literature review, which had been carried out before the interviews. Hence, my coding approach was rather a mix of data-derived codes and researcher-derived (or theory-driven) codes. As Braun and Clarke (2013) explain it, this separation between data-derived codes and researcher-derived codes is never pure. Consequently, my coding reflected topics I thought were important to answer the research question, that reflected both the participants' experience as grassroots actors, but also the way in which the literature frames grassroots innovations and sustainability transitions in the food system. A table of codes is available in appendix C.

ii) Theme development

Thematic analysis, as with any pattern-based analysis, assumes that ideas which recur across the dataset capture something meaningful. Themes are the patterns that are relevant and important to address the research question. Relevance, however, is not determined by the frequency with which codes occur. Whereas the codes capture ideas, themes capture a “central organising concept” (Braun and Clarke, 2013:224). Themes are created after active examination of the codes generated by the researcher, and, in line with a constructivist paradigm, different researchers can come up with different analyses. The themes developed will not cover everything that was identified in the data, but rather reflect on a selection that addresses the research question.

After placing the codes into code groups, or domain summaries, themes were first developed into candidate themes and went under a round of scrutiny to check if they fitted with the coded data and were rephrased if necessary. Candidate themes went under a round of scrutiny to see if they assisted in explaining the research questions and if they truly reflect on the participants’ experience. Out of the eight themes developed, four appeared to assist in answering the research question. The themes were: support of small-scale urban farming, networking and relationships, financial model and viability, innovations and technology.

iii) Theme interpretation and literature discussion

Once the four themes were established, I addressed how each theme helped answer the research question and contrasted them with the literature. I also identified areas for further research.

3.6 Limitations and ethical considerations

This research projects comes with its ethical considerations and research limitations. I will detail each below.

3.6.1 Study limitations

Although fitting for this research project, case study design has its limitations. Firstly, that proximity and exchange with the research participants are key to insightful data. The fact that I am a foreigner in South Africa with limited knowledge of local languages

distances me from locals that do not feel comfortable with English. Being a foreigner can also make me aloof to certain cultural and historical aspects, despite my best efforts. Although this could have been countered with the help of an interpreter and translator, COVID-19 uncertainty and lockdown restrictions were not supportive of having more people involved in the research process.

The COVID-19 related restrictions stretched the distance between myself and the research participants even further as it did not allow me to conduct face to face interviews with the research participants. Conducting interviews within participants work environments is what Flyvbjerg (2006) praises as one of the strengths of case study design for qualitative research. The COVID-19 lockdown also made it impossible for me to ‘knock on the door’ of potential research participants’ projects, such as community gardens. This left out of my research of any grassroots actors that operate with lower degrees of institutionalisation. It also prevented me from using observation as a research method, which could have helped add further context to the findings.

3.6.2 Ethical Considerations

As for ethical considerations, the process was guided by Stellenbosch University’s ethical aspects of scholarly and scientific research. The university’s Humanities Research Ethics Committee approved my research proposal, data collection instruments and informed consent forms. Once ethical clearance was issued, I started contacting potential research participants with an overview of the research project. As they agreed to participate in it, they were provided a full description of the study’s purpose, acknowledged the interviews would be recorded, offered anonymity, and the option to withdraw from the study. No participants opted for anonymity and all agreed to being recorded, hence all organisation’s and individual identities have been shared. The interviews and transcripts were shared only with my supervisor (and only excerpts of these), as no third-party actors were involved in transcription. The ethical clearance was updated and re-issued after COVID-19 lockdown measures were relaxed to include telecommunications tools such as Zoom and Skype.

All data related to this thesis (including recordings, transcriptions, notes) has been deleted off secondary devices (e.g. my mobile phone that was used to do the recordings)

and remain only on my password-protected laptop and in my password-protected cloud storage account. This data will be deleted at the end of the research project.

3.7 Conclusion

In this chapter, I have discussed how I aim to address the research objective stated in 1.4, namely, to contribute to the understanding of Cape Town's food system transition through its grassroots innovations. The constructivist/interpretivist paradigm informed the approach to my research into what innovations are being developed and adopted locally by grassroots movements to achieve a more sustainable food system in Cape Town. This research question stems from the intersection of my interest in sustainability transitions and in evolutionary economics, my previous area of research. I chose to use this lens to look at food systems, for their pervasive role in sustainability transitions, and the lack of research done in the global South on those themes, as pointed out by the literature. A narrative literature review was conducted to inform the case study, which was the design selected for its suitability to understand how and why questions and study current social phenomena in a bounded system of interest. As for data collection and analysis, I employed semi-structured interviews and thematic analysis. These coupled methods allowed for in-depth understanding of the investigated topic and for the research participant's perspective to emerge. The chapter was concluded with details on the ethical considerations and limitations of this study, which were heavily influenced by COVID-19 lockdown measures. The following chapter will discuss the research findings.

Chapter 4 – Findings: Cape Town’s grassroots innovations for food system transitions

4.1 Introduction

In Chapter 1 I presented an overview of this research project and the wider context. Chapter 2 offered a literature review on socio-technical transitions, food system transitions and the role of grassroots innovations in sustainability transitions. Chapter 3 presented the research approach, design, and methods for this study. This chapter will explore the findings of the thematic analysis, substantiated by interview segments.

This chapter is structured in the following way: 4.2 provides the context of the grassroots actors that participated in the research, and 4.3 presents the themes and subthemes developed from the analysis, with citations from the interviews to illustrate them. 4.4 offers a conclusion to the chapter.

4.2 Case study context: Cape Town’s grassroots actors

In this section, I will introduce the grassroots actors that agreed to participate in this research project via a brief overview of their stories and their innovative features, which is what drew me to them. Unless otherwise indicated with an in-text citation, all of the information in this section is from the participants’ interviews.

4.2.1 Oribi Village

Oribi Village is a registered non-profit organisation that was established in early 2018. They are the local initiative of the wider network of the social and environmental entrepreneurship development agency, Groupe SOS, which is funded by the Agence Française de Développement (French Development Agency). Oribi’s goal is to develop social entrepreneurship in South Africa, providing programmes and support for skills development and training. They host incubation programmes for social entrepreneurs and have already hosted two cohorts aimed at sustainable food systems, and another cohort aimed at tourism.

The incubation programme for food system social entrepreneurs aims at addressing accessibility, transparency and over-industrialisation in the food system for a more just and resilient food system. All participants must aim to have a social and/or an environmental impact, in addition to generating revenues. Throughout an incubation programme, OriBi hosts weekly meet ups that consist of workshops, lectures, and masterclasses. OriBi assists the entrepreneurs in setting up their development plan, their business, strategy and financial models, to assist them in becoming ‘investment ready’. OriBi uses the United Nations’ Sustainable Development Goals (UN-SDGs) to communicate their social and environmental impact, and as a tool for the social entrepreneurs.

I found OriBi Village’s innovative feature to be their social entrepreneurship incubation programme dedicated to the food sector. It seems to be the only incubation programme like this in South Africa. They have a big network of food systems agents, from on-the-ground actors to institutions. Although OriBi is not only focussed on the food system, I chose to include them in this study because they engage with it directly and support its transition.

I spoke to Félix Wauquiez in OriBi’s Head Office on the 9th of March of 2020. At the time of the interview, he had been working with OriBi Village for the past three months as the incubation programme manager.

4.2.2 Food Flow

Food Flow came into being just before COVID-19 lockdown measures were implemented in South Africa, on the 28th of March 2020. It was co-founded in Hout Bay by an organic specialty vegetable farmer, Iming Lin, who noticed her usual clients, restaurants and hotels, were suspending their orders as social physical distancing became a common practice, meaning loss of income for her farm and vegetables that were potentially going to go to waste. Together with Ashley Newell, they decided that they could connect this produce that would eventually go to waste and re-direct it to vulnerable communities, which saw government feeding programmes they were dependant on suspended with COVID-19 early lockdown measures.

Food Flow aimed to redirect the food grown by small-scale urban farmers in Cape Town that was being sold to restaurants before the COVID-19 lockdown to local, vulnerable communities. Individual donations were collected to sponsor ‘harvest bags’, which include about six types of vegetables, occasionally one vegetable swapped for half a dozen eggs, according to what is available at harvest time. The harvest bags were then matched to families and communities who rely on government feeding schemes, such as schools, and other social groups that fall outside of the government’s social support network. A donations campaign was set up on *Webtickets*, an online ticket-selling platform where individuals could sponsor a harvest bag through the website, as if they were buying an online a ticket for an event. Harvest bags were then purchased from farmers and distributed according to the amount raised on a weekly basis. By matching farms to feeding sites, not only were they guaranteeing income for the farmers, but they also fed communities that would have gone hungry as jobs became scarce and school feeding programmes were suspended under lockdown measures. By guaranteeing income to livelihood farmers, they also prevented more people falling vulnerable to hunger and being in need of government support.

Because governmental institutions were closed with COVID-19 lockdown measures, Food Flow does not have a legal status yet, but they plan to register as a non-profit organisation. In the interim, donations are directed through Oxfam South Africa, and Food Flow invoices Oxfam for the produce bought from 14 (at the time of our interview) food production actors, including PEDI and Abalimi Bezekhaya, who participated in this research. Food Flow then matches the harvest bags to the identified communities and distribution partners, such as feeding sites identified by the Western Cape’s Department of Social Development, the local community action network’s¹² soup kitchens and other projects. In their first week, they expected to support 150 families in Imizamo Yethu, a township in Hout Bay, Cape Town, but they received enough donations to sponsor 500 harvest bags. As of the time of the interview, Food Flow had already donated 8000 harvest bags and over a million Rands had been donated and directed to small-scale urban farmers.

¹² Community Action Networks (CANs) are grassroots groups set up to help their respective community respond to COVID-19 by providing non-medical support, such as soup kitchens, community grocers, donations distribution and washing stations, depending on what each local community needs.

Food Flow's innovative approach to food aid and hunger relief caught my attention. Mainstream food relief programmes rely on the distribution of shelf-stable products and canned goods. Food Flow connects farmer's produce that would go to clients in the hospitality industry directly to vulnerable communities, without middlemen or warehouses, ensuring fresh and nutritious goods. Even though I classified Food Flow as a 'food aid' organization, their role is really the support of small scale farming, as they recognize it themselves. Moreover, Food Flow has made an effort to find vulnerable communities that fall outside of the scope of the Department of Social Development, reaching communities that are even more excluded, and in some cases even politically opposed to the current government.

I spoke to Ashley Newell, Food Flow's co-founder on Skype on the 22nd of May 2020.

4.2.3 Making Kos

Making Kos embodies a landscaper's efforts to disseminate the use and cultivation of wild foods in Cape Town and the Western Cape. It is a one-woman operation, Loubie Rusch. Wild foods are also known as indigenous and traditional foods crops. Wild foods' development and cultivation has been ignited by the rise of the modern food system, particularly the need for diversity in diets and for climate action. Wild foods have the potential to improve nutrition, through increasing dietary diversity and are adapted to climate resilience (Mabhaudhi *et al.*, 2019). Making Kos emphasises the context of the Western Cape: a water-sensitive locale with high numbers of people going hungry. Wild foods can thus both regenerate the landscape, since they are adapted to the Cape's poor soils, and improve nutritional security, given that they are easy to grow, and drought resistant and nutritious.

For the past decade, Making Kos has been experimenting with the use of wild foods in the kitchen and understanding how to cultivate them. Foraging wild foods is not sustainable if too many people rely on it, as plant stocks would get depleted and this could erode the landscape. Moreover, the cultivation of wild foods at a wider scale has landscape regeneration potential, in a landscape that has been colonised by mainstream crops. Wild foods can also offer nutritional security in the context of climate change. She had a demonstration and study garden in Khayelitsha which, due to practicalities, has been moved to her curb side and hosts workshops in her kitchen, most of that has

been self-funded. Making Kos has also been involved in government and academic projects for the support of livelihoods that had a wild food component to it. She took part in Oribi's Village incubation programme in 2019. Currently, she is involved in two main projects, one is developing wild foods recipes together with UCOOK, a meal kit delivery business, and the other is her usual workshops, consultations, foraging walks, and product development experiments.

Making Kos' innovation is the study and cultivation of wild foods. Although wild foods have a strong sustainability claim, not much is known – or at least registered - about the cultivation, propagation or harvest thereof in the Western Cape, since they have not been used in agriculture, but rather foraged. Moreover, Making Kos has been experimenting with different uses so people not only know about them, but also know how to eat them, i.e. exploring how wild foods can be incorporated into diets.

I spoke with Loubie Rusch, landscape architect and founder of Making Kos, on Skype on 15th of May of 2020.

4.2.4 Ubuhle Bendalo

Ubuhle Bendalo is a small food garden in Khayelitsha with no legal status. After completing the six-month training with Abalimi Bezekhaya on urban agriculture, Sophumla found himself with no access to land that he could farm. Together with Ria Schuurman, they co-founded Ubuhle Bendalo, a small community garden. They occupy a small space in a school in Khayelitsha. They started out in late 2017 as a collective that would support setting up community gardens in Khayelitsha to improve nutritional security and additional income to Khayelitsha's households. After the incubation programme in Oribi Village in 2018, they have decided to focus on their own food garden and transform it into a source of income for Sophumla. They provide vegetables to Umthuzi, a vegetable box scheme that has operated since early 2018 in Cape Town, that was also part of Oribi's Village incubation programme. They also sell seedlings and compost in the neighbourhood and offer classes in gardening and nutrition to the school they share grounds with. They have helped set up over 40 home gardens and aim to sell their produce within the local community.

Ubhle Bendalo's innovative component, as a food garden, is its participation in the Participatory Guarantee System¹³. Participatory Guarantee System is a peer-reviewed quality assurance system for organic produce. It differs from mainstream organic certification as it does not require third-party involvement, nor the costs associated with it. Moreover, Ubhle Bendalo is placed in a public space, utilising a space that otherwise would be not used for food growing. Its goal, to grow and sell within the Khayelitsha community, also defies the current food system logic, which relies on supermarkets, middlemen, and a globalised food chain.

I interviewed Ria Schuurman, co-founder of Ubhle Bendalo, on June 12, 2020 through a phone call. She and Sophumla manage the garden and community efforts together.

4.2.5 PEDI Agri-hub

PEDI Agri-hub is part of the Philippi Economic Development Initiative (PEDI), which is a registered non-profit company¹⁴ developed from a public-private partnership that focuses on catalysing Philippi's economic development. PEDI, established in 1998, has recognised that the agricultural sector in Philippi is a key driver for economic development and established the Agri-hub 'arm' to revitalise small and medium urban farming businesses via training and market access. The Agri-hub is not registered as a separate entity, it occupies the same offices as the rest of the PEDI staff involved with other projects and 'arms'. The Agri-hub acts as an 'aggregator', connecting small-scale emergent farmers that grow organically, to supply to other businesses. Currently their main customers are restaurants and UCOOK.

The Agri-hub retains a small percentage of the vegetables' sale value and also benefits from government funding. They occupy the premises of the Philippi Fresh Produce Market, which was an infrastructure investment made by the City of Cape Town that was not enough to catalyse the sector on its own and has expanded to an agri-processing

¹³ Participatory Guarantee Systems (PGS) are locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange as defined by IFOAM Organics International, the International Federation of Organic Agriculture Movements.

¹⁴ Non-profit companies differ from non-profit organisations, which are registered under the Department of Social Development. Their legal structure is similar to that of a company, but they do not share capital and cannot distribute shares or pay dividends.

and packaging facility. Besides training farmers in organic practices, they have also established the Cape Flats Participatory Guarantee System, a peer review system that guarantees organic produce without the costly process of a third-party certification. PEDI owns no farms and has a network of about 50 farmers.

The innovative feature of the PEDI Agri-hub is that they pioneered the consolidation of the Cape Flats Participatory Guarantee System in Cape Town to strengthen small scale urban organic farmers. On top of that, PEDI Agri-hub is also coordinating the processing of produce from emergent farmers, usually excluded, to provide to 'mainstream' businesses.

I interviewed Chris D'Aiuto on May 26th, 2020 via Skype. A trained agronomer, he has been leading PEDI Agri-hub for over two years.

4.2.6 The Green Ranger

The Green Ranger is the alias of Xola Keswa, a young farmer committed to farming following permaculture practices. Permaculture is a global movement from the late 1970s that proposes a design system for communities and agriculture using systems thinking to emulate the dynamics of natural ecosystems (Ingram, 2018). He grew up in the Eastern Cape where his grandparents farmed and moved to Cape Town to volunteer with permaculture organisations. He was awarded sponsorships to participate in different permaculture and organic farming trainings after dropping out of traditional agricultural degrees in Gauteng. He has volunteered in many other organic and permaculture trainings and workshops, and set up food gardens in businesses and schools.

Currently, he is funded by the South African Urban Food and Farming Trust and the University of Cape Town's Global Risk Governance programme. With the support of this funding, he has developed the 'Personal Garden', a self-watering raised bed based on permaculture principles, so people with low access to land, quality soil or irrigation systems can grow food in a small space to supplement their diets or income. It is made of upcycled materials, so anyone can build one at home. He commercialised the Personal Garden through his company, Organic Matters Inc. The personal garden design was a finalist at the Friedrich Naumann Foundation (FNF) Green Pitch

Challenge 2019, hosted by Green Cape. The event invited entrepreneurs and innovators with economically viable green economy innovation business ideas, in any development phase. He has also submitted the design of the Personal Garden for patent under the category of ‘indigenous biological resource, genetic resource, traditional knowledge or use’.

The Green Ranger’s background in permaculture and organic agriculture, a niche in the food system, allowed him to develop the innovative Personal Garden to support backyard gardens in poor soil communities to complement their diets.

I interviewed Xola on the 16th of June 2020 on Zoom.

4.2.7 Abalimi Bezekhaya

Abalimi Bezekhaya, meaning ‘gardens of hope’, is a registered non-profit organisation, pioneering urban and emergent farming in the greater Cape Town area. It was established in 1982 as a way to alleviate poverty caused by apartheid measures. Nowadays, it supports emergent farmers through four main pillars: i) continued education with training, as well as follow-up support, ii) provision of resources, iii) infrastructure support, and iv) market access.

Under continued education, Abalimi offers short workshops as well as month-long training in organic agriculture and farm management, from basic, introductory-level short courses to focused training according to the farmers’ needs. Abalimi are also available for their network farmers for support on-site. Under the second pillar, they offer resources such as soil, manure and seedlings at low, often subsidised costs for the local community at their Community Garden Centre. They also offer so called ‘manure-drives’, where they drive through Khayelitsha with the resources on offer. This was their strategy in the early 1980s to make themselves known in the community, and this has now been revived with the COVID-19 lockdown measures. This strategy is important to them as many farmers do not have cars to drive to other garden centres to carry heavy bags of soil or manure, and the area is underserved in terms of public transportation. The third pillar, infrastructure support, encompasses the digging of boreholes, fencing and other infrastructural work. The last pillar, market access, involves connecting established gardens to possible clients, such as restaurants, markets

and shops, outside and within the community. Abalimi ran a vegetable box scheme for ten years called Harvest of Hope. It closed down in 2018 due to financial constraints. The farmers, who would buy seedlings from Abalimi and pay them back as they sold the vegetables to Abalimi, started selling their produce to other clients instead of selling back to Harvest of Hope. Abalimi understands this as a ‘graduation’, meaning that the farmers had found clients in the market.

Abalimi relies on external funding, sponsorships and donations to carry out its programmes, as well as volunteers. They are connected to the Farm and Garden National Trust, that helps with resource mobilisation. Abalimi is governed by a board that includes farmers, managers, and representatives from funding partners. Abalimi owns no farms, but supports about 60 community gardens in the Cape Flats area.

With its almost four decades of activities, it has raised awareness on the importance of micro-farming for food security for the most vulnerable communities and its social and environmental benefits. During its existence, it has captured knowledge around the specificities of micro farming in Cape Town and developed tools such as the Urban Farming Development Chain, which is widely used by like-minded organisations.

I interviewed Grace Stead, Abalimi Bezekhaya’s managing director since late 2017, on the 20th of June 2020 on Zoom.

4.2.8 Case study overview: grassroots innovations

Now that I have introduced them, this section can provide an overview on all the research participants’ different initiatives for an easy view of the case study.

The table below offers each research participants’ details, namely the name of the initiative, approximate time of activity, its structure, and the activity domain in which it operates.

Table 4: Grassroots organisations profile

Initiative	Time active	Structure	Activity Domain
Oribi Village	2.5 years	Non-Profit Organisation (NPO)	Incubator
Food Flow	3 months	Fund	Food aid
Making Kos	10 years	Individual	Consultant
Ubhle Bendalo	2 years	Entrepreneur	Food Garden
PEDI Agri-hub	2 years	Non Profit Company (NPC) – Public private partnership	Aggregator
Green Ranger	1 year	Social entrepreneur	Farmer
Abalimi Bezekhaya	38 yeas	Non Profit Organisation (NPO)	Small-scale farmer support

The agri-food initiatives vary in terms of how long they have been active, from 38 years to only a couple of months (at the time the interviews took place, between March and June 2020, the agri-food initiatives varied in terms of how long they have been active, from 38 years to only a couple of months. The actors interviewed also vary in terms of structure, some are registered (Abalimi, Oribi Village, PEDI Agri-hub), some are solo entrepreneurs (Making Kos, Green Ranger), and some are small groups of people who got together with a project in mind (Food Flow, Ubhle Bendalo). Some are part of a larger organisation (PEDI, Oribi Village), while others are self-standing organisations (Abalimi, Food Flow). Some are reliant on grants, sponsorships, and donations (Food Flow, Abalimi, Oribi Village) and others are looking for independent financial models (Ubhle Bendalo, PEDI Agri-hub).

The seven participating initiatives also show a variety of ways in which they participate in the food system: from production (food gardens and farming, such as Ubhle Bendalo and the Green Ranger) to processing and distributing in the middle of the value chain (PEDI Agri-hub, Food Flow) and support services across the chain (business incubator, food aid and business support, like Abalimi, Food Flow, and Oribi Village).

At the same time, the participating organisations engage in a variety of activities to support a more sustainable food system. The table below describes the innovative features that called my attention to each organisation as I was gathering potential research participants, be it in the use of a technology, or a product or ‘the way things are done’.

Table 5: Grassroots activities and innovations

Initiative	Activities	Innovative Feature
Oribi Village	Business development	Offers an incubation programme for social entrepreneurship in food
Food Flow	Food distribution	Provides food parcels to vulnerable communities, including ones that fall outside of the government’s food aid mapping, straight from mall-scale farmer
Making Kos	Education; research	Raises awareness on wild foods through workshops and academic collaborations, and studies its cultivation and usage
Ubhle Bendalo	Food production	Grows food in a shared space using organic principles and is part of the Cape Flats Participatory Guarantee System
PEDI Agri-hub	Food distribution; food processing	Supports small-scale urban farmers via aggregation and advances urban organic agriculture through Participatory Guarantee Systems
Green Ranger	Food production; training	Uses permaculture as design principles and has developed a self-watering garden. The design was finalist at GreenPitch Challenge 2019
Abalimi Bezekhaya	Education and training; food distribution; input supply; infrastructure development	Supports micro-farmers using organic principles and raises awareness on micro-scale urban farming. Developed the first Community-Supported Agriculture vegetable box scheme in Cape Town. Developed the Farmer development chain to better support small-scale farmer’s livelihoods.

Together, these initiatives take different entry points to support greater sustainability transitions in the food system. The activities vary from food production and food processing to business and infrastructure development. Food distribution refers to connecting food production to food consumption. Most of these initiatives take a holistic approach to food, engaging in multiple activities that support greater sustainability in the food system.

4.3 Themes

4.3.1 Introduction

After coding and establishing candidate themes, I reviewed and reorganised these to compile the final themes. The themes have been divided into sub-themes, which I found explain the nuances of the theme better and are relevant in addressing the research question, namely how grassroot actors are developing and adopting innovations for greater sustainability in Cape Town's food system. In the remainder of this introduction, I introduce the themes, as well as the themes that have been discarded. In the following sub-sections, I will go into details of the themes, subthemes and associated segments that illustrate the theme and subtheme. The order in which the themes are presented here does not reflect any relative importance or hierarchy, and the number in brackets is the number of associated code segments.

The four themes are:

- Support of small-scale urban farming (202)
- Networking and relationships (136)
- Financial model and viability (84)
- Innovation and technology (62)

Other themes were formed, but I chose to discard them as they did not address the research question, but rather informed the context. They are namely:

- Organisation's identity (163)
- Socio-economic inequalities in South Africa (88)
- Conventional food system (52)
- COVID-19 impact (25)

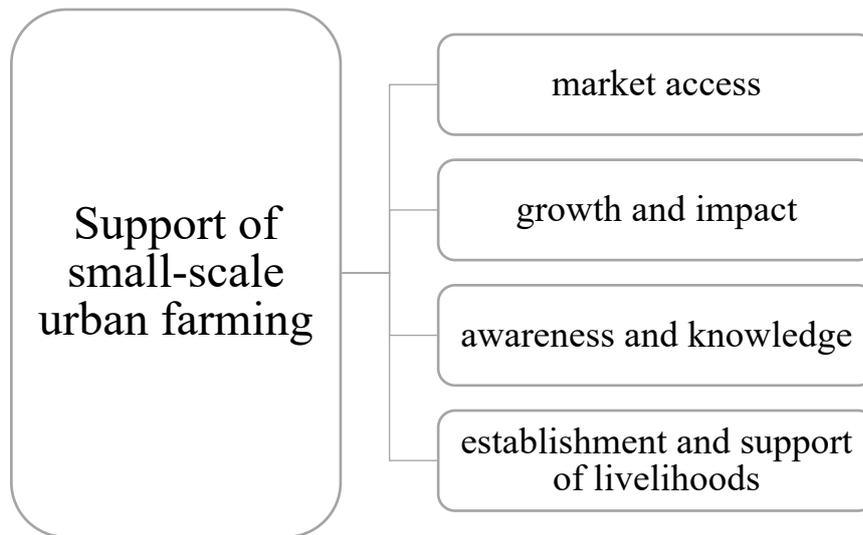
I will present each theme and its subthemes in the sections below.

4.3.2 Theme 1: Support of small-scale urban farming

The first theme, 'support of small-scale urban farming', is made up of codes that refer to the strategies used by the research participants to support small-scale farming. It has

been divided into four sub-themes, namely ‘market access’, ‘growth and impact’, ‘awareness and knowledge’, and ‘establishment and support of livelihoods’. These sub-themes can be understood as the four main strategies used by the participants to provide support to small-scale urban farming.

Figure 4: Theme 1 and its subthemes



The theme ‘support of small-scale urban farming’ is directly mentioned by Food Flow, for example, who said, “we really see our role as supporting the small-scale food producer” (Newell, 2020). Abalimi clarifies that ‘farming’ is a more encompassing term that includes food gardens: “farms is not actually the right word, the people often call themselves gardeners, not farmers, (...) you can say small-scale urban farming, but (that) really is sort of next level, whereas people that we work with are very much at the basic level” (Stead, 2020). Stead (2020) explains that the term ‘farming’ usually refers to bigger and more organised, i.e. commercially oriented, food production activities. However, in this case study, I have chosen to use the term ‘small-scale urban farming’ to include any scale of food production activity within the participant’s understanding of the ‘urban’.

The subtheme ‘market access’ is made up of the codes that relate to grassroots initiatives’ efforts to connect small scale urban farmers to income generation opportunities. Examples are codes such as ‘need for active support from the government’, ‘risk’, ‘market potential’ and ‘market standards’. PEDI sees their job as

aggregators as communicating with small scale famers “on those kinds of things, how do we plan better for your market, how do you get a better market share” and states that “those are the needs of the market (...) so how can we help you grow towards those deliverables” (D’Aiuto, 2020). Making Kos also discusses finding ways in which wild foods can be perceived as ‘conventional’, such as her project of working together with chefs to raise awareness on how to use such foods. Making Kos and PEDI both bring attention to the fact that emergent farmers “are so marginalised that they just do not have access” (D’Aiuto, 2020). Ubuhle Bendalo and the Green Ranger have identified market access as their biggest challenges, whereas Abalimi Bezekhaya structured its arm Harvest of Hope to ensure market access for the farmers it supported; “the fourth pillar (of Abalimi’s strategy) is market access, (...) so we started up with Harvest of Hope” (Stead, 2020), and stated that they have “put a farmers in contact with restaurants and hotels directly” (Stead, 2020).

Despite market potential, as PEDI puts it, they’re “not even scratching the surface of the client’s needs” (D’Aiuto, 2020). It is worth mentioning that market access is not as simple as a pathway to a door of possibilities, which the code ‘market standards’ captures. Ubuhle experiences this with their main client, a vegetable box scheme, mentioning that they already have about 60 other farmers on their supply network and “can only take so much a week”, “it’s not like they (the market) will take anything that you have to offer” (Schuurman, 2020). PEDI notes that “delivering short is not an option” and that they are continuously “training for consistency and quality” (D’Aiuto, 2020), as well as focusing on food safety standards, food health certificates, and invoicing. Making Kos also recognises that “chefs needing reliable, on-time, food quality produce” (Rusch, 2020).

Another point that the participants highlight is that small-scale farmers cannot afford the risks due to their fragile socio-economic position, which such grassroots organizations try to dissipate, with Abalimi stating “we carry the cost upfront”, and, referring to sales of seedlings, “we take that gamble on behalf of the farmers to make sure that we take what they need” (Stead, 2020). Making Kos recognises that she wishes she could tell farmers to ‘go for it’ when it comes to wild foods, admitting “I knew nobody else was going to take that risk” (Rusch, 2020).

The subtheme ‘growth and impact’ refers to how the grassroots actors are trying to expand activities, benefitting more people, but also triggering changes enough to have substantial social and environmental impact in the communities they are involved in. Food Flow, for example, started its activities in Cape Town but already organises similar operations in Limpopo, Kwazulu-Natal and the Eastern Cape. Making Kos also refers to the potential of wild foods and environmental sustainability: “the more small-scale farmers can grow it, the more our landscapes can get restored” (Rusch, 2020), as she trains more farmers and cooks to create offer and demand of wild foods. Impact growth also refers to ‘entry points’ into the conventional food system, such as finding large buyers and building the capacity to secure such clients, which in PEDI’s case is looking for more farmers to be part of the Cape Flats PGS network. It also includes wishing to “see emerging farmers have larger, scalable markets”, illustrated by growing organics “in the Cape Flats, and (...) we’re trying to find this new market (for the organic produce) that are high demands, that weren’t already captured by the current system” (D’Aiuto, 2020), for example a catering company or restaurants in the area. This subtheme also refers to the effort of greater inclusion by the grassroots actors. For PEDI, this means that once the emergent farmers in their network are “successful on a small bit of land, then there’s such an argument as to say when land becomes available, these are the farmers that are able to scale and able to produce at a higher level (...) and that’s transformative for the country” (D’Aiuto, 2020).

The subtheme ‘awareness and knowledge’ refers to the necessary knowledge about alternative food production, and to raising awareness about it in the wider community. The Green Ranger explains how he found organic agriculture, permaculture and biodynamic farming through Google searches, as he was not familiar with those terms, where both PEDI and Abalimi offer organic farming training as part of their strategy for knowledge generation. Ubuhle Bendalo, Making Kos and the Green Ranger all refer to how much of farming and gardening is knowledge that has been lost or forgotten, not “rocket science” (Green Ranger, 2020), and emphasise how learning is hands-on. Knowledge is thus built through trainings, workshops and ongoing support.

Although all research participants recognise that organic and small-scale urban farming is still very much a niche in the market, they also agree that in Cape Town there is growing awareness around it. Abalimi reflects on awareness levels when they started

their vegetable box: “Eleven years ago when we started it nobody was even really selling organic vegetables, we couldn't easily get hold of organic vegetables, and now it's a lot more common and there are a lot more people buying from the townships” (Stead, 2020). They recognise “there is an increased interest and need around food security, so there are more people, more players, more actors” (Stead, 2020). PEDI adds to that perception: “a lot of (their) clients value the social aspect of what we do more than the organic one” (D’Aiuto, 2020). Awareness is raised through close relationships with potential clients.

The subtheme ‘establishment and support of livelihoods’ refers to the fact that behind the support of small-scale urban farming is the goal of establishing livelihoods for vulnerable populations in the Cape Town area. For some research participants, this is also their very reason for acting, such as PEDI who says, “it’s about having a social impact in local livelihoods” (D’Aiuto, 2020). Food Flow’s understanding of its operational model also frames this perfectly: “we're not only trying to feed people, we're trying to protect food livelihoods, so that not only do we get people fed, but we prevent other people from becoming hungry and becoming dependent on the larger food aid government response” (Newell, 2020) This ultimate goal – establishment and support of livelihoods – is also informed by the perception that the most vulnerable populations barely have access to land, and if they do, “with 600 square meters, they’ll never earn a livelihood” (D’Aiuto, 2020). The reasoning behind supporting small-scale urban farmers is that, if backyard farmers manage their little space successfully, there is a motivation to postulate for productive land redistribution (D’Aiuto, 2020).

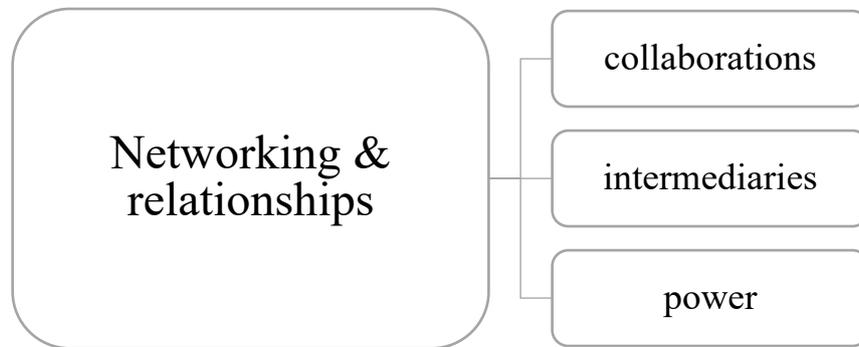
The subthemes also inform each other, ‘support and establishment of livelihoods’, for example, informs the need to grow and upscale, and knowledge and training is geared towards market access as well. For example, the training in peer reviewing processes supports farmers in selling their produce as organic, which has a higher market value, and therefore supports market access (D’Aiuto, 2020).

4.3.2 Theme 2: Networking and relationships

The theme ‘networking and relationships’ refers to all collaborations and partnerships with different actors in the system and the quality of the relationships. This theme has

been divided into three sub-themes, namely ‘collaborations’, ‘intermediaries’, and ‘power’.

Figure 5: Theme 2 and sub-themes



The subtheme ‘collaborations’ encompasses all different collaborations that the research participants mentioned. In the interviews, they mentioned collaborations with academic institutions, with government bodies, with like-minded organisations and collaborations for further training and development, for funding, business development and even exposure. Such collaborations take different forms and different agreements.

Frequently, the organisations have their own operational network. For example, PEDI has created its own Participatory Guarantee System network, the Cape Flats PGS, with around 50 farmers, similar to Abalimi’s network of farmers. Food Flow recognises that “the Western Cape farmers are pretty well connected” (Newell, 2020) and that their quick implementation was thanks to its partnership with established partners. All research participants have or have had a collaboration with an academic body. Making Kos cited a research project funded by the National Research Foundation and the collaboration of the Southern Africa Food Lab, whereas Food Flow acknowledges students from University of Cape Town’s (UCT) Graduate School of Business supporting their journey and consolidating the organization’s experience. Abalimi is involved with the University of Western Cape’s Food Governance Community of Practice, sharing their experiences with the wider group. A research programme at UCT currently funds the Green Ranger product development, and Ubuhle Bendalo acknowledges “there have been research groups involved in teaching us good urban agricultural practices” and highlights how separate support efforts “are coming together

to help many small-scale farmers to grow better produce” (Schuurman, 2020), which may lead to better market access.

This multitude of collaborations shows how diverse such partnerships can be and how diverse their purposes are. Government collaborations are just as ubiquitous and happen to attend diverse goals. PEDI Agri-hub is a side project from a public-private partnership with the City of Cape Town, and builds on to an existing project from the City, the Philippi Fresh Produce Market. It is currently looking for funding with the Department of Agriculture. On the other hand, Making Kos has also participated in social development programmes through the provincial government with a wild food component to it. Differently, Food Flow “got in touch with the Department of Social Development in the Western Cape and connected with more of their identified feeding sites” (Newell, 2020). Collaborations can also happen with like-minded organisations that support the research participants’ goals. PEDI, for example, mentions a “partnership with ASISA Foundation on training farmers on a business (...) because while (they) are trying to grow as an institution, (they) are also trying to get (their) farmers to grow in the same direction” (D’Aiuto, 2020). PEDI, Making Kos, and Ubuhle Bendalo have all participated in Oribi Village’s incubation programme to develop their business skills to leverage their impact. Oribi Village also recognise making a solid effort to bring together different actors in order to scale their impact and better support their incubees (Wauquiez, 2020). Another example is Food Flow’s partnering with the Community Action Networks to find vulnerable communities that were not being supported by any government-funded food aid. Making Kos understands that just because two or more actors are working towards the same or complementing roles, we assume “a connection will happen automatically” (Rusch, 2020), but actually it requires someone to ‘catalyse’ or facilitate such connections, that is, to be “the person that ties together, that pulls the network, (...) to build those bridges and tie those things together” to consolidate grassroots efforts and someone who “understands the tension that arises when you throw (different) people in the room together” (Rusch, 2020).

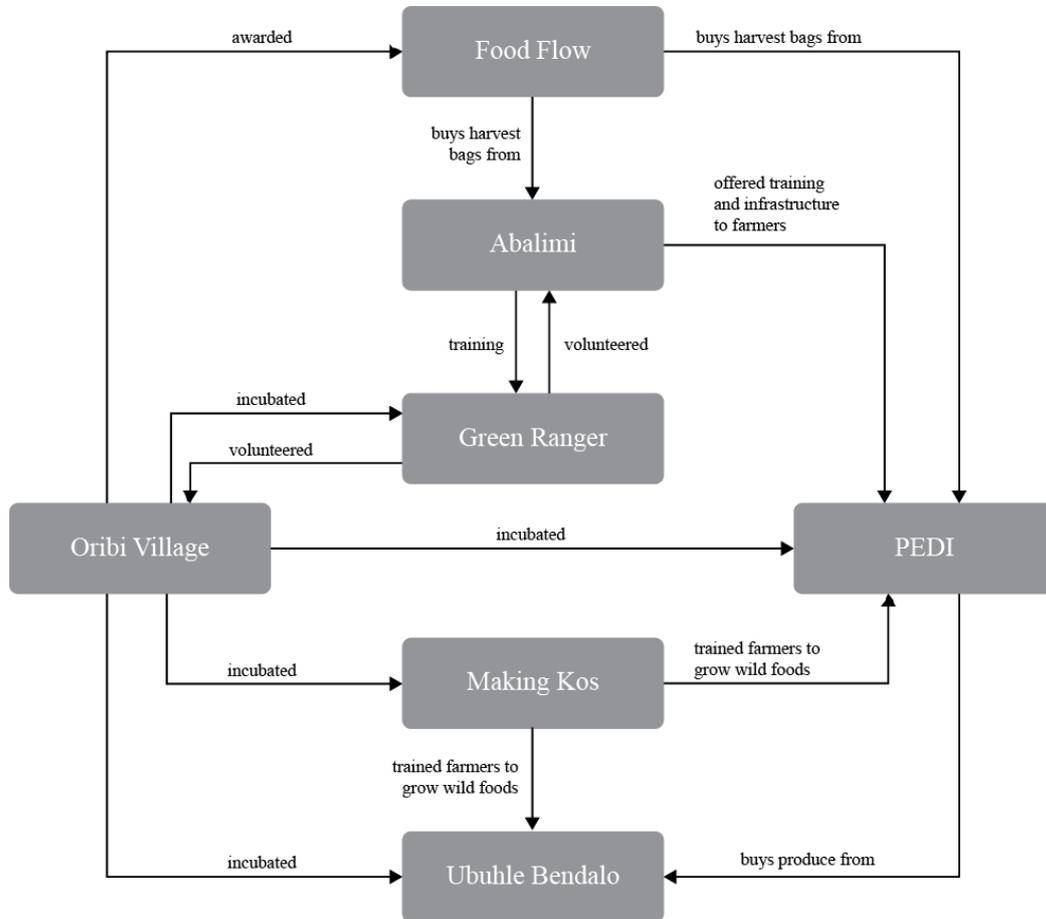
The second subtheme, ‘intermediaries’, refers to collaborations between the grassroots actors and actors that are part of the regime, meaning that they operate under the same logics of the regime. Examples are PEDI’s supply to UCOOK, a meal kit delivery service, and its efforts to become a supplier to airport restaurants: “we’re trying to see

how our product can fit into such development” (D’Aiuto, 2020). The quality of the relationship also proves to be key to the growth of the grassroots actors, which PEDI exemplifies saying; “it isn’t like any other partnership I’ve ever experienced, they’re literally fostering our business forward” (D’Aiuto, 2020). Similarly, Making Kos also contributes to UCOOK’s meal kits by providing ways to incorporate wild foods into the recipes. Such partnerships have a ripple effect, as Making Kos illustrates: “UCOOK came to present, and the penny immediately dropped for me that this would be an amazing way to remove the risk off farmers because if we did an indigenous box, (...) into that box can go the information about the plant, the recipe, how to use the plant, as well as the ingredients and it would give us the opportunity to estimate how much a farmer would need to grow” (Rusch, 2020).

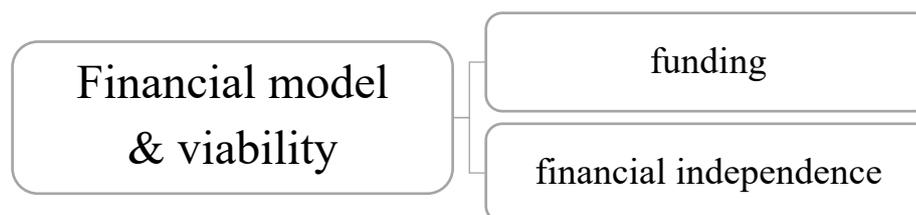
The third subtheme refers to power in the relationships. Making Kos highlights the importance of the quality of the relationships for real impact: “if grassroots organisations don't find partners who know how to be fair, they're going to be in trouble” and “grassroots initiatives can't actually have impact unless they network into something which is equitable” (Rusch, 2020). She explains her decision not to team up with different established brands for product development, stating “I’m not supporting you and your bottom-line driven business” (Rusch, 2020).

It is worth mentioning the network formed by the participants in this research. Oribi Village hosted an incubation programme in 2019 and Making Kos, PEDI and Ubuhle were participants in this cohort. Oribi Village also hosted an e-challenge during the strict lockdown months (April – May 2020) and awarded Food Flow for its solution. Abalimi’s farmers and Ubuhle Bendalo sell produce to PEDI. The Green Ranger has volunteered with Abalimi and Oribi Village and has worked with PEDI. PEDI and Abalimi are engaging with Participatory Guarantee System, and Ubuhle Bendalo is part of the PGS network, spearheaded by PEDI. Food Flow buys harvest bags from PEDI. Ubuhle Bendalo and PEDI are growing and distributing wild foods with support from Making Kos.

As introduced under each research participant’s section, all the initiatives also connect with each other. The figure below summarises the relationships between the research participants.

Figure 6: Research participants' network**Research Participant Network****4.3.4 Theme 3: Financial model and viability**

The third theme, ‘financial model and viability’, encompasses all codes that refer to the quest of a viable financial model for the grassroots actor. There are two subthemes that showcase the crossroads that the organisations face, namely ‘funding’ and ‘financial independence’.

Figure 7: Theme 3 and sub-themes

‘Funding’ refers to how grassroots actors find the funds to operate. All participants discussed their funding. Food Flow, for example, relies mostly on private donations, PEDI Agri-hub relies on local government funding, whereas Abalimi is supported by both private donations, grants, and project-specific funding. Making Kos has participated in projects funded by academic institutions, government bodies, such as the Department of Agriculture, and has also self-funded many of her own projects. The Green Ranger also recognises that all his training and education was thanks to external funding: “it’s through people’s money, Foundation for Human Rights, Gauteng government, whoever that is that funded me, now it’s UCT, it’s through these funds (that have) allowed me to make this (self-watering garden) box” (Keswa, 2020).

Abalimi highlights how pivotal funding is for outreach and impact, especially regarding infrastructure investments: “the main concern there is finance, because we can only provide support if there’s actually funding available to do it” (Stead, 2020). This shows a diversity of funding streams as well as funding models. Funding comes with tricky aspects to it. Food Flow, Oribi Village and PEDI Agri-hub have their finances tied with a parent organization, limiting their autonomy. Funding also requires the organization to comply with audits and reporting, which requires dedicated staff, such as Abalimi explains, and a higher degree of institutionalization. Making Kos’ ponders: “when I started on this process of registering a non-profit, the reason I was thinking of that was that I could barely apply for the grants” or Abalimi’s experience with farming collectives: “they need a constitution if (they) want to get any funding from the Department of Agriculture” (Stead, 2020).

These challenges prompt some organisations to search for an independent financial structure. Food Flow addresses this directly: “we are a donor funded, donor reliant organisation which isn’t sustainable in the long term, so that’s kind of the biggest challenge” (Newell, 2020). PEDI Agri-hub is actively investing in its expansion and

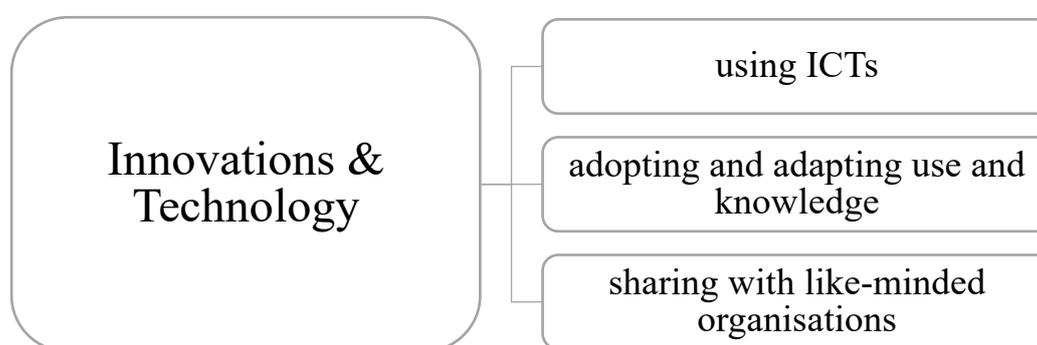
business model: "I think it still remains to be seen if the Agri-hub can support itself" (D'Aiuto, 2020). This strategy of seeking financial independence is based on Abalimi's vegetable box which, according to PEDI's understanding, "never proved its (financial) sustainability" (D'Aiuto, 2020). Private investments add pressure to the organizations, as PEDI "needs to be profitable to return the investment" (D'Aiuto, 2020).

A viable financial model is one of the main struggles for the grassroots actors. Making Kos and Ubuhle Bendalo are both struggling to find a financial model. Keswa (2020) is "grappling with how do I actually package myself to be viable", with Rusch recognizing that she "earn(s) nothing out of it" (2020). In some interviews, alternative income streams were brought up, for instance "(solar panels) might be something that can help support PEDI in the long run as well" (D'Aiuto, 2020).

4.3.4 Theme 4: Innovations and technology

The fourth theme, 'innovations and technology', stems from the codes that refer to the innovations and technologies that the actors acknowledge to be adopting and/or developing and its dissemination. It comprises the following subthemes: 'using information and communications technologies (ICTs)', 'adopting and adapting use and knowledge', and 'sharing with like-minded organisations'.

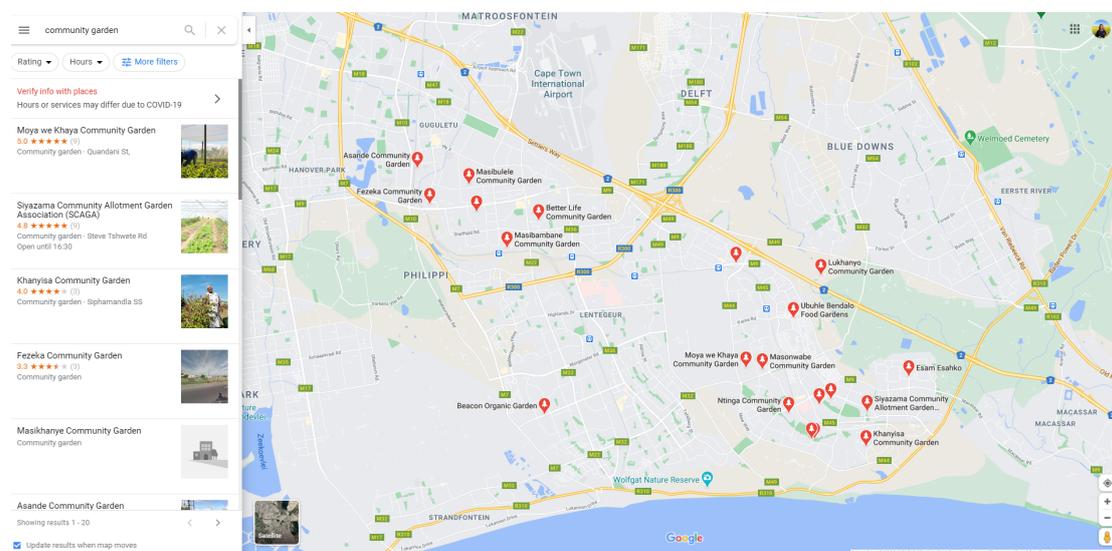
Figure 8: Theme 4 and sub-themes



Beyond each grassroots actors' innovative component highlighted in section 4.2, the research participants engage with the use and adaptation of existing technologies and

innovations. The first subtheme, the ‘use of information and communications technologies’, was common to all conversations. Firstly, it was through their use of ICTs that I managed to get in touch with the organisations – they had a publicly available contact email or telephone on social media, websites, or blogs. Making Kos illustrates this with their use of social media groups to draw attention to wild foods (where wild food’s identification and recipes were shared) while Food Flow is “working better on how to tell our impact story” (Newell, 2020) to feed social media accounts and other communications outlets. Abalimi also incentivizes the farmers to build their online presence by offering them websites and creating Google Maps references under the term “community garden” as a strategy for market access. They explain: “if you go onto Google Maps and type in ‘community garden’, we've tried to map a lot of our community gardens (...) then they should start popping up because we're also trying to get them to be able to market themselves and put themselves out there” (Stead, 2020). The results of the mapping efforts are below:

Figure 9: 'Community Garden' Google Maps search results



Another example of the use of ICTs is for traceability and market access. Traceability refers to the ability to track foods or ingredients from production through processing, manufacturing, transporting and retail to consumer, which suggests transparency in the

food value chain. Abalobi¹⁵ has been a successful example of how these can be combined for greater sustainability in the food system, as perceived by PEDI: “the levels of traceability that Abalobi has so brilliantly demonstrated”. Abalobi’s innovation has inspired not only PEDI, as they say “we want to try to incorporate a small scan code on the label that allows you to see exactly what farmers (...) that pack came from” (D’Aiuto, 2020) but also Making Kos who states, “let the app do the (marketplace) work” and “the app would be to bring that (produce from emergent farmers) into the food system in an equitable way” (Rusch, 2020).

The subtheme ‘adopting and adapting use and knowledge’ refers to the use of all different technologies and knowledge and its application in the local context. Examples are open source¹⁶ technologies and models of knowledge sharing (such as the Participatory Guarantee System, agroecology, Abalimi’s Farmer Development Chain or the Green Ranger’s self-watering garden box), or the use of traditional knowledge (Making Kos and wild foods, permaculture and organic principles).

The Abalobi inspiration is an example of how grassroots actors and their success stories can inspire each other, and grassroots actors and like-minded organisations may cross-pollinate ideas and innovations. This is not the only example shared in the interviews. Another example is Abalimi’s Farmer Development Chain that “also gets used by Food and Trees For Africa (...) and it’s quite widely recognised in South Africa by various organisations” (Stead, 2020), or the Participatory Guarantee System, developed elsewhere but being implemented in Cape Town by PEDI Agri-hub. These mutual inspiration flows are translated in the subtheme ‘sharing with like-minded organisations’.

¹⁵ Abalobi is a registered non-profit organization that offers an information management system and suite of apps to small-scale fishing communities. More information is available on their website, abalobi.info

¹⁶ Open source is a term that originated from software development and its opposition to centralised and commercialised software development. Open source, in broader terms, refers to publicly shared information, with no concerns about patents and royalties, and allows it to be used, modified and distributed freely

4.4 Conclusion

The focus of this chapter was the findings of the thematic analysis. Firstly, I introduced the case study: the grassroots actors currently active in Cape Town that are working towards greater sustainability in the food system. I have introduced their backgrounds and identified the innovative feature that drew my attention to them.

Understanding the background and the context that they operate in offers insights into the themes developed. Secondly, I explained the themes and subthemes developed from the interviews. I narrowed it down to four themes. They are i) support of small-scale urban farming, ii) networking and relationships, iii) financial model and viability and iv) innovations and technology. The themes guide the answers to the research question of how grassroots actors are developing and adopting innovations for greater food sustainability in Cape Town. The themes relate, then, to how grassroots actors see that small-scale urban farming has leverage to trigger sustainability transitions in the food system, its challenges, and the centrality of collaborations with niche and regime actors.

Chapter 5 - Discussion and conclusion

5.1 Introduction

This chapter provides a discussion of the study's key findings in the context of the literature in order to draw conclusions and make suggestions for further research. It presents the various themes that emerged from the research as potentially relevant to understanding grassroots innovations for food systems transition in Cape Town. These themes are informed by the fieldwork as well as the literature review. The chapter integrates the qualitative findings of the study with the literature to provide a comprehensive analysis of the research problem and an interpretation of the overall results. The claims derived from the findings of this study are compared or supported through reference to the reviewed literature.

5.2 Main findings

The main findings of this research project have been organised under the four themes. The high incidence of coded segments that made up the first theme developed, 'support of small-scale urban farming' suggests that in Cape Town, grassroots actors identify a strong need for further developing small-scale urban agriculture. Small-scale urban agriculture is understood as having high leverage in the many aspects of sustainable food system transitions. In the context of this research, small-scale urban farming refers to food gardens on curb sides, in backyards and other small pockets of land in communities in vulnerable neighbourhoods. Firstly, it can provide additional nutritional diversity and supplement food consumption. Secondly, it can also provide an additional source of income. Ideally, it may also provide families and communities with a livelihood.

This central role of small-scale urban agriculture can be explained in the Cape Town context through the focus on the nexus between urban poverty and urban agriculture. The multiple challenges of food security in a context of urban poverty, such as the need

for income and livelihood sources, high levels of informality in the economy, and food deserts¹⁷, can be addressed through small-scale urban farming.

Small-scale urban agriculture is the diametrical opposite to the solution of the dominant food regime. It focuses on the production of fresh foods for minimal processing, such as green leaves, spuds and other roots that are not commodities. It also shifts away from petrochemical inputs, machinery, and patented seeds, so it has a low dependence on external inputs and relies on labour. Small-scale urban agriculture often operates on a closed loop of nutrient cycling as well and offers ‘low mileage food’. Tied to organic and permaculture principles, small-scale urban farming, as defined by the grassroots actor’s interviews, saves money, making it an accessible activity, and has lower environmental impacts than modern agriculture.

The second theme developed, networking and relationships, highlights how all grassroots actors relate to other actors in their environment, be it the community they are involved with and that they are part of, like-minded organisations, educational institutions, patrons and partners. It ranges from knowledge exchange to client relationships and partnerships. It includes actors in the food system, but also actors indirectly engaged with the food system. As importantly, it also encompasses the quality of the relationships through power, which is intrinsic to the contestation of the regime.

The third theme, financial model and viability, highlights how the grassroots actors struggle to stay afloat, no matter their financial model, and the choices that are made with different financial models, for example in the case of donor-based funds that require significant record keeping and dedicated personal to the activity, or the lack of independence in the case operating under a larger parent organisation. It also relates directly to the first theme, support of small-scale urban farming, and the objective of creating livelihoods from small-scale urban farming. Grassroots actors, such as community gardens, aim to achieve at least income generation for their livelihoods.

¹⁷ Food deserts are urban areas with limited access to affordable and nutritious food. It considers not only the existence of food, but also the type of food, its availability, and accessibility.

The fourth theme, innovations and technology, goes beyond the innovative feature that I identified in each grassroots actor for research participation. It also encompasses insights on how innovations and technologies from other niches are adopted, and how knowledge circulate in the network.

5.3 Literature Contrast

5.3.1 Introduction

This section contrasts the research findings to the literature covered in chapter 2. It is further divided into the same topics as chapter 2, from understanding grassroots innovations at microlevel and zooming out to socio-technical transitions to sustainability.

5.3.2 Grassroots innovations in Cape Town

5.3.2.1 Characteristics

a) Ideological drive and values

Grassroots innovations are defined as “networks of activists and organisations generating novel bottom–up solutions for sustainable development; solutions that respond to the local situation and the interests and values of the communities involved” (Seyfang & Smith, 200:585). The seven grassroots actors interviewed in Cape Town seemed to share an ideological drive to support livelihoods and enhance food security in various marginalised communities in Cape Town. This suggests that in the Cape Town context of high unemployment and poverty, this is a key grassroots concern, and it is identified as the local need that needs to be addressed. For Abalimi Bezekhaya, Food Flow, PEDI, and Ubuhle Bendalo, the need to create and/or support livelihoods was the main focus, whereas for Oribi Village, food security was deemed the main concern.

In contrast, Making Kos and the Green Ranger directly addressed ecological goals. Making Kos expressed concern around climate change, resilience, and the preservation of indigenous plants in the Cape Town landscape. Rusch (2020) is also concerned about nutrition and livelihoods but has found, in the promotion of wild foods, a solution that

combines these ecological and social goals. The Green Ranger is driven by a need to produce food in an ecologically sustainable way, with the need to provide nutritious food to communities.

Sustainability grassroots efforts in Cape Town's food system seem, therefore, to be driven mostly by the context's extreme poverty, but for many, ecological goals and values are greatly intertwined with this social driver. This contrasts quite strongly with a lot of the literature on grassroots innovations in sustainability transitions in the Global North, where many food system innovations are driven by ecological values.

b) Actors

The idea of grassroots innovations being developed by a community to solve their own problems is strong in the literature. Depending on how one defines 'a community', this did not feature as strongly in the actors sampled, as none of the initiatives was developed by more than one (or just a couple) of actors, such as in a neighbourhood townhall, or as part of a community of practice. However, despite this dissonance, the community aspect was not part of the criteria developed. Grassroots innovations can still be led by a single or a small group of individuals acting within a community, for the community. This can be understood as a feature of grassroots innovations in Cape Town, where community gatherings are weakened in the context of livelihood struggle, informal economies, and social fragmentation. Or it can also be understood as a bias created by the sampling strategy, which is something that could be further studied.

Another point of resonance with the literature that appeared in the field research was the role of outsiders. Oribi Village, for example, is financed by French development agencies and its leadership team is made up of foreigners. However, they have motivated their interest in acting with the local community to foster their success in developing their solutions. They provide support to an often-cited problem, of "not knowing the business side of things" (Rusch, 2020) and supporting grassroots actors with coming up with a viable financial model which was brought up as one their main challenges in both the literature and in this research as theme 3.

Intermediaries are actors in the system that identify with grassroots niches. UCOOK could be identified as an intermediary to Cape Town's food system transition, as it is

shifting its sourcing to organic. It has chosen to partner with PEDI, which aggregates the scattered produce from small-scale farmers committed to organic agriculture.

d) Diversity in forms, resource base and activities

The sample of grassroots actors that participated in this research project showed the diversity of grassroots niches. Grassroots actors can come in different forms: collectives, clubs, associations, social entrepreneurs (that is, companies that have a strong social and ecological component to their core), and public-private partnerships, entities that embody collaborations between the public and private sector. There is also a diversity in financial models, for example the contrasting strategies of Abalimi Bezekhaya (funding and grants from government and private donations) and Making Kos (self-funded, collaborations with research projects and businesses), as well as institutionalisation degree and structure.

The different actors also demonstrate the different entry points into the food system (Ingram, 2011), into such as the case of Oribi Village and Food Flow, and it does not need to be a direct interaction. These are only a handful of ways in which organisations can engage in sustainability transition in the food system.

e) Appropriability of innovations

As the literature indicated, the interviewed grassroots actors are creating innovations that they are not aiming to 'protect' and derive profit from. In fact, sharing their approaches openly is a feature of many of these organisations: PEDI's application of the Participatory Guarantee System for organic food production, for example, or Abalimi Bezekhaya's farmer development chain and training in organic farming, or Making Kos's refusal to work as a consultant for corporations and invent 'wild flavours'. An exception seemed to be Green Ranger, who has designed the garden box and has applied for patent. This, nonetheless, is aligned with a 'social entrepreneurship' side of grassroots innovations (cf. van Lunenburg, Geuijen & Meijer, 2020), where surplus revenue is invested back into the business' goal.

5.3.2.2 Challenges

The literature pointed to “merely surviving” as one of the main challenges to grassroots movements and innovations (Hossain, 2016). As theme 3 highlights, the grassroots actors identify a struggle in creating a viable financial model for their project. Within intrinsic challenges, the interviews have made it clear that beyond surviving as an organisation, most grassroots actors are concerned with an urgency for income generation, beyond activism and volunteering. This suggests that grassroots movements are also responding to high unemployment rates and urban poverty in South Africa. It suggests that grassroots innovation movements do not rely so much on volunteers acting on their free time, but rather on an entrepreneurial mindset, trying to build a livelihood. For example, the usual grassroots activities such as community gardens must be income generating.

Beyond intrinsic organisational challenges, the literature also identifies diffusion challenges. On the diffusion challenges, the grassroots actors have expressed the ambiguities of connecting to regime-incumbent actors (D’Aiuto, 2020; Rusch, 2020). D’Aiuto (2020) shared the concern of trade-offs between small-scale urban farming supply and the expectations of the market, such as efficiency and consistency in supply. This ambiguity shows in theme 2, under the subtheme power.

Power, and power struggles, as discussed in the literature of socio-technical transitions, is inherent to regime change and transitions. This becomes evident as a challenge for grassroots innovations. First, for the very reason they are trying to oppose the regime. Secondly, as they form partnerships with regime incumbent actors and risk losing touch with their own regime-challenging component.

5.3.2.3 Benefits

The literature covered here pointed to the benefits of grassroots innovations as offering diversity to what sustainability means, triggering regime reconfiguration, fostering food democratisation, and offering a great leverage point to other sustainability transitions, such as social justice and food security, among others.

The research conducted here is not clear if said benefits have been achieved. The longest running actors, Abalimi and Making Kos, 38 years and 10 years, respectively, seem to be able to see a change in the environment they operate in. Abalimi, for example, recognises that buying township produce is more widespread than it was 30 years ago, and there is proof of that is the operation of other township vegetable box schemes and wholesale, such as PEDI and Umthuzi. Making Kos has also managed to have partnerships with Umthuzi and UCOOK where indigenous and wild foods are components of their products.

Food Flow and Oribi Village, despite their short running time, also created their impact measures, in numbers of harvest bags offered and money donated, and of businesses fostered. However, systemic social and environmental impact measurement was not discussed as it is little discussed in the literature.

The activities carried out by the grassroots actors (Making Kos, PEDI, Oribi Village, Abalimi Bezekhaya and Food Flow) seem to corroborate in the understanding of the role of grassroots actors in creating bridges between local actors, in order to increase the community's capability to organise itself around pressing issues and thus, transforming the local context" (Smith, Fressoli & Thomas, 2014)

5.3.2.4 Success and diffusion

The success and diffusion of grassroots innovations ties back to the previous section. The success of grassroots innovations is based on their adoption where relevant, and its social and environmental impacts.

In the interviews, scaling out and up was discussed. Scaling out refers to expanding volumes or geographical reach, whereas scaling up refers to influencing public discourses, political agendas and legislation, for example. The participation of intermediaries such as UCOOK and the City of Cape Town (in the case of PEDI), the Western Cape Government (for Making Kos), and other funding agencies (for example the case of Oribi Village and Abalimi) have proven to be key to the success of the grassroots movements in this study, confirming the literature. It is important to also highlight that the relationships between the grassroots actors and the intermediaries are

also unique and very specific, not the usual commercial transaction, as PEDI recognised (D’Aiuto, 2020).

However, the literature points to an ambiguity in successfully diffusing, and working with regime-incumbent actors. PEDI has expressed their wishes to supply to conventional food outlets, and Abalimi pointed out that their network farmers aim to supply to the hospitality industry, which the subtheme ‘market access’ captures. Some might view this mainstreaming and commercialisation of grassroots innovation as capture, whereas it might also be understood as success (Smith, Fressoli and Thomas, 2014).

5.3.3 Socio-technical transitions

The discussion above on benefits and diffusion of grassroots innovations links us to the bigger picture, that of a regime transition in the food system. Are the innovations diffusing widely and reconfiguring the regime in a more sustainable direction? First and foremost, the case study explored has shown mostly incipient innovations (such as PGS in the Cape Flats) and incipient organisations (with the exception of Abalimi Bezekhaya, as discussed in 4.2.7). Because of the early stages of the grassroots innovations, it is too early to assess any regime-wide transitions. Abalimi Bezekhaya’s perception on how they have the township produce acceptance within Cape Town and PEDI’s confirmation of that perception reinforce that grassroots innovations have a potential to shift the regime. The literature also justifies how the beginning stages of transitions are made up of experimentations and instability, which this case studies exemplifies.

The case study (that is, the group of grassroots actors) seem to be aligned with the trend observed of progressive food movements, which claim for food justice (Holt Giménez & Shattuck, 2011). These envision a transition to a food regime based on local foodsheds, family farms, urban agricultural, community-supported agriculture, and on access to fresh, healthy food in high- and low-income neighbourhoods. Progressive food movements share this belief in local food production and processing, with new business models that include under-served communities. The grassroots actors interviewed in Cape Town seem to share this goal of creating new models of production

and consumption that allow for greater participation by marginalised groups. There was little talk about changing or challenging the underlying market logic of the food system, and more focus on finding livelihoods for communities within the dominant market system. This ‘alignment’ between the actors interviewed could, of course, be due to the limitation of snowball sampling, where grassroots actors suggest like-minded actors. There may be more radical proponents to a radical food regime transition in Cape Town, but this sampling approach did not reveal any.

Another recurrent topic in the interviews was the COVID-19 pandemic and its effects on grassroots movement’s mechanisms and goals. Food Flow is a clear example, as it is a local grassroots emergency response to the pandemic. The COVID crisis can be understood as a shock at landscape level to the food system (Wells *et al.*, 2020). With incomes even tighter due to higher unemployment triggered by lockdown measures, people’s ability to buy food has been further pressured, particularly for those who depend on casual labour and informality. A landscape shock might well be what is needed to destabilize the regime and create ‘windows of opportunity’ for grassroots innovations to scale up and out. Wells *et al.* (2020) suggest that the COVID-19 shock has already generated a transition in the current socio-technical systems and ruling regimes, amplifying already contested inequalities. The authors also suggest that willingness to abide by lockdown restrictions shows a sense of community, which the authors consider necessary for sustainability transitions (Wells *et al.*, 2020).

5.4 Research question

This research project aimed to understand how grassroots organisations are adopting and developing innovations to achieve a more sustainable food system in Cape Town. The four developed themes can clarify what the focus of grassroots actors in the Cape Town context is.

Above all, theme 1, ‘support of small-scale farmers’ is understood as key for a sustainable, socially just food system in Cape Town. This resonates with the historical land exclusion in the Western Cape and South Africa. It also shows that policies on social and economic inclusion are still not enough to sustain emergent farmers. Secondly, it is clear that small-scale urban farming must provide a livelihood to the farmers. This makes sense in a context of high unemployment and high levels of

informality in the economy. Small-scale urban farming, in this context, goes beyond a community garden to improve food security or nutritional security for vulnerable households, but rather aims to become a livelihood source. The social need comes first, before the environmental aspect of sustainability. The low-input aspect of sustainable agriculture also proves to be attractive to support independent livelihoods. Small-scale urban farmers are a significant part of Cape Town's vulnerable communities and are often overlooked in public policies. Small scale urban farming then becomes a tool to address urban poverty in disadvantaged communities.

Small-scale urban farming proposes alternatives to the food regime. It suggests the diffusion of power, with the fragmentation of land ownership, the abandonment of genetically modified seeds and other external inputs and short supply chains and direct retail (Cohen and Ilieva, 2015). Small-scale urban farming fits into the wider umbrella of organic and agroecological practices and political proposition. The grassroots efforts aim at the institutionalisation of small-scale agroecological farming, proving economic potential and that it is worthy of socio-economic policy support. Yet, at the same time, small-scale urban farming was not discussed in terms of opposing the dominant regime, but rather as a sector that could benefit from the regime, enhancing local livelihoods.

Theme 2, 'networking and relationships' confirms the literature on how grassroots unique innovations emerge through collaborations and partnerships with other organisations, and that it is key for their establishment and diffusion. As discussed in chapter 4, such experimentations encompass different relationships, such as funding, knowledge exchange, training, product development, market access, research, etc, as well as different actors, such as like-minded organisations, government, academia, and businesses.

Theme 3, 'financial model and viability', poses the recurring challenge for the grassroots actors, that of having a viable model so they can continue to support and benefit the communities they focus on. As stressed in section 3.3.2, financial model and viability comes as a further challenge as the case study actors must not only be viable for themselves, but also as a source of income for the involved community. This has been addressed in the section 5.3.2. Because of this livelihood element, many of this

case study's grassroots actors lean towards social entrepreneurship, due to the unreliability and insufficiency of grants and funds.

Effort is put into fostering their long-term viability also through unique funding structures and partnerships. So, both themes 2 and 3 offer further spaces for experimentation and innovation in how to support small-scale urban farming in Cape Town.

The fourth theme, 'innovations and technology', characterises the grassroots movements alignment, as discussed in section 5.3.4. The technologies and innovations adopted and developed by the case study actors, such as traceability, organic, participatory guarantee system, and the cultivation of wild foods, suggest an alignment of the grassroots actors with a progressive food movement (cf. Holt-Giménez & Shattuck, 2011), while still engaging with regime-incumbent actors. In the interviews, solutions such as aquaponics, rooftop farms, vertical gardens, precision farming, or fortified GMOs, are not addressed, implying the grassroots actors don't identify them as good proponents for sustainable food systems in Cape Town. There is also no mention of more radical alternatives, such as food sovereignty, agroecology or land reform.

Grassroots actors are developing and adopting innovations aligned with food justice agenda, and relationships are key for them to further develop and establish themselves. Such collaborations are formed with both niche actors and regime actors, and financial viability is even harder due to the enmeshing of grassroots projects with the need to establish livelihoods. Grassroots actors identify the support and development of small-scale urban farming as a leverage point to trigger great food system sustainability in Cape Town.

As discussed in the literature review, socio-technical transitions are spatially heterogeneous (Cohen & Ilieva, 2015), so this study has addressed the rollout of socio-technical transitions in the food system that are taking place in Cape Town, South Africa.

5.5 In practical terms

As discussed in chapter 2, grassroots movements are valuable for development policies, for they offer insight into the neglected communities of society, and often end up providing solutions to local needs that are low cost and context-appropriate. They may value local socio-environmental knowledge, indigenous knowledge and traditional knowledge. Policy can support local communities' wellbeing by fostering grassroots movements innovations and valuing the diversity of solutions they might bring to the table.

This research project addressed the identified gap in the literature of the grassroots innovation's in food system transitions in the global South (El Bilali, 2019a). As El Bilali (2019a) discusses, the literature on food systems transitions does not address the roles civil society and social movements despite being identified as “the backbone of alternative food systems” (p. 361).

Some methodological aspects of this research project may have created biases that led to this research findings. For starters, the fact that I am a foreigner and the social distancing measures during the academic year of 2020 occurred may have distanced me from grassroots actors with lower degrees of institutionalisation and more marginalised by society. This research might be more helpful if led by someone that belongs to the communities involved, and hence is able to go more in-depth. Perhaps a similar research project with more time and different context would have allowed one to gather a larger sample too, further adding diversity to the case study.

Grassroots innovations in Cape Town can be further explored by using different analytical frameworks, such as transition management, social practice approach, strategic niche management, innovation systems, or connecting to different analytical frameworks, as suggested by Köhler *et al.*, (2019). An example is El Bilali and Probst (2017), who offer an integrated analytical framework for analysing food system sustainability transitions, which uses the multi-level perspective as a basis and incorporates elements of other relevant transition frameworks to analyse food systems distinctly and assess the type of transition path taken as well as its transformative potential (Wittenberg, Bilali and Strassner, 2019)

The topic of food systems transitions in Cape Town can be further studied by ‘zooming out’ (El Bilali and Probst, 2017), and understanding the different interaction between niches, regimes and landscape, which was beyond the scope of this research project. Furthermore, exploring Cape Town’s transitions looking at transitions pathways, with frameworks suggested by Berkhout, Smith and Stirling (2003), Geels and Schot (2007), or El Bilali (2019c). Moreover, grassroots innovations can also be studied with comparative case studies, in order to properly address spatiality and scalability (El Bilali, 2019a).

A further area of investigation is the assessment of transitions impact and outcomes, which this research project addressed in section 5.3, as El Bilali (2019b) stressed. Food sustainability transitions research focuses more on the ‘transition’ component of ‘sustainability transitions’. The desired outcomes, i.e. greater sustainability in all its dimensions: environmental, human, social, cultural, political, financial, etc, and within the food system, greater food and nutritional security, must also be assessed (Wittenberg, Bilali & Strassner, 2019; El Bilali, 2019b). This case study adds to the livelihoods, poverty alleviation and income generation as desired outcomes of greater sustainability in the food system.

5.6 Conclusion

This research project contributed to expanding the interest in the local specificities of grassroots innovations, identified as marginal in the food sustainability transition literature (El Bilali, 2019b).

The first chapter has offered an overview and the rationale for this study, namely understanding grassroots innovations for sustainable food systems in the global South, under the research question “how are the grassroots developing and adopting innovations for sustainable food systems in Cape Town?”. Grassroots innovations were chosen as a focus for this research because of their commitment to social justice, which purely technical innovations may not be able to deliver, despite environmental sustainability gains.

The second chapters discussed the literature on the topic. The theoretical framework of socio-technical transitions informs the approach to understanding grassroots actors in system-wide transformations. The multi-level perspective offers the most prominent analytical framework to understand sustainability transitions. Then, the role grassroots innovations in sustainability transitions is discussed. The chapter ends with an applied discussion of the previously cited literature to food systems transitions.

The third chapter presented the approach and methods applied to the research project. Under a constructivist view, this research was designed around a case study of local grassroots actors, who were mapped initially through my personal network and expanded through snowball sampling. The selected actors had to fit the criteria I developed from the literature, namely addressing innovatively food system sustainability, be operational in and around Cape Town, and be dependent on volunteer labour, grants or funds. With the chosen participants, I carried out semi-structured interviews with grassroots actors. The interviews were centred around i) understanding the main characteristics of the actors and their activities ii) understanding the story of the organisation and iii) understanding the innovative features of their activities. The interviews were analysed using thematic analysis, assisted by the use of Quirkos, a software for thematic analysis.

The fourth chapter presents the findings in two sections. Firstly, I introduce each grassroots actor that makes up the case study, their story, activities and innovative feature, providing a background to the themes developed. The themes developed are further discussed and presented in the second section of the chapter. They are ‘support of small-scale urban farming’, ‘network and relationships’, ‘financial model and viability’, and ‘innovations and technology’.

The fifth and final chapter offers a discussion on the themes. Firstly, the interviews are contrasted to the literature on grassroots innovations and food system transitions. Where most themes of grassroots innovations did apply to the case study, the main difference that I found was that grassroots actors are also striving to create a livelihood for the actors involved, adding a further challenge not covered in the literature. Secondly, I addressed the research question with the four themes developed. In the grassroots movement, small-scale urban farming is identified as having great leverage

for sustainability transitions in the Cape Town context. Relationships and networks are inherent to grassroots innovations establishment and diffusion and are a ground for innovation and experimentation themselves. Financial model and viability, as foreseen in the literature, is the major challenge for grassroots actors, and there is the added challenging factor that grassroots projects must also be ‘entrepreneurial’, in the sense that they must create livelihoods and employment for the community involved. The technologies and innovations are aligned with the ideals of food justice and progressive food movements globally.

This research addressed the *in loco* experience of Cape Town’s grassroots innovations movements. Grassroots innovations offer locally-appropriate solutions, meaning the grassroots innovations developed in Cape Town, South Africa may drastically differ from the grassroots innovations developed in Mumbai or Oslo (Smith, Fressoli & Thomas, 2014), yet they all aim for greater sustainability in the food system. Their success and diffusion depend on many other aspects of the system, and its impact is hard to assess quantitatively. Yet, grassroots solutions should be considered in the policy landscape due to their appropriateness to locally addressed, systemic shortcomings and the contribution to diversity in the wider pool of innovations.

References

- Altieri, M. (1996) *Agroecology: The science of sustainable agriculture, Agroforestry Systems*.
- Angel, S., Parent, J., Civco, D.L., Blei, A. and Potere, D. (2011) ‘The dimensions of global urban expansion: Estimates and projections for all countries, 2000-2050’, *Progress in Planning*, 75(2):53–107.
- Berkhout, F., Smith, A. and Stirling, A. (2003) *Socio-technological Regimes and Transition Contexts, System Innovation and the Transition to Sustainability: Theory, Evidence and Policy*. Edited by B. Elzen, F. Geels, and K. Green. 106. Brighton.
- El Bilali, H., Callenius, C., Strassner, C. and Probst, L. (2018) ‘Food and nutrition security and sustainability transitions in food systems’, *Food and Energy Security*, 8:1–20.
- El Bilali, H. (2019a) ‘Research on agro-food sustainability transitions: A systematic review of research themes and an analysis of research gaps’, *Journal of Cleaner Production*, 221(2019):353–364.
- El Bilali, H. (2019b) ‘Research on agro-food sustainability transitions: where are food security and nutrition?’, *Food Security*. Food Security, 11(3):559–577.
- El Bilali, H. (2019c) ‘The Multi-Level Perspective in Research on Sustainability Transitions in Agriculture and Food Systems: A Systematic Review’, *Agriculture*, 9(4):74.
- El Bilali, H. (2020) Transition heuristic frameworks in research on agro-food sustainability transitions, *Environment, Development and Sustainability*. 22:1693–1728
- El Bilali, H. and Probst, L. (2017) ‘Towards an Integrated Analytical Framework To Map Sustainability Transitions in Food Systems’, *Agrofor International Journal*, 2(2):24–32.
- Braun, V. and Clarke, V. (2013) *Successful Qualitative Research*. London: SAGE Publications.
- Bui, S., Cardona, A., Lamine, C. and Cerf, M. (2016) ‘Sustainability transitions: Insights on processes of niche-regime interaction and regime reconfiguration in agri-food systems’, *Journal of Rural Studies*. 48,:92–103.
- Campbell, B.M., Beare, D.J., Bennett, E.M., Hall-Spencer, J.M., Ingram, J.S., Jaramillo, F., Ortiz, R., Ramankutty, N., Sayer, J.A. and Shindell, D.. (2017) ‘Agriculture production as a major driver of the earth system exceeding planetary boundaries’, *Ecology and Society*, 22(4).

- Cohen, N. and Ilieva, R. T. (2015) 'Transitioning the food system: A strategic practice management approach for cities', *Environmental Innovation and Societal Transitions*, 17:199–217.
- D'Aiuto, C. (2020) Personal Interview. 26 May. Cape Town.
- Darnhofer, I. (2015) 'Socio-technical transitions in farming: key concepts.', in Sutherland, L.-A. et al. (eds) *Transition pathways towards sustainability in agriculture: case studies from Europe*. CAB International:17–31. .
- Durrant, R. (2014) Civil society roles in transition: Towards sustainable food? Unpublished doctoral dissertation. Brighton: University of Sussex.
- Ericksen, P. J. (2008) 'Conceptualizing food systems for global environmental change research', *Global Environmental Change*, 18(1): 234–245.
- Fan, S. and Ramirez, A. (2012) 'Achieving food security while switching to low carbon agriculture', *Journal of Renewable and Sustainable Energy*, 4(4).
- FAO (2018) *The State of Food and Agriculture 2018. Migration, agriculture and rural development*, Rome.
- FAO (2016) *The State of Food and Agriculture 2016: Climate Change, Agriculture and Food Security*. Rome.
- Feola, G. and Nunes, R. (2014) 'Success and failure of grassroots innovations for addressing climate change: The case of the transition movement', *Global Environmental Change*. 24(1):232–250.
- Fletcher, M. and Plakoyiannaki, E. (2012) 'Sampling', *Encyclopedia of Case Study Research*. SAGE Publications, Inc.
- Flyvbjerg, B. (2006) 'Five Misunderstandings about case-study research', *Qualitative Inquiry*, 12(2):219–245.
- Fressoli, M., Arond, E., Abrol, D., Smith, A., Ely, A. and Dias, R.,. (2014) 'When grassroots innovation movements encounter mainstream institutions: implications for models of inclusive innovation', *Innovation and Development*. 4(2): 277–292.
- Friedmann, H. (2005) 'From Colonialism to Green Capitalism: Social Movements and Emergence of Food Regimes', *New Directions in the Sociology of Global Development*, 11:227–264.
- Friedmann, H. (2009) 'Discussion: Moving food regimes forward: Reflections on symposium essays', *Agriculture and Human Values*, 26(4):335–344.
- Friedmann, H. (2017) 'Paradox of Transition: Two Reports on How to Move Towards

Sustainable Food Systems’, *Development and Change*, 48(5):1210–1226.

Gaffney, J., Bing, J., Byrne, P.F., Cassman, K.G., Ciampitti, I., Delmer, D., Habben, J., Lafitte, H.R., Lidstrom, U.E., Porter, D.O. and Sawyer, J.E., (2019) Science-based intensive agriculture: Sustainability, food security, and the role of technology. *Global Food Security*, 23:236.

Gaitán-Cremaschi, D., Klerkx, L., Duncan, J., Trienekens, J.H., Huenchuleo, C., Dogliotti, S., Contesse, M.E. and Rossing, W.A., (2019) Characterizing diversity of food systems in view of sustainability transitions. A review. *Agronomy for Sustainable Development*, 39(1):1.

Geels, F. W. (2004) ‘From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory’, *Research Policy*.

Geels, F. W. (2011) ‘The multi-level perspective on sustainability transitions: Responses to seven criticisms’, *Environmental Innovation and Societal Transitions*, 1(1): 24–40.

Geels, F. W. (2014) ‘Regime Resistance against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective’, *Theory, Culture & Society*, 31(5):21–40.

Geels, F. W. (2019) ‘Socio-technical transitions to sustainability : a review of criticisms and elaborations of the Multi-Level Perspective’, *Current Opinion in Environmental Sustainability*. (39): 187–201.

Geels, F. W. and Schot, J. (2007) ‘Typology of sociotechnical transition pathways’, *Research Policy*, 36(3): 399–417.

Gentles, S.J., Charles, C., Ploeg, J. and McKibbin, K.A., (2015) Sampling in qualitative research: Insights from an overview of the methods literature. The qualitative report, 20(11):1772-1789.

Gernert, M., El Bilali, H. and Strassner, C. (2018) ‘Grassroots Initiatives as Sustainability Transition Pioneers: Implications and Lessons for Urban Food Systems’, *Urban Science*, 2(23): 1-21.

Global Panel on Agriculture and Food Systems for Nutrition (2016) *Food systems and diets: Facing the challenges of the 21st century*. London, UK.

Gordon, L.J., Bignet, V., Crona, B., Henriksson, P.J., Van Holt, T., Jonell, M., Lindahl, T., Troell, M., Barthel, S., Deutsch, L. and Folke, C., (2017) ‘Rewiring food systems to enhance human health and biosphere stewardship’, *Environmental Research Letters*, 12(10): 100201.

- Hargreaves, T., Haxeltine, A., Longhurst, N. and Seyfang, G., (2011) Sustainability transitions from the bottom-up: Civil society, the multi-level perspective and practice theory (No. 2011-01). CSERGE Working Paper.
- Hargreaves, T., Longhurst, N. and Seyfang, G. (2013) ‘Up, down, round and round: Connecting regimes and practices in innovation for sustainability’, *Environment and Planning*, 45(2): 402–420.
- Hermans, F., Roep, D. and Klerkx, L. (2016) ‘Scale dynamics of grassroots innovations through parallel pathways of transformative change’, *Ecological Economics*., 130:285–295.
- HLPE (2014) *Food Losses and Waste in the Context of Sustainable Food Systems*. Rome. Available at: www.fao.org/cfs/cfs-hlpe.
- Holt-Giménez, E. and Altieri, M. A. (2013) ‘Agroecology, food sovereignty, and the new green revolution’, *Agroecology and Sustainable Food Systems*, 37(1): 90–102.
- Holt-Giménez, E. and Shattuck, A. (2011) ‘Food crises, food regimes and food movements: rumblings of reform or tides of transformation?’, *The Journal of Peasant Studies*, 38(1): 109–44.
- Hossain, M. (2016) ‘Grassroots innovation: A systematic review of two decades of research’, *Journal of Cleaner Production*. 137(2016): 973–981.
- Ingram, J. (2011) ‘A food systems approach to researching food security and its interactions with global environmental change’, *Food Security*, 3(4): 417–431.
- Ingram, J. (2018) ‘Agricultural transition: Niche and regime knowledge systems’ boundary dynamics’, *Environmental Innovation and Societal Transitions*. 26(2018):117–135.
- IPES-Food (2016) *From uniformity to diversity: A paradigm shift from industrial agriculture to diversified agroecological systems*. International Panel of Experts on Sustainable Food systems.
- IPES-Food (2017) *Too big to feed: Exploring the impacts of mega-mergers, consolidation and concentration of power in the agri-food sector*. International Panel of Experts on Sustainable Food systems.
- Keswa, X. (2020) Personal Interview. 16 June. Cape Town.
- Köhler, J., Geels, F.W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., Alkemade, F., Avelino, F., Bergek, A., Boons, F. and Fünfschilling, L., (2019) An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions*, 31:1-32.

- Kuokkanen, A., Mikkilä, M., Kuisma, M., Kahiluoto, H. and Linnanen, L. (2017) ‘The need for policy to address the food system lock-in: A case study of the Finnish context’, *Journal of Cleaner Production*, 140: 933–944.
- Lamine, C., Darnhofer, I. and Marsden, T. K. (2019) ‘What enables just sustainability transitions in agrifood systems? An exploration of conceptual approaches using international comparative case studies’, *Journal of Rural Studies*. 68 (2019):144–146.
- Lamine, C. and Dawson, J. (2018) ‘The agroecology of food systems: Reconnecting agriculture, food, and the environment’, *Agroecology and Sustainable Food Systems*, 42(6).
- Lara, L. G. Pereira, L.M., Ravera, F. and Jiménez-Aceituno, A., (2019) ‘Flipping the Tortilla : Social-Ecological Innovations and Traditional Ecological Knowledge for More Sustainable Agri-Food Systems in Spain’, *Sustainability*, 11 (1122)
- Levidow, L. (2015) ‘European transitions towards a corporate-environmental food regime: Agroecological incorporation or contestation?’, *Journal of Rural Studies*. 40, :76–89. .
- Levidow, L., Pimbert, M. and Vanloqueren, G. (2014) ‘Agroecological Research: Conforming—or Transforming the Dominant Agro-Food Regime?’, *Agroecology and Sustainable Food Systems*. 38(10):1127–1155.
- van Lunenburg, M., Geuijen, K. and Meijer, A. (2020) ‘How and Why Do Social and Sustainable Initiatives Scale? A Systematic Review of the Literature on Social Entrepreneurship and Grassroots Innovation’, *Voluntas*.
- Mabhaudhi, T., Chibarabada, T.P., Chimonyo, V.G.P., Murugani, V.G., Pereira, L.M., Sobratee, N., Govender, L., Slotow, R. and Modi, A.T., (2019) ‘Mainstreaming Underutilized Indigenous and Traditional Crops into Food Systems : A South African Perspective’, *Sustainability*, 11(1):172.
- Markard, J., Geels, F. W. and Raven, R. (2020) ‘Challenges in the acceleration of sustainability transitions’, *Environmental Research Letters*, 15(081001).
- Markard, J., Raven, R. and Truffer, B. (2012) ‘Sustainability transitions: An emerging field of research and its prospects’, *Research Policy*. 41(6):955–967.
- Marsden, T. (2013) ‘From post-productionism to reflexive governance : Contested transitions in securing more sustainable food futures’, *Journal of Rural Studies*. 29(2013):123–134.
- McMichael, P. (2009) ‘A food regime genealogy’, *Journal of Peasant Studies*, 36(1):139–169.
- Newell, A. (2020) Personal Interview. 22 May. Cape Town.

- Patel, R. (2009) 'Food sovereignty', *The Journal of Peasant Studies*, 36(3):663–706.
- Pattnaik, B. K. and Dhal, D. (2015) 'Mobilizing from appropriate technologies to sustainable technologies based on grassroots innovations', *Technology in Society*. 40:93–110.
- Rossi, A. (2017) 'Beyond Food Provisioning: The Transformative Potential of Grassroots Innovation around Food', *Agriculture*, 7(6).
- Rusch, L. (2020) Personal Interview. 15 May. Cape Town.
- De Schutter, O. (2017) 'The political economy of food systems reform', *European Review of Agricultural Economics*, 44(4):705–731.
- Schuurman, R. (2020) Personal Interview. 12 June. Cape Town.
- Seyfang, G. and Haxeltine, A. (2012) 'Growing grassroots innovations: Exploring the role of community-based initiatives in governing sustainable energy transitions', *Environment and Planning: Government and Policy*, 30(3):381–400.
- Seyfang, G. and Longhurst, N. (2016) 'What influences the diffusion of grassroots innovations for sustainability? Investigating community currency niches', *Technology Analysis & Strategic Management*. 28(1):1–23.
- Seyfang, G. and Smith, A. (2007) 'Grassroots innovations for sustainable development: Towards a new research and policy agenda', *Environmental Politics*, 16(4):584–603.
- Smith, A. (2003) 'Transforming technological regimes for sustainable development: A role for alternative technology niches?', *Science and Public Policy*, 30(2):127–135.
- Smith, A., Fressoli, M. and Thomas, H. (2014) 'Grassroots innovation movements: Challenges and contributions', *Journal of Cleaner Production*. 63:114–124.
- Smith, A. and Seyfang, G. (2013) 'Constructing Grassroots innovations for sustainability', *Global Environmental Change*, 23(5): 868–880.
- Smith, A., Voß, J. P. and Grin, J. (2010) 'Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges', *Research Policy*, 39(4):435–448.
- Sonnino, R., Tegoni, C. L. S. and De Cunto, A. (2019) 'The challenge of systemic food change: Insights from cities', *Cities*, 85, pp. 110–116.
- Sorrell, S. (2018) 'Explaining sociotechnical transitions: A critical realist perspective', *Research Policy*. 47(7), pp. 1267–1282.

Sovacool, B.K., Turnheim, B., Martiskainen, M., Brown, D. and Kivimaa, P., (2020) Guides or gatekeepers? Incumbent-oriented transition intermediaries in a low-carbon era. *Energy Research & Social Science*, 66:101490.

Stead, G. (2020) Personal Interview. 20 June. Cape Town.

Swilling, M. and Annecke, E. (2012) *Just Transitions: Explorations of Sustainability in an Unfair World*. Cape Town: UCT Press.

Tenzek, K. E. (2018) 'Snowball Subject Recruitment', *The SAGE Encyclopedia of Communication Research Methods*.

Vanloqueren, G. and Baret, P. V. (2017) 'How agricultural research systems shape a technological regime that develops genetic engineering but locks out agroecological innovations', *Food Sovereignty, Agroecology and Biocultural Diversity: Constructing and Contesting Knowledge*, pp. 57–92.

Wauquiez, F. (2020) Personal Interview. 9 March. Cape Town.

Wells, P., Abouarghoub, W., Pettit, S. and Beresford, A., (2020) 'A socio-technical transitions perspective for assessing future sustainability following the COVID-19 pandemic', *Sustainability: Science, Practice, and Policy*. 16(1):29–36.

Wittenberg, J., El-Bilali, H. and Strassner, C., (2019) Contribution of grassroots initiatives to sustainable urban food systems: the case of a campus garden in Muenster, Germany. In X International Agriculture Symposium, Agrosym 2019, Jahorina, Bosnia and Herzegovina, 3-6 October 2019. Proceedings:1700-1706. University of East Sarajevo, Faculty of Agriculture.

WWF (2016) *Living Planet Report 2016. Risk and resilience in a new era*. Gland, Switzerland.

WWF (2018) *Living Planet Report - 2018: Aiming Higher*. Gland, Switzerland. Available at: www.wwf.com.

Appendices

Appendix A: Preliminary Interview Guide

Interview Guide

Scope of Question	Question
Description and context	<ul style="list-style-type: none"> • What is the name of the organisation? • What does your organisation do? • How is your organisation structured? • tell me the story of your organisation, how it came to be? • What is the purpose of your organisation?
Activities and role	<ul style="list-style-type: none"> • Tell me about your day to day operations with your organisation. • How do you see your organisation participating in Cape Town's food system today? • How do you see your organisation changing Cape Town's food system? • What challenges has your organisation encountered?
Technologies and innovations	<ul style="list-style-type: none"> • What solutions have you developed to overcome these challenges? • How do you connect your organisation to the market? • What has your organisation developed for itself? • Ways to grow food, ways to connect to each other, ways to market your product, ways to organize itself, ways to fund itself? • Can you tell me the impacts of this innovation?
Closing and comments	<ul style="list-style-type: none"> • Is there anything you would like to add? • Who else would you recommend me to talk to? • Is there anything you would like to ask me?

Appendix B: Secondary Interview Guide

Interview Guide

Scope of Question	Question
Need	<ul style="list-style-type: none"> • Tell me the story of your organisation, how it came to be?

	<ul style="list-style-type: none"> • What is the purpose of your organisation?
Innovation Idea	<ul style="list-style-type: none"> • How does your organisation address this purpose?
Activities; Problems and solutions	<ul style="list-style-type: none"> • What strategies do you use to achieve your purpose? • What are the challenges to achieve this purpose? (intrinsic vs diffusion) • What solutions have you developed to overcome these challenges?
Closing and comments	<ul style="list-style-type: none"> • How do you see your organisation participating in Cape Town's food system today? • Is there anything you would like to add? • Who else would you recommend me to talk to? • Is there anything you would like to ask me?