Addressing Diversity in Urban Agriculture: How Picking the Right Policies and Choosing the Correct Locations Can Contribute to Viable Urban Food Systems

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Summary

Urban regions have a large impact on global environment in terms of energy, material and water and this impact will only increase in the future as population growth in urban regions continues. One of the causes of this is the urban food system: cities are dependent on an unsustainable global food system, characterized by low resilience and high resource dependency; urban demand for food has impacts throughout the entire year and stretching across the globe. Up-scaling the development of urban agriculture could be one strategy to create more sustainable urban food systems in the future, and increase the sustainability of the city as a whole. The 'reconnection' of food production to the city via the development of urban agriculture can be a way to increase the awareness of consumers on the origins and impact of the food they eat on a daily basis, and provide a wide range of environmental, economic and social benefits to urban areas. For this reason the development of urban agriculture is increasingly supported by city governments in North-America and Europe.

Scientific research on the development and governance of urban agriculture often does not, or very crudely, distinguish between different types and forms of urban agriculture that are present within cities. Furthermore the research usually deals with these issues at the scale of the city as a whole, rather than taking into account the extent to which the barriers and opportunities for urban agriculture differ at different locations within a single city. Recommendations flowing from this research, such as the installment of Food Policy Councils or the conduction of land inventories are useful, but research and policies aimed at specific types of urban agriculture or the development of urban agriculture at specific locations within a city can possibly generate even more benefits for the city as a whole, and be an effective way of aligning the goals of city governments and urban farmers. Therefore, the goal of this thesis is to find out how the use of specific governance instruments as well as locational characteristics influences the development of different types of urban agriculture.

A qualitative case study design has been chosen to explore the interrelationships between the development of urban agriculture, locational characteristics and the governance instruments available to different actors engaged in the governance and development of urban agriculture. To ensure that most types of urban agriculture that have been (or are being) developed in the Netherlands at the moment, are included in the research, eleven cases within the Dutch cities of Amsterdam, Rotterdam, The Hague and Utrecht have been selected for the research. Three general frameworks have been developed to guide the empirical research: A typology of urban agriculture projects, as well as two general frameworks containing relevant locational characteristics and governance instruments.

The research shows that governance instruments are mainly used in a reactive and facilitative manner, and seem to have only a limited influence on the project characteristics of urban agriculture projects. Furthermore, empirics show that there is a causal relation in the other direction: urban agriculture project characteristics 'trigger' the use and availability of governance instruments. Locational characteristics play a stronger more determining role in the development of different types of urban agriculture. For all of the cases included in the research the characteristics of the location at which they were developed have influenced the characteristics of the project; urban farmers and project leaders adapt the characteristics of their project in order to make optimal use of the (niche-) spaces at which their projects are developed. However, the research also shows that project leaders and urban farmers can in turn influence those locational characteristics which are a barrier or disadvantage for the development of their projects. Contrary to what could be expected on the basis of the literature that has been reviewed, there is also an interrelationship between locational characteristics and the use and availability of governance instruments by different actors.

The research has shown that the characteristics determining locational suitability differ strongly for different types of urban agriculture. Furthermore, the adaptive capacity of urban farmers means that locational characteristics must not be treated as a static determinant in either policies or research related to the development of urban agriculture. Locational characteristics are dynamic, even though the costs, energy and impacts associated with adapting certain locational characteristics need to be taken into account when determining where to develop urban agriculture. Land inventories working with one rigid set of locational criteria, rather than a diversified set for different types of urban agriculture do not take into account the ability of urban farmers to make productive use of many different types of urban niches, and will almost certainly underestimate the potential for the development of urban agriculture within a city.

The fact that the use and availability of governance instruments is largely reactive rather than pro-active should also be taken into account by researchers and policy makers. The exact role of policy goals in the decision making of actors engaged in the governance of urban agriculture, and that of project goals in the decisions made by urban farmers and project leaders can be researched in more detail. Yet, even without this kind of research, the results presented in this thesis indicate that city-governments and other actors involved in the governance of urban agriculture could potentially influence the locational selection process and the type of urban agriculture that is developed by others. This could be achieved by the creation of even clearer and more specific policy goals, or possibly policy targets, ideally in cooperation with both civil society actors and urban farmers. In this way the use of governance instruments would remain reactive and facilitative in nature, but this reactive use would be more coordinated and effective.

City governments and civil society actors do not need to plan or conduct the development of urban agriculture themselves, but could ensure that the projects that are developed by others contribute to the realization of their own policy goals as much as possible, by supporting the development of specific types of urban agriculture at specific locations. Furthermore, if the 'triggers' for the use of governance instruments and the policy goals which are causing these triggers are established in consultation with civil society actors and urban farmers, the capacities of both of these types of actors can also be used as effectively as possible. Civil society actors can create preconditions for the use of their own governance instruments which complement those of city governments. And if the policy goals of city governments and civil society actors are communicated clearly to project leaders and urban farmers, these actors can in turn use their capacity to adapt the characteristics of their projects in such a way that they make optimal use of the governance support which becomes available when the characteristics of the location at which a project is developed or the characteristics of the urban agriculture project itself correspond with the policy goals of both city governments and civil society actors. This type of pro-active facilitation could be a more effective use of governance instruments in which the bottom-up nature of the development of urban agriculture is maintained and the resources and capacities of all three actors in the research can be used as efficiently as possible.

1. Introduction

1.1. Societal background or problem:

By 2050 Earth's population is projected to reach almost 10 billion according to the medium variant population projections of the United Nations Department of Economic and Social Affairs (UNDESA, 2013). More than half of this growing population now lives in cities according to the estimates in the World Urbanization Prospects (2014) of the UNDESA and this percentage is projected to keep increasing. In tandem with their growing populations and the increasing concentration of economic activities, the environmental impacts of the world's cities have grown beyond the city limits and now cause regional and even global pressures upon the environment (Bai, 2007).

Because of these developments "urban agglomerations and their resource uses have become the dominant feature of the human presence on earth" (Deelstra and Girardet, 2000, p. 43) and some scientists even describe them as the 'new battleground for sustainability' (Clark (2003) in: Bai, 2007). Urban regions have a large impact on global environment in terms of energy, material and water (Van Bueren, 2012) and this impact will only increase in the future as population growth in urban regions continues. Even to fulfill just the basic needs of the inhabitants of these cities in terms of water, shelter and food will prove a major future challenge, let alone doing so in a sustainable manner.

Reshaping the urban food system so that it operates in a more sustainable and a circular rather than linear manner could be a way of ensuring sufficient and sustainable food production in the future, and increasing the sustainability of the city as a whole. (Smit and Nasr, 1992; Deelstra and Girardet, 2000) Up-scaling urban agriculture could be one strategy through with to achieve such system wide changes. The ambition behind this is not to create entirely self-sustaining cities in terms of food, but rather to create urban food systems which contribute to mitigating the burden urban regions place on the global environment, contributing to a circular urban system. To contribute to such to developments, the specific focus of this thesis will be on how locational characteristics within a city influence the kind of Urban Agriculture (UA) that may best be developed there, as well as the governance instruments which are can be used to influence the development of UA in a particular location.

1.1.1. Cities and the global food system: an unsustainable and non-resilient situation.

Major technological and scientific improvements such as those associated with the Green Revolution and strategies aimed at maximizing economies of scale and labor efficiency, have been developed in an attempt to fulfill the growing global demand for food in the twentieth and twenty first centuries. The conventional agricultural system that arose from these principles is characterized by monoculture, extreme specialization of production and homogenization crops (Francis and Porter, 2010). Although the improvements in term of yields per acre and production efficiency achieved have been significant (Evenson and Gollin, 2003), this system is widely viewed as unsustainable by environmental and agricultural scientists. It consumes large amounts of energy derived from fossil fuels rather than renewable sources, as well as materials such as chemical fertilizers and requires vast amounts of land and water. Furthermore, the environmental pollution resulting from production methods in conventional agricultural systems negatively impact the local and global environment and reduce biodiversity (Horrigan et al*.,* 2002; Feenstra 2002; Tilman, 1999). Lastly, the conventional agricultural system is seen as not very resilient in the face of external changes and shocks. This is not only related to an extreme dependence on oil and natural gas for the functioning of the system, or possible resource bottlenecks related to the growing scarcity of phosphorus (Cordell et al*.*, 2009; 2010), but also because of a lack of resilience within the agro-ecological systems themselves. This lack of resilience stems from mono-culture practices and more specifically a lack of biological diversity within the system, caused by those practices. Although crops are crossbred or genetically modified to resist a variety of natural disasters (e.g. droughts, pests, molds) mono-cropping does mean that *if* a development occurs with which the crops cannot deal (e.g. a new disease is spread by

a certain mold), than since virtually all crops grown are of the same variety, almost *all* crops will be vulnerable (Francis and Porter, 2010).

Within this global food system cities occupy a peculiar position: the globalization of food chains has led to a separation of the urban consumer and the mostly rural places where food is produced (Mendes et al*,* 2008; Feenstra, 2002; Gladek et al., 2011). Cities rely on increasingly large and distant hinterlands to fulfill their material and energy needs and feed their population; they usually have an ecological footprint which is far larger than the resources under the jurisdiction of the city. This global resource dependency of urban areas makes them even more vulnerable to external shocks and changes than the global system upon which they rely (Deelstra and Girardet, 2000; Van Bueren 2012). Moreover, the way in which cities deal with the food, water and energy resources they receive to sustain themselves often is unsustainable. The modern urban system, like conventional agricultural practices, is a largely *linear* rather than a *circular* one: "Resources are funneled through the urban system without much concern about their origin or about the destination of wastes..." (Deelstra and Girardet, 2000, p. 50). Cities draw upon food which is often produced in an unsustainable way in the conventional agricultural system (Francis and Porter, 2010), while their outputs are often simply discarded as waste rather than using them as inputs for some other part of the urban-ecological system, as is often the case in natural cycles. As a result urban demand for food has impacts throughout the entire year and stretching across the globe. (Deelstra and Girardet, 2000). Furthermore, meeting the demand for food is of an increasing concern for urban governments because of a set of developments related to food price surges, growing food insecurity, land conflicts and climate change (Morgan, 2009; Morgan and Sonnino, 2010). Cities are thus dependent on an unsustainable global food system, characterized by low resilience and high resource dependency.

1.2.1. Changes in the city: the beginning of a new food system?

Because of the complexity and lack of transparency of urban food chains, urban consumers are not always aware of the environmental impacts associated with food production, or the lack of resilience and reliability of food systems that has just been discussed. Especially in developed countries consumers expect the food of their choice to be available in large quantities and for a low price, regardless of natural seasonal cycles and other constraints (Gladek et al., 2011). However, the conventional food system discussed above is increasingly being challenged by civil society organizations and individuals. Often the most important aspect addressed by these movements, and explicitly or implicitly the main driver of their actions is the wish to 'reconnect' food consumption and production and repair what McClintock (2010, p. 193) calls the individual 'metabolic rift' in urban areas: *"the alienation of humans from nature and from the products of our labor"*, in this case: food. Consumer awareness on the origins and impact of the food we eat on a daily basis is seen as one of the most important benefits of Urban Agriculture. The widely shared desire of urban dwellers in Western society to 'reconnect to nature' is also one of the main drivers of the UA movement, together with an increased awareness of the impact of food on human health, which has resulted in an increased demand for fresh and local produce (Doherty, Exploratory interview, 2014).

Aside from individual consumer and civil society organizations, local authorities have also begun to support Urban Agriculture within their jurisdictions. In many (especially North-American) cities urban agriculture is seen as a possible solution for so called 'food deserts': areas where inhabitants have limited or no access to fresh and healthy foodstuffs (Walker et al., 2010). In cities like Vancouver, Toronto, Portland and many others (see Friedmann, 2007; Mendes et al*.,* 2008) the bottom-up initiatives coming from inhabitants themselves have been institutionalized in the form of Food Policy councils which are either part of the local government or advice city authorities on food policies. In support of these policies land inventories have been conducted (e.g. Ackerman, 2012; Balmer et al*.,* 2005) and food strategies have been written to streamline and guide the many initiatives 'sprouting up' from the ground. The range of potential advantages of urban agriculture driving the support of urban planners and policy makers is broad and differs per location. The 'reconnection' of food production to the city and the availability of fresh and local foodstuffs within

the city voiced by civil society actors is echoed in policy documents (e.g. Gemeente Amsterdam, 2014a) and complemented by a wide range of environmental, economic and social policy goals such as mitigating the Urban Heat Island effect, reducing the CO2 footprint and food miles of produce, addressing obesity of urban population educational goals and building a more resilient and thriving food industry within a city (see for example: Zwart, 2012)

Although the development of Urban Agriculture in Western society is sometimes described as something completely new, urban agriculture is not a completely new phenomenon. Both in North America and Europe urban agriculture has been a means of dealing with food shortages in wartime or economic crises (Armstrong, 2000) and aside from this there has always been a segment of the population engaged in maintaining their own plots within the city, largely out of recreational or idealistic motives but also for reasons of income supplementation or subsistence when monetary income proved insufficient (Woidt-Wallisser, explorative interview, 2014).

Still, the support and recognition of UA by city authorities and urban planners, as well as the scale and means of production associated with it, are indeed a relatively new and recent phenomenon. The initial development of urban agriculture in the West has been a bottom up, largely unregulated process in which pro-active individuals, entrepreneurs and organizations within society have shown the potential benefits of urban agriculture and explored the many shapes and sizes in which it can be developed. Especially in the North-American context the UA movement has matured as evidenced by the establishment of a range of large-scale and even commercial projects and companies such as Brooklyn Grange (Brooklyn grange, 2014) in New-York City or the soon to be build Hantz Farms in Detroit (Hantz Farms, 2014). To some extent the incorporation of UA in policy-making and planning advocated by Pothukuchi and Kaufman (2000) and others has been achieved, as evidenced by the *"Policy Guide on Community and Regional Food Planning"* published by the American Planners Association in 2007. In European cities developments have followed a similar trajectory although some cities and regions are less advanced in terms of the scale of urban food production and the adoption of food councils and strategies than others. However, although most European cities are still 'lagging behind' compared to their North-American counterparts, the urban agriculture movement is also becoming more prominent within a number of European cities (Ann Doherty, exploratory interview 4, 02-13-2014).

1.2. Scientific research and literature on urban agriculture

The potential of UA has not been lost on the scientific community, and in tandem with the societal trends described above, the body of scientific research on sustainable urban food systems and urban agriculture has grown. A large number of studies have been conducted on UA practices in the developing world (e.g. Schmidt, 2012) as well as North America, Canada and Europe (e.g. Paül and McKenzie, 2013) and much has been written about different forms and scales at which UA manifests itself and the actors that may be involved (e.g. Jarosz, 2008; Holland, 2004; Feenstra, 2002). Also, a number of studies have been conducted in an attempt to quantify the production potential of UA in particular cities (Grewal and Grewal, 2012; McClintock et al., 2013).

There seems to be a consensus within the scientific community that urban agriculture can have a host of social, economic and environmental benefits through which it may contribute to more sustainable urban-ecological systems (see , Mendes et al, (2008); Aubrey et al, (2012); Grewal and Grewal, (2012); Zimbler, (2001). There is no need to elaborate on all of these in the introduction of thesis, what seems to be clear is that UA can potentially improve the urban environments sustainability. In a more indirect manner UA can contribute to creating circular urban systems with are both more resilient and sustainable than the current linear urban food systems. The way in which this may be achieved is discussed by Deelstra and Girardet (2000), De Graaf et al (2011), Smit and Nasr (1992) and others.

Although it seems to be clear that UA could potentially be a means to create more sustainable urban systems, it is also clear from the scientific literature that stimulating and governing the development of UA is far from straightforward.

There is a growing body of empirical research on the way in which urban contexts provide barriers and opportunities for the development and implementation of UA and how one may best deal with these in policies aimed at stimulating UA. The most important barriers mentioned are: (1) competition for different land uses within cities (e.g. Aubrey et al., 2012); (2) lacking legal and institutional frameworks protecting UA and the related ownership or right to use of land in the long term (Schmidt, 2012); (3) a lacking integration of urban agriculture into the spatial planning system of cities (Mendes et al., 2008; Morgan, 2009; Pothukuchi (2009) Pothukuchi and Kaufman, 2000) and (4) a lack of education and skills of many urban citizens regarding the actual farming practices and possible systems (Holland, 2004). On the other hand there seems to be a great number of contexts in which the opportunity to realize the advantages of UA mentioned above is present as well, as the Alternative Food Systems surrounding the cities of Seattle and Barcelona described by Jarosz (2008) and Paül and McKenzie (2012) respectively evidence. These arise from (1) a growing demand for local foodstuffs; (2) a locally rooted food culture and actively involved civil society, (3) the presence of available land for UA and (4) the support of local municipality and other government bodies.

The body of research on what would be the best governance instruments to overcome such barriers and make use of existing opportunities is more limited. Examples of these instruments are the land inventories discussed by Mendes et al., (2008), Holland (2004) discussion on the actor configurations in London's communal gardens, but also, on a municipal level, the research related to the Food Policy Councils and similar initiatives of cities like Toronto, (Friedmann, 2007) London and Amsterdam (Zwart, 2012). For a general overview of methods of urban planning and other policy instruments for the governance of UA one can read the articles of Thrift (2011) and Pearson et al., (2010). Most authors agree on the fact that UA can have great benefits for the sustainable development of cities, especially on the local scale, and should therefore be an integral part of urban planning practice and the strategies and policies of local authorities (Thrift, 2011; Morgan, 2009). But there is no consensus as to what these planning practices and local food policies should look like exactly.

1.2.1. Identification of knowledge gaps in the scientific literature: locational variability

Within the scientific literature, both the research on barriers and opportunities for urban agriculture and the governance instruments available for steering these developments, usually deal with the development of urban agriculture in general, without distinguishing between the many different types and forms of urban agriculture that are present within cities. Furthermore the research usually deals with these issues at the scale of the city as a whole rather than taking into account the extent to which the barriers and opportunities for UA differ at different locations within a single city.

Further research on both these issues is necessary: although policies may to some extent be applicable to UA *in general*, there will most likely also be cases where they must be adapted because different kinds of urban agriculture require different governance instruments. Furthermore it is likely that the importance of particular barriers and opportunities varies between different kinds of urban agriculture. And lastly it is likely that these different barriers and opportunities will not be present equally throughout the city as a whole but rather vary between different locations within it. These issues have not yet been addressed sufficiently in the scientific literature on UA, and although some theoretical foundation for beginning to answer these research questions is provided by De Graaf et al. (2011) and Van der Schans (2010) in non-peer reviewed literature, almost no empirical research has been done to further develop these frameworks and test their validity.

1.3. The aim of the research and the research framework

Therefore the goal of this thesis is to find out in what way the development of different types of UA, is influenced by the characteristics in particular city districts or even specific locations within them , as well as the use of different policy instruments by different actors engaged in the development or governance of UA.

Respecting the diversity of different contexts and physical environments in which any system is to be implemented is an essential consideration when designing sustainable and circular urban systems, especially because their sustainability often relies upon a symbiotic relationship with the environment of which they are a part. The kind of production inputs (e.g. the size and kind of physical space) available and the way outputs may be treated (e.g. market conditions, potential for symbiosis with other systems) will differ per location. Lastly even the institutional properties of sites may differ within the same city: city districts may have different policies with regard to UA and the kind of planning legislation and zoning status of a location can differ even within a city district (De Graaf et al., 2011; Smit and Nasr, 1992; Nationale Federatie Stadsgerichte Landbouw, 2013).

Taking all of these considerations into account would allow for the design and implementation of Urban Agricultural systems that fit optimally within the urban system of which they become a part. On the other hand, designing policies and systems anew again for every specific urban location is inefficient and would in many cases lead to 'reinventing the wheel' time and time again. By creating typologies of (1) the different types of UA that may be developed in a city, (2) the locational characteristics which influence the development of these UA projects and (3) the kind policy instruments that are available to the actors involved in the development and governance of a particular type of UA on a particular location, this research provides a tool which avoids both overgeneralizing and over specifying knowledge on UA and it's governance. The frameworks can show municipalities and other urban actors interested in the development and governance of UA what locational characteristics and governance instruments they should take into account when developing a specific kind of urban agriculture in a location, or designing policies related to such developments. On the other hand the framework does not *dictate* which of these are most important in a particular case because that would mean overgeneralization. Aside from creating these different typologies, the way in which the three development of urban agriculture is influenced by locational characteristics and the use of different governance instruments is also addressed in the empirical research. Thus, the research aim is not only to structure and complement the existing body of literature and theories on the geography and governance of UA, but also tests the validity of these frameworks created for that purpose through empirical research and to elucidate the ways in which the variables central to the three frameworks may influence each other.

1.3.1. Research questions

The central research question guiding my research will be:
What role do governance instruments and locational characteristics play in the development of different types of urban agriculture?

The sub-questions related to the central research question are:

1. What are the main types of UA that can potentially be developed in a city?
2. How do different locational characteristics influence the development of different types of urban agriculture?
3. What are the different governance instruments available to different actors when developing and establishing different types of urban agriculture within a city?
4. How do these governance instruments influence the availability and suitability of locations for urban agriculture?

1.3.2. Outline of the thesis

In this chapter the theoretical framework guiding the empirical research is developed. It consists of three frameworks and a conceptual model which visualizes the way in which the variables central to these framework may influence each other. The first of the three frameworks is a typology of the different types of UA which may be developed in a city. It includes a range of project characteristics used in the scientific literature on the subject, which are combined into one coherent analytical tool. The same is done for the different locational characteristics mentioned as relevant for the development of UA in both scientific and non-scientific literature. The last of the three frameworks discussed in chapter 2 summarizes the different governance instruments that actors use to influence the development of UA and is based entirely on scientific literature again. In the last section of chapter 2, the way in which these governance instruments and the characteristics of particular locations within a city can influence the development of UA is visualized in a conceptual model.

As stated above the two goals of the research are to empirically validate the frameworks presented in chapter 2 as well as the assumptions made in the conceptual framework. This will be done through a qualitative research design based on the study of 10 cases within the Netherlands, which are composed of an UA project as well as policy makers or implementers and civil society actors involved in the governance of these projects. The general research design and the methodology used for the data collection and analysis of the data are discussed in chapter 3.

In the fourth chapter the results of the empirical research are presented. Section 4.1 contains a more detailed description of the 10 UA projects which form the core of each of the eleven case studies. In section 4.2 the typology of urban agriculture presented in chapter 2 is validated and where necessary adapted on the basis of the results of the empirical research. The same is done with the two theoretical frameworks containing the locational characteristics relevant for the development of UA, and the governance instruments which are or could be used by different actors involved in the development or governance of UA. In section 4.3 the interrelationships between locational characteristics, the use and availability of governance instruments and the project characteristics of different types of UA is explored. The conceptual model is validated on the basis of these results. In the fifth chapter the conclusions of the thesis research are presented by answering the central research question and the sub-questions related to it. The limitations of the research as well as the theoretical implications of it are discussed in chapter 6. The managerial implications and a number of policy recommendations based on the results of the research project are also discussed in this chapter.

The chapter is followed by a list of references a short word of thanks to those that have made the research possible, and an appendix.

2. Theoretical Framework

The research questions and framework described in the introduction make it necessary to think in a structured manner about three questions: 1) how can the diverse urban agriculture projects that are developed in cities be distinguished from one another? 2) What locational characteristics determine the geography of different types of urban agriculture (*where* different types of urban agriculture are developed within a city)? And 3), in what way can the development of different types of urban agriculture be governed most effectively within a city?

To answer the first question the relation between urban and rural areas as theorized in the urban planning and economic geography literature will be discussed, as well as the scientific literature on urban metabolism and circular urban-ecological systems. To answer the second question a literature review on the incorporation of urban agriculture in urban planning law and practice is conducted. Before doing so however, the concept of urban agriculture will be defined.

2.1. Defining urban agriculture

In accordance with Luc Mougeot (2000), I define Urban Agriculture in the broadest sense as:

"an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city or a metropolis, which grows or raises, processes and distributes a diversity of food and non-food products, (re-)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area" (Mougeot, 2000, p.11)

The most striking thing about this definition is that it claims that both the in- and outputs related for urban agriculture operate at a local scale, *inside* the urban area of which the industry is a part. In fact Mougeot argues that:

"The lead feature of UA which distinguishes it from rural agriculture is its integration into the urban economic and ecological system" (Mougeot, 2000, p.9).

This may sound somewhat obvious, but it has important implications for the potential impact which UA may have upon the sustainability of the urban food system. Because UA is an integrated part of a wider urban system it does not only lead to local positive impacts discussed in section 2.2 below, but can potentially trigger changes which resonate throughout what Van Bueren (2012, p. 7) describes as the '*urban metabolism*' of a city: the flows of natural resources such as water, energy and materials (and in our case food), but also wastes produced by humans, which are the in- and outputs of the urban system. The role UA can play in the urban metabolism of a city will be discussed in more detail in section 2.3. Ultimately, both roles of UA within the city can be a reason for city governments, urban planners and other actors at the local level to get involved in the governance of UA. In section 2.4 a theoretical model for explaining the geography of urban agriculture within a city is discussed, and in section 2.5 a framework for the governance instruments relevant for the development of UA is presented.

2.2. The complementarity of rural and urban areas

2.2.1. Ebinezer Howard and the Garden City model

Probably the most well-known conceptual model of the relationship between rural and urban area's is that of the garden city, by Ebinezer Howard (De Graaf et al., 2011; see figure 2.1). The model consists of a central city, surrounded by smaller 'satellite towns' which are connected to the center with public transport. In the center of the Garden City is to be a central park, surrounded by a retail district and residential areas, which in turn are surrounded by a permanent green belt. Adjacent cities are to be connected to the garden city via railways (LeGates & Stout, 2007). With this spatial design Howard hoped that problems related to the industrial revolution and the related urbanization of the poorer classes such as a lack of access to green, rural spaces, air pollution and even the labor conditions of the lower social classes and the formation of slums, could be tackled, through 'restoring people to the land' (Howard, 1898).

The conceptual model, *proposes* a possible spatial allocation for rural or urban area's rather than explaining their location or spatial relationships. Nevertheless there is one important notion that can be taken away from Howards work: urban and rural areas have different characteristics and fulfill different functions. Thus they can complement each other. It is this complementarity which explains and justifies the presence of urban agriculture within modern cities, and the involvement of urban planners and other policy makers in its development advocated by Morgan (2009) and others.

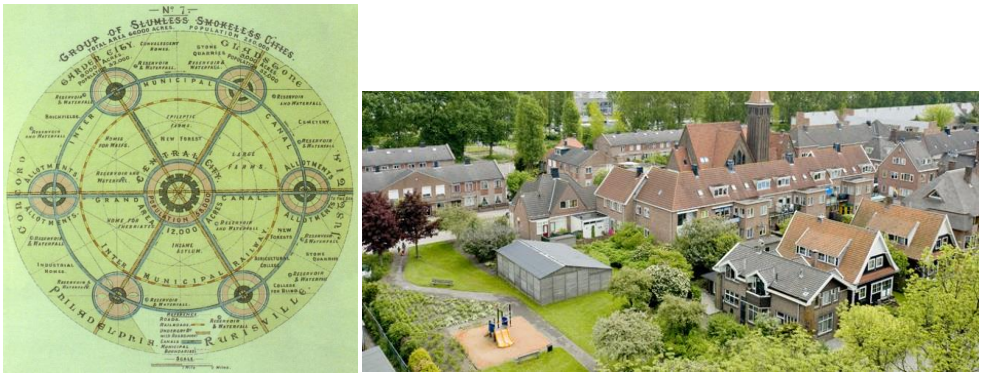


Figure 2.1 Howards Garden City concept (left, Source: De Muynk, 2011, p. 17.) as applied in Heijplaat, Rotterdam, The Netherlands (Right, source: Heijplaat, Tuindorp, 2014)

2.2.2. How agriculture and urban environments may complement each other: the potential direct impact of UA on a city.

The contemporary scientific community acknowledges Howards notion that urban agriculture can have a host of social, economic and environmental benefits through which it may contribute to more sustainable urban-ecological systems. These are related to the availability of fresh and healthy produce in urban environments (Zimbler, 2001; Grewal and Grewal, 2010), the reconnection of food consumption and production and the related change in the behavior of urban dwellers (Gladek et al. 2011; McClintock, 2013), economic growth and the provision of employment, the mitigation of peak flows related to storm water run-off (Tjallingii, 2012), the mitigation of the urban heat island effect (De Graaf et al, 2011). It is not necessary to discuss these benefits in detail, figure 2.2 (p.15) summarizes most of them.

2.2.3. Different types of Urban Agriculture

From the brief discussion above we can see that the way in which a city is impacted by the presence of urban agriculture can vary widely, and the impacts can be very beneficial, at least in theory. The extent to which an UA project realizes this potential, depends both on the type of UA in question and the needs of the city (and particular location within it) in which it is located (Nationale Federatie Stadsgerichte Landbouw, 2013). Furthermore, it will become clear in section 2.4 that the form and type of urban agriculture which can be developed in a city differ, because of the different urban environments in the city and the characteristics of locations within those environments. Therefore it is useful to think about the different types of UA that fall within Mougeot's (2000) definition in a structured manner.

Within the current scientific literature there are quite a few different typologies for distinguishing between different types of UA. Reasoning that policy makers may more effectively achieve their goals when they support the development of those types of urban agriculture that are most likely to directly impact these goals positively, Van Veenhuizen (2006, p. 22), has created the typology presented in figure 2.2. It allows policy makers and urban planners to prioritize the development of UA in relation to specific policy goals. This typology assumes that that the kind of urban agricultural systems that will be present in a city and the scale at which they are present will influence the sustainability impact this system on the urban environment. Different kinds of UA are related to three sustainability dimensions: ecological, social and economic sustainability.

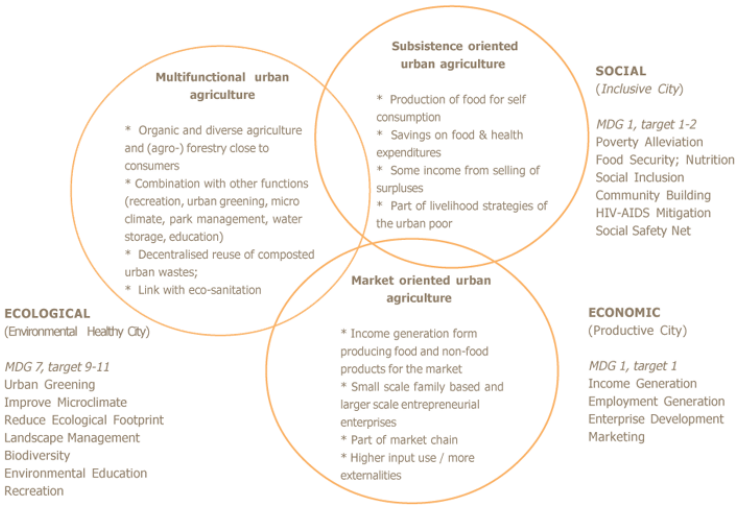


Figure 2.2: Types of urban farming and related policy dimensions: Source: Van Veenhuizen, (2006, p.22).

This kind of typology mainly addresses the potential for different types of UA to fulfill different types of urban demands. Although useful for guiding the decisions of policy makers, such typologies are not a suitable tool for answering the central research question of this thesis: potential benefits of UA for a city as a whole tell us little about the reasons why UA is locates a particular place within a city, unless these benefits are always very localized, which is not the case in the generic framework as presented by Van Veenhuizen (2006).

In this regard the study of Mougeot (2000) may be more interesting since he also takes into account the goals of the urban farmers themselves and the production scale and methods associated with those goals. Indirectly these scales and methods are likely to influence the locational needs of the farmer. In a similar vein the typology of Pearson *et al.* (2010) also, although only partially and indirectly, addresses locational requirements for different types of UA. It is based on (1) the scale of different projects, (2) the model of ownership of the land needed for UA and (3) and the produce

resulting from UA. De Graaf et al. (2011) do explicitly distinguish different types of UA on the basis of the spatial requirements they have. He looks at the extent to which UA systems require spaces in the form of land (soil-bound UA) or building surfaces (e.g. rooftops). Furthermore he takes the amount of control imposed upon the growth process of crops into account. Ackerman (2012) take a somewhat similar approach in their case study on the potential for UA in New-York City.

The discussion above illustrates that there is no consensus within the scientific community regarding the criteria on which a typology of UA should be based. Many typologies of UA can be formulated and the extent to which these are useful depends upon the research question and in general the goal and scope of the research.

For answering the central research question of this thesis both the scale and spatial form different types of UA take, and way in which the production process and the UA project as a whole is operating are of importance. The first determine the locational characteristics that are important in explaining the spatial allocation of different kinds of UA, while the latter are of relevance when answering the second part of the research question regarding the governance of particular types of UA at a certain location. I have therefore tried to include the most important aspects of both when formulating my own typology of urban agriculture types. The result is presented in table 2.1, below.

Kind of urban agricultural system	**Physical properties of the UA system****	**Social and actor (farmer) properties**	**Production properties**	**Potential sustainability effects:**
Backyard urban farming	- Size: ? * - NCE - Outdoor - Sunlight dependent - Soil based - Non Capital intensive	Goal: food provision, recreation. Land ownership and tenure: private Labor: voluntary Education/skills: no	Scale and intensity of production: Production for sustenance with possible surpluses Production of food for humans Inputs and outputs: local scale	Mainly social.
School / institutional gardens	- Size:?* - NCE - Outdoor - Sunlight dependent - Soil based - Non Capital intensive	Goal: food provision, education. Land ownership and tenure: private Labor: voluntary Education/skills: no	Scale and intensity of production: Production for sustenance with possible surpluses Production of food for humans Inputs and outputs: local and non-local scale	Mainly social.
Guerilla gardening, edible landscape movement	- Size:?* - NCE - Outdoor - Sunlight dependent - Soil based - Non Capital intensive	Goal: food provision, recreation, public education. Land ownership and tenure: Public Labor: voluntary Education/skills: no	Scale and intensity of production: Production for sustenance with possible surpluses Production of food for humans Inputs and outputs: local scale	Mainly social.
Community gardening	- Size:?* - NCE - Outdoor - Sunlight dependent - Soil based - Non Capital intensive	Goal: food provision, education, recreation, Land ownership and tenure: public or semi-public. Labor: voluntary Education/skills: no	Scale and intensity of production: Production for sustenance with possible surpluses Production of food for humans Inputs and outputs: local and non-local scale	Mainly social.
Open space outdoor commercial farming	- Size:?* - NCE* - Outdoor - Sunlight dependent - Soil based - Capital intensive	Goal: Income generation/ employment. Land ownership and tenure: private. Labor: paid Non-local. Education/skills: yes	Scale and intensity of production: Production on a commercial scale Production, processing and marketing/trading of food for humans/animals, agro-industrial products. Inputs and outputs: non-	Mainly economical.

				local scale	
Non-Commercial rooftop farming	- Size:? * - NCE* - Outdoor* - Sunlight dependent - Soil based - Non Capital intensive		Goal: food provision, recreation Land ownership and tenure: private or semi-public. Labor: voluntary Education/skills: yes	Scale and intensity of production: Production for sustenance with possible surpluses Production, of food for humans. Inputs and outputs: local scale	Mainly social and ecological.
Commercial rooftop farming	- Size:?* - CE - Usually indoor - Sunlight dependent - Both non-soil and soil based - Capital intensive		Goal: Income generation/ employment. Land ownership and tenure: private. Labor: paid Education/skills: yes	Scale and intensity of production: Production on a commercial scale Production and marketing/trading of food for humans. Inputs and outputs: local and non-local scale	Mainly economic and ecological.
Commercial farming in an outdoor controlled environment	- Size:?* - CE - Outdoor - Sunlight dependent - Soil based - Capital intensive		Goal: Income generation/ employment. Land ownership and tenure: private. Labor: paid Education/skills: yes	Scale and intensity of production: Production on a commercial scale Production and marketing/trading of food for humans. Inputs and outputs: non-local scale	Mainly economic and some ecological.
Non-Commercial farming in an indoor controlled environment	- Size: < 30 m2 - NCE - Outdoor - Not sunlight dependent - Soil based - Capital intensive		Goal: food provision, recreation Land ownership and tenure: private or semi-public. Labor: voluntary Education/skills: yes *Production for sustenance with possible surpluses Production on a commercial scale*	Scale and intensity of production: Production for sustenance with possible surpluses Production of food for humans. Inputs and outputs: local and non-local scale	Some social effects.
Commercial farming in an indoor controlled environment	- Size: * - CE - Indoor - Not sunlight dependent - Soil based - Capital intensive		Goal: Income generation/ employment. Land ownership and tenure: private. Labor: paid Education/skills: yes	Scale and intensity of production: Production on a commercial scale Production and marketing/trading of food for humans. Sometimes processing. Inputs and outputs: non-local scale	Mainly economic.

Table 2.1: A typology of urban agricultural systems and their most important characteristics. Sources: Based on: Ackerman, 2012; Deelstra and Girardet, 2000; Mougeot, 2000; Pearson et al, 2010; Smit and Nasr, 1992; Veenhuizen et al, 2006
**These characteristics could not be established on the basis of the review of the scientific literature, or only with large uncertainties*
*** NCE = Non-controlled environment, CE = Controlled environment*

It is important to understand that making a distinction between different *types* of urban agriculture is not the same as making a distinction between all of the different *forms* that can exist within one type of UA. In line with the definition provided by De Graaf et al. (2011, p. 19) I define types as *"abstract, schematic concepts with generic characteristics"*, where 'forms' of UA are the location specific realization of these different types. Thus Urban agricultural 'types' such as those presented in table 2.1 are cultivation methods or combinations of methods which can be distinguished from one another because they use a different medium for growing and use different kinds and amounts of nutrients and water, as well as energy, labor, knowledge and capital inputs for their production. They can also have a differing extent of integration into the urban environment and buildings. The 'form' UA takes refers to the location and time specific materialization of specific types of UA. Here the farmer decides on the scale and the spatial arrangement and allocation of the agricultural system. The farmer also determines the specific way in which labor, time and capital goods serve as inputs for production within different types of UA.

As the typology of Van Veenhuizen (2006) and table 2.1 illustrate, different types of urban needs can result in different direct impacts upon the urban system. These can be related to the goals of individual farmers, but also to specific policy goals of planners and city governments. The other way around, table 2.1 also shows that the different types of UA require different locations within the cities in terms of for example the amount and kind of space they occupy and the medium upon which they grow their crops. Thus the city at which a particular type of UA is developed needs to be suitable for that type of UA, in the sense that the city (or at least locations within it) must be able to provide the demands of each type of UA system. At the same time the impact these UA systems have upon a city, so the urban demands it can fulfill will also change depending on the type of UA in question. Both kinds of relationships play a role in explaining the geography of UA within a city (De Graaf et al., 2011).

Before discussing such explanations further, there is a need to take a more detailed look at another kind of impact of UA on the urban environment: the role of UA within circular urban systems, and the way in which it can change the 'metabolism' of a city.

2.3. Circular urban-ecological systems: urban agriculture from a systems perspective

According to a growing body of scientific literature one of urban agricultures most important potential impact may not lie in its direct (localized) impacts but rather stem from the fact that UA could contribute to changing linear urban systems into *circular* ones, which would be more resilient and self-sustaining and less of a burden on the environment (Deelstra and Girardet, 2000; Smit and Nasr, 1992). Looking at the potential of urban agriculture for contributing to circular urban systems can complement the discussion on the benefits UA may hold for a city and vice versa (section 2.2.) and thus provides another set of factors which may be used to explain the spatial allocation of different types of UA within a city (section 2.4.).

2.3.1. From linear to circular urban systems: the urban metabolism approach

By stimulating the creation of a circular urban system UA would fundamentally reshape the 'urban metabolism' of a city, which may be defined as *"the sum total of the technical and socioeconomic processes that occur in cities, resulting in growth, production of energy, and elimination of waste"* (Kennedy et al., 2007, p. 44). Or perhaps more clearly put: *"the exchange processes whereby cities transform raw materials, energy, and water into the built environment, human biomass, and waste."* (Broto et al. 2012, p. 851).

Currently, many urban systems are linear rather than a circular. Their metabolism consists of inputs, stocks and outflows rather than closed material or energy cycles (Brunner, 2007), and they depend to a large extent on external supplies of water, energy, nutrients, and other materials, while the possibilities to produce these resources on a more local scale (within or close to the city) are generally overlooked (Agudelo-Vera et al., 2012). In fact Brunner (2007, p. 12) goes as far as to suggest that *"cities are vulnerable and depend completely on their hinterlands for both supply and disposal. All resources are imported, and all emissions and final wastes must be disposed of or dissipated in the hinterland."*

When such linear systems could be turned into more circular ones which make use of the remaining qualities and potential of resource stocks and outflows of the city (Agudelo-Vera et al., 2012) and thus require fewer inputs from outside the urban system and create less outputs or waste stemming from the city, the ecological footprint of cities and the demand they and Deelstra and Girardet, 2000; Van Bueren, 2012, chapter 1) From this perspective *"making cities sustainable is about making efficient use of (…) resources and trying to maintain the quality of the resources during and after usage"* (Van Bueren, 2012, p. 6).

2.3.1. Theoretical background and focus

The scientific research focusing on urban metabolism is rooted in a diversity of fields such as industrial ecology, urban ecology, ecological economics and political ecology. Within each of these fields the research questions related to the urban metabolism of cities differ. For an overview of these different emphases and their origins I refer to the article of Broto et al. (2012). For the research purposes of this thesis, two specific questions are of importance: (1) in what way can UA play a role in creating circular flows of energy, water and materials in a city and (2) in what way do the opportunities for UA to do so vary between different locations within the city. If urban agriculture can for example make productive use of the organic material flows or nutrient rich wastewater flows in a city, this would provide urban farmers with a free input, whilst reducing the need for the city to engage in less productive solutions for getting rid of this waste such as incineration or removal through the sewer system. Locations at which such synergies can be achieved would be attractive for the development of urban agriculture than can make use of them. The first question will be answered in the paragraphs below, while the issue of locational variety will be discussed in section 2.4.

Two schools of thought: industrial ecology and political ecology and economy

To identify which material and energy flows within the urban environment are potentially available within the urban environment, the scientific research on urban metabolism as conducted by industrial ecology proves useful. This perspective will be complemented by that of political ecologists and economist, who focus on the influence of institutions on the shaping of these flows.

Alan Wolman (1965) was one of the first to conceptualize cities as ecological system with their own distinct metabolism. This concept was taken further by industrial ecologists who tried to account for the material and energy flows of a city, usually through a Mass Flow Analysis of the city of interests in which the material and energy flows within a city are mapped. The scope of the research varies from the analysis of a single flow within a city such as phosphorus (e.g. Kalmykova et al., 2012; Metson et al, 2012) to the comparison of different cities over time in terms of energy use and water and material flows (Kennedy et al., 2007). Once these flows have been mapped researchers and policy makers can try to optimize these flows through the development of industrial symbiosis, whereby the waste-flows from one industry can become the input for another process (Dunn and Steinemann 1998).

This approach has been relatively successful in gathering data and knowledge about the different flows within cities, but less so in providing solutions for those flows that cause environmental degradation or other problems within the urban system and areas related to it (Marcotullio and Boyle 2003). Aside from merely mapping the systems flows and suggesting where these may be altered through the engagement of different actors in symbiotic relationships Minx et al. (2010) feel that knowledge of the metabolic in- and outflows of a city should be explicitly linked to the way in which things such as urban forms and infrastructures, or even lifestyles, shape them. This kind of research is taking within disciplines such as political ecology and political economy scientists attempt to understand the way in which urban energy and material flows are shaped and maintained by economic, political and cultural drivers within the urban system (Broto et al., 2012). As stated earlier, the research of this thesis will relate to both of these research goals as well, by looking at the governance of urban agriculture (section 2.5).

2.3.2. The flows within urban metabolisms which provide opportunities for UA

Circular urban food systems could potentially make use of precisely the characteristic which distinguishes urban agriculture from traditional agriculture: its integration in the urban economic and ecological system (Mougeot, 2000), by engaging in symbiotic relationships with other urban actors and making use of the waste-flows in the urban environment (Deelstra and Girardet, 2000). The purpose of this literature review is to identify those flows of the urban metabolisms which may provide urban agriculture with a chance to reduce costs by gaining access to free inputs (e.g. waste heat) or add value to the production by providing additional services other than food production (e.g. wastewater treatment). Such chances may be translated into economic benefits for certain types of urban agriculture at certain locations and can thus also partially determine the suitability of a location for urban agriculture (Nationale Federatie Stadsgerichte Landbouw, 2013).

Ways in which to make use of the flows within a city: the urban harvest approach

Agudelo-Vera et al (2012) in their Urban Harvest Approach (UHA), argue that creating circular urban metabolism can be done through three strategies: (1) minimizing demand for material and energy inputs, (2) minimizing the outputs of the system by recovery, cascading, and recycling (3) multi-sourcing the remaining demand by using renewable and local sources. The first of these strategies is related to using the resource inputs as efficient as possible, whereas the last two aim to identify the potential to harvest resources within urban areas themselves, by tapping in to the different urban metabolism flows.

The authors suggest that demand minimization can be achieved by stimulating changes in human behavior, or implementing new and more efficient production technologies. Output minimization is achieved through *cascading* (reintroducing a resource in the system at a lower quality so that, the remaining quality of this resource is used) *recycling* (reuse of a particular resource flow

after quality upgrading) or *recovery* (the extraction of useful substances from waste flows). After these strategies have been applied there may still be a remaining demand. Within the UHA this demand is met by using local and renewable sources, such as solar energy and rainwater, which have the advantage of minimizing transport costs and external dependence.

How urban agriculture can engage in the practice of harvesting urban resources

UA projects may become a part of circular urban systems by adopting the three strategies suggested By Agudelo-Vera et al (2012) and in particular by practices such as cascading, recycling and recovering (for examples in the Netherlands see: Nationale Federatie Stadsgerichte Landbouw, 2013). This potential role of UA as a part of closed loops within the urban system has been recognized by the scientific community. Deelstra and Girardet (2000) and Smit and Nasr (1992) for example suggest that urban agriculture could contribute to creating circular urban food systems by: (1) reducing the amount of waste generated in the food industry (e.g. by reducing the need for food packaging since production is close to consumption), (2) re-using outputs of the urban system and using them in the food production system (e.g. using waste heat from buildings in adjacent greenhouses) or (3) recycling the outputs of the food system itself (mostly in the form of composting organic waste) (Smit and Nasr, 1992; Deelstra and Girardet, 2000). Furthermore UA can be a part of concepts such as "Living machines" (Van Bohemen, 2012, chapter 2), which may combine wastewater treatment with growing food (provided the water is not so polluted as to give rise to health dangers).

Lastly, on a higher systems level, UA can potentially reconnect people to the land, water and food they live of (Feenstra, 2002) and through this process spark a change in what Meadows (2007, p.17) calls the "Paradigm or mindset out of which a system arises". If this happens changes in the way in which the entire food system operates may be sparked through UA practices. By designing circular urban food systems we could move from changing the parameters of the system (Meadows, 2007; p.6) to changing the fundamental way in which the system operates: cities could become sources of resources and food rather than consumers that are simply putting a burden on the environment.

An oversight of some of the aforementioned ways in which UA can become a part of circular urban systems, as suggested by the scientific literature, is provided in table 2.2 below. The table is structured, after Kennedy and Hoornweg (2012), according to 4 metabolic flows of interest: Biomass, Minerals, Water and Energy. These flows are linked to UA through the strategies defined in the Urban Harvest Approach. It is by no means comprehensive, but it does provide an idea of the many ways in which UA can, in theory, make use of the flows within a city. Moreover it shows that the UHA is a fruitful concept, also when dealing with urban food systems and UA in relation to the metabolism of cities.

Flow of interest for UA	Strategy from UHA	Way in which UA can make use of it provide an urban need	Urban demand met through the process:
Biomass: organic wastes:	Minimizing system outputs: Recovery	Use organic waste-materials as building materials for UA	Organic waste treatment
	Minimizing system outputs: Recycling	Use organic materials as a fertilizer via a composting process	Organic waste treatment
	Minimizing system outputs: Recycling	Use solid waste incineration residues as fertilizer after a composting process	Organic waste treatment
	Minimizing system outputs: Recovery	Use organic materials as growing substrate	Organic waste treatment
Minerals non-organic wastes:	Minimizing system outputs: Cascading	Use non-organic waste materials as building materials for UA	Temporary mitigation of non-organic waste streams
Water: wastewater flows	Minimizing system outputs: Recovery	Use grey water flows to provide nutrient rich water for the irrigation of UA	Wastewater treatment

Water: precipitation	Multi-sourcing: using locally available renewable inputs	Use rainwater (directly or via storage) for irrigation of an UA project	Mitigation of peak-flows
Energy flows: heat	Minimizing demand:	Mitigate urban heat Island effects through changing urban surface albedo factors	Minimizing energy demand for cooling
	Minimizing demand:	Insulation of buildings / climate control through evaporation	Minimizing energy demand for heating / cooling of buildings
	Minimizing system outputs: Cascading	Use waste heat from industries / households to heat greenhouses	More efficient use of heat flows in the city
Energy flows: CO2	Minimizing system outputs: recovery	Use CO2 to speed enhance the growth processes of plants in UA projects	Mitigation of CO2 emissions

Table 2.2: Urban flows which may be influence by urban agriculture. Based on Kalmykova et al (2012) Dumitrescu (2013) Deelstra and Girardet (2000) Kennedy and Hoornweg (2012) De Graaf et al. (2011)

2.4. Explaining the geography of Urban Agriculture

The sections above clarify how UA can positively impact the city in which it is located and change the way in which this urban system functions. However, they do not provide a full explanation as to why different types of UA are located in particular locations within those cities. The potential for making use of material and energy flows can provide certain types of urban agriculture with a competitive advantage at a particular location, but there are other plausible explanations.

2.4.1. Von Thünens theory on agricultural land-uses

Some 70 years before Howard created his Garden Cities design, the German economist Johann Heinrich Von Thünen attempt to find out what caused the spatial lay-out of the rural areas surrounding cities. In his book “Der Isolierte Staat”, he describes the relationship between the spatial patterns of rural land-uses and economic laws. Von Thünen, reducing reality to an ‘Isolated State’, concludes that rural spatial patterns may be explained by the following factors: (1) the shelf life of produce, (2) the transportability of produce and (3) profit margins on produce. These three determine the distance to the market, which in Von Thünens case is the city center. The result is that different forms of agriculture are located in concentric rings of increasing distance from the city center. The model is visualized in figure 2.3.

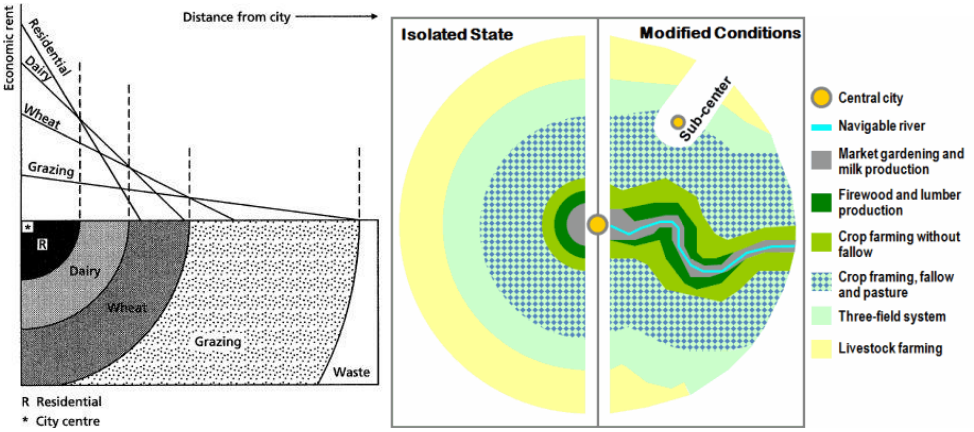


Figure 2.3 The Von Thünen model Source: De Muynk, (2011, p. 17.)

During the industrial revolution the factors which Von Thünen used to explain the distance of different types of Agriculture, partially lost relevance (Sinclair, 1967; De Graaf et al., 2011; Van der Schans, 2010). Through innovations in agricultural production, transport and food conservation technologies, the shelf life and transportability of produce became less and less important for the geographical location of agriculture. The economic laws that were at the basis of Von Thünen model were no longer determining the location of agriculture in reality. Agriculture was no longer located near cities but moved far beyond the city's sphere of influence and became part of the global industrialized food system we know today.

However, although technological and societal changes may have made the theory of Von Thünen irrelevant in the 20th century, De Graaf et al. (2011) and Van der Schans (2010) argue that recent changes have created a situation in which Von Thünens work has regained relevance. According to them the likely future increase of scarcity of fossil fuels and the increasing disconnection between the consumers and producers of food force create a situation in which the spatial relationship between the market and the location of agricultural production must be analyzed once more. In order to do this in a meaningful way they suggest that the classical model of Von Thünens 'Isolated State' should be adapted.

2.4.2. Von Thünen 2.0

The classic Von Thünen model shows that the spatial allocation of agriculture versus the city is to some degree driven by economic law and reasoning. This assertion also forms the basis of the renewed Von Thünen model presented by De Graaf et al. (2011) and Van der Schans (2010), which can be used to explain why urban agriculture is located somewhere in a city and how this differs with certain types of urban agriculture. Within the renewed model the geography of urban agriculture is based on the following economic and behavioral laws:

(1) *Urban farmers will focus on produce which has a short shelf life or a low transportability, and high profit margins.*
(2) *Urban farmers will locate their activities in places where production costs are as low as possible.*
(3) *Urban farmers will locate their activities at places where the benefits related to urban agriculture development are as high as possible.*

These are actually the same economic laws as those proposed by Von Thünen. However, the concepts behind these laws need to be reinterpreted. *Shelf life* (in the sense of being able to preserve food in a state fit for human consumption) has become less of an issue thanks to technological innovations. But the freshness of produce and extremely short period between harvesting and consumption may improve the quality of certain kinds of produce and thus provide economic advantages for producers and health advantages for consumers. Although most produce is now *transportable* across the globe against relatively low costs, food miles and related carbon emissions may provide an incentive for limiting transport distances.

Lastly, the concepts of *profit margins* and added value of farming activities can be interpreted differently in the case of urban agriculture as well. Since the price of land in the city will almost per definition too high to be directly offset by agricultural production alone, the presence of urban agriculture is explained by other factors as well, such as the possibility to make use of temporarily available or altogether unused spaces for a period of time or the ability to capitalize on, social advantages and environmental benefits generated through UA. They offer a different way of adding value to urban agricultural production. Where these kinds of added value can actually be translated in economic gains, adding value depends on much more than the agricultural production alone (Nationale Federatie Stadsgerichte Landbouw, 2013). In those cases the kind of product coming from an UA system, they key ultimate independent variable in Von Thünens original model, are in fact just a side-issue; one of many determining factors and most likely not the most influential ones.

2.4.3. Using the revised Von Thünen model to explain the geography of urban agriculture

The first of the three laws is relevant to the research because it asserts that the transportability of products is still a limiting factor for some kinds of produce despite the technological innovations mentioned earlier. In so far as this is true it provides an explanation for the presence of agriculture near or even in a city. However, (unless one would assume that transportability of produce would be an issue within the city itself) it does not explain any choices made with regard to a particular location. After all: the whole city is seen as a market for urban agriculture initiatives. Unlike the original model, this theory does not assume that all initiatives are tailoring to the same central, market. This is not to say that intra-urban transport distances do not play a role: the most important dimension of transport in this model may not so much be the distance to certain markets, but rather possible related negative externalities such as noise nuisance, or the emissions related to motorized traffic. Therefore it may be interesting to limit the distance between farmers and consumers to the extent that they may be covered by walking or cycling.

The second and third laws do provide a possible explanation for the specific locations of UA within a city. If they are true then one would expect that different types of urban agriculture will be located at places within the city because of its capacity to (financially or otherwise) benefit from the opportunities present in those locations. For the purpose of this research project it is interesting to identify which chances and advantages are translated to economic gains by UA projects, and which spatial pattern arises from these economic considerations, if any.

Aside from the reinterpretation of the concepts of transportability, shelf life and profit margins and the absence of one central marketplace, there is one more fundamental difference between the original model and the theoretical framework proposed by Van der Schans (2010) and De Graaf et al., (2011): the assumption of the isolated state is not maintained. In the old model economic laws, *ceterus paribus,* create a concentric model or agricultural land uses, which is distorted by differences in physical geographical conditions. In the model proposed by De Graaf and Van der Schans, the differences in physical geography and morphology actually *are* more or less concentrically organized in a city. They create rather than distort a concentric land-use model and possibly a concentric geography of different types of urban agriculture. Thus in the model of De Graaf et al. (2011) contains a fourth law which explains the development of UA at particular locations:

(4) *The different properties of the urban environment and specific locations within it, cause a variation in locational barriers and opportunities, and therefore, at least in part, cause the spatial pattern of Urban Agriculture within a city.*

Within the model proposed by De Graaf and Van der Schans, the city (in the context of the Netherlands and Europe) has a more or less concentric build-up of different urban environments ranging from peri-urban open spaces (Randstedelijke open ruimtes) and the edges to the Inner-city center (Binnenstedelijk centrum). Between these different environments but also at the neighborhood level there will be differences in morphology, building types, demographics and the presence or lack of certain facilities. All of these will lead to different opportunities and limitations for urban agriculture.

One can argue whether such a concentric lay-out is indeed present in reality, but this is not relevant with regard to the central research question of this thesis. The relevance of this theory for the central research question of the thesis lies in answering the following question: do the spatial, social and environmental factors identified by Van der Schans and De Graaf indeed influence the opportunities for urban agriculture at a specific location. The development of knowledge regarding which independent variables lead to opportunities and possibly economic advantages for different types of UA at a particular location, would allow for a partial explanation of the geography of urban agriculture and provide actors with making more optimal locational choices for the development of urban agriculture. Therefore, the locational characteristics which influence the development of different types of UA within a city as identified by De Graaf et al. (2011) will be incorporated into the

theoretical framework of the research, but the notion of a concentric spatial pattern of these characteristics within a city will not be part of the research.

The city in a renewed von Thünen model:

De Graaf et al. (2011) conceptualize the location characteristics which influence the suitability for urban locations in relation to specific types of UA by looking at three different 'layers' within the city:

- The *Physical-Spatial* characteristics of the city are mainly related to the build environment.
- The *Environmental-Technical* characteristics refer to both aspects related to the physical-geography of the urban environment (such as soil conditions) and the availability of waste-flows such as waste-water or heat.
- The *socio-cultural* layer refers to the way in which spaces are used (urban activities) and the demographics of the city and it neighborhoods.

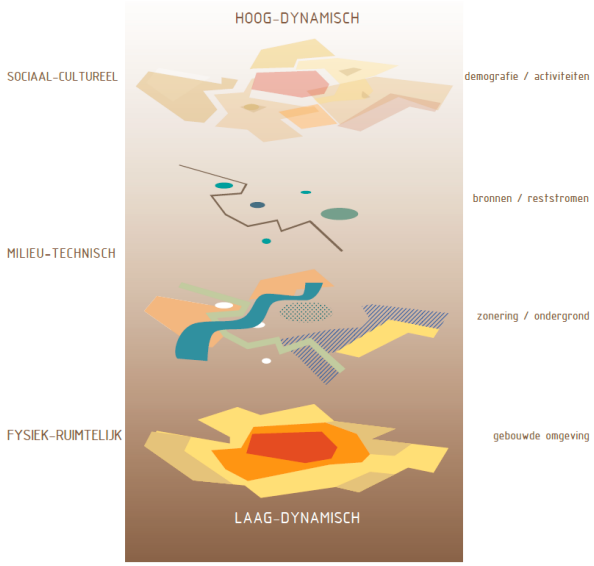


Figure 2.4: The different urban 'layers' influencing the geography of UA according to the research of De Graaf et al (2011)

Each of these layers is conceptualized as progressively more dynamic: where the build environment changes at the slowest pace and the socio-cultural characteristics changes the quickest. The 'Layers Approach' is illustrated in figure 2.4.

The different urban environments, which are conceptualized in the least dynamic physical-spatial layer of the map, are: (1) residential and working environments (2) working environments or (3) green environments within the city. They encapsulate the basic physical characteristics of any urban location, and even some more stable socio-cultural and environmental-technical characteristics can be attributed to them, such as the presence of restaurants or the availability of wastewater streams. The *residential-working environments* (5 in total) are distinguished from one another by looking at characteristics such as building density, the percentage of public spaces and the ratio between the green and built environments and spaces within them. De Graaf et al (2011) feel that these characteristics are also indicators of spatial qualities such as the availability of sunlight, available unsealed land, the orientation of buildings and micro climates. Furthermore they assert that these characteristics can also tell us something about the inhabitants of an area and the presence of facilities and companies. The *working-environments* (3 in total) are either business districts, harbor-

bound industrial areas or office parks. The key locational characteristics are the amount of green present for esthetic purposes and the carrying capacity of available rooftop surfaces. The 12 *green urban environments* distinguished by De Graaf et al. differ from each other in terms of land-use and maintenance, accessibility, biodiversity and/or the possible existence of local pollution.

The second layer (the environmental-technical layer) consists of: soil quality, available sources of rainwater, and the spatial pattern of the Urban Heat Island effect within a city. In this layer the role of UA within circular urban metabolisms (discussed in section 2.3) becomes most tangible.

The third layer is the socio cultural layer of the map. It is not addressed by De Graaf et al (2011) aside from the socio-cultural factors attributed to the urban environments in the physical-spatial layers of the map. De Graaf et al (2011) suggest that a number of characteristics could be interesting here such as: (1) the presence and availability of skills and knowledge for urban farming within particular subcultures or (2) the presence of a specific demand for certain products within particular subcultures.

2.4.3. The locational characteristics which influence the spatial pattern of UA within a city

From the discussion above it can be concluded that UA can be of great potential benefit to a city by complementing urban spatial functions with rural ones (in line with the thinking of Howard) and by positively interacting with a cities metabolism as suggested by Deelstra and Girardet (2000), Smit and Nasr (1992) and others.

By reinterpreting the concentric model of Von Thünen, De Graaf and Van der Schans have shown that the location of different types of urban agriculture can potentially be explained by the way in which the different environments of the city provide different types of UA with opportunities for realizing economic, social or environmental profits and reducing costs; these opportunities stem in part from spatial, environmental and technical and socio-cultural differences between urban environments (De Graaf et al. 2011) and in part from the opportunities offered at specific locations for 'tapping into' the flows of the urban metabolism (see table 2) and other complementarities between urban and rural areas (section 2.2).

All of these factors have been combined in table 2.3 below which lists the locational factors that in theory could influence the economic opportunities for UA at a specific location within a city (e.g. the availability of waste streams) or the barriers to realizing these opportunities (e.g. a spatial zoning laws or the amount of unsealed land available at a certain location). The table contains all of the locational characteristics which may be important in determining the opportunities and barriers for the development of UA at a certain location, according to the literature that has been reviewed. These locational characteristics are hypothesized to lead to a different degree of location suitability, for different types of UA.

Table 2.3 is in part based on research on inventories of land available for UA in North American cities (e.g. Ackerman, 2012; Balmer et al, 2005; Horst, 2008). The focus here is on quantitative spatial research and locational characteristics considered relate to physical properties of a location (e.g. the slope and vegetation and human build cover of land) as well as the ownership and tenure arrangement of land. Studies of this kind in which locations are identified on some more elaborate set of criteria and specific locational characteristics are linked to specific kinds of UA are rare (for an example see Ackerman, 2012). Therefore these criteria are complemented by the criteria in table 2.2, related to circular urban metabolisms, and more general literature on the kind of materials and resources needed for UA (e.g. Waltman, 2010) as well as the 'suitability' criteria used in some land inventories as a criterion such as access by foot or public transport (e.g. Markgraf and Kay, 2010). As can be seen the factors influencing the geography of UA mentioned in table 2.3 relate to each of the urban 'layers' identified by De Graaf et al. (2011). I added a fourth layer to these three, the "laws and regulations layer", because characteristics such as the zoning status of ownership of land may also differ per location and, as will be discussed in the next and last section of the chapter, also influence the suitability of a location for different types of UA.

Urban 'layer' in which the locational property is located	Locational characteristic of importance for UA
Physical-Spatial	Amount of non-sealed land available
	Slope of the land on the location
	Soil quality at the location
	Amount of flat rooftops available
	Strength of the flat rooftops available
	Amount of space available inside buildings
	Availability of sunlight
Environmental-Technical	Existing Infrastructure for transport
	Access to drinking water at the location
	Availability of organic wastes for composting or substrate
	Availability of grey wastewater flows for irrigation
	Availability of rainwater for irrigation
	Availability of heat outputs from industries or other adjacent buildings and households
	Availability of (renewable) electricity
Socio-Cultural	Time for which the location is potentially available
	Likely development future of the location
	Accessibility of the site and safety concerns
	Competition from other land uses
	Availability of markets or restaurants as sales channels
	Inhabitants from adjacent neighborhoods with sufficient income to become a sales channel
	Accessible by (depending on distance): public transport / walking / bicycle
Laws and regulations	Juridical status of the locations and spatial legislation applicable
	Ownership and tenure modality of a space at a certain location

Table 2.3: locational characteristics related to three layers of the urban environment. Based on: Ackerman, 2012; Balmer et al, 2005; Horst, 2008; Keathler, 2006 McClintock et al, 2013; Mendes et al, 2008; Taylor and Lovell, 2012; Deelstra and Girardet, 2000; Waltman, 2010; Smit and Nasr, 1992, De Graaf et al. (2011), Nationale Federatie Stadsgerichte Landbouw, 2013.

2.5. Governing Urban Agriculture

Although the review of the scientific literature has shown that UA could potentially be a means to create more sustainable urban systems, it is also clear from the scientific literature that stimulating and governing the development of UA is far from straightforward. UA makes use of the chances offered by urban spaces and environment in an opportunistic manner (Van der Schans, 2010) and it is therefore hard for urban planners to influence the way in which it develops.

Even though this may prove difficult it can be interesting for urban planners and other policy makers to optimize the benefits of UA for the city and vice versa, to 'match' the demand and supply listed in table 2.2, for example, or optimize the localized sustainability impact of UA projects. Moreover, in a country like the Netherlands the many spatial zoning limitations as well as other legislative and economical barriers, actually necessitate active stimulation and guidance of the development of UA according to De Graaf et al. (2011). Just as Thrift (2011), Pothukuchi and Kaufmann (1999, 2000), Morgan (2009) and other authors mentioned in the introduction of the research he argues that urban planners and policy makers can and should actively engage in governing the development of UA within cities.

"Urban planning can not only play a facilitating role in recognizing opportunities for individual urban farming companies but also a strategic one by using urban farming as a tool to influence the functioning of the city as a whole, as a part of the urban food-, waste-, water-, and energy system" (De Graaf et al., 2011 p. 19).

Thus according to De Graaf et al. both the characteristics of urban locations and the impact of urban farming on the entire urban system by changing a cities metabolism are issues that should be addressed, arguably by a more active role of city governments. The knowledge on the locational demands of different types of UA could be used to strategically govern its development.

Several authors have conducted research on the policy instruments available for governing the development of UA (see Mendes *et al.,* 2008; Holland, 2004; Friedmann, 2007; Zwart, 2012; Thrift, 2011; Pearson *et al.,* 2010). Most of these authors hold the view that UA can have great benefits for the sustainable development of cities, especially on a local scale, and should therefore be an integral part of urban planning practice and the strategies and policies of local authorities (e.g. Thrift, 2011; Morgan, 2009). Therefore, to complete my theoretical framework, I have summarized the governance instruments mentioned in the scientific literature on urban agriculture in table 2.4 below. It must be noted that there are only a limited number of papers explicitly discussing what governance instruments are available, and when they do the authors are mostly discussing the role of urban planners and local authorities. This emphasis largely leaves out the role of private or civil society actors. Empirical research will be needed to make a more complete the list and show which criteria would be best suited for distinguishing different types of governance instrument from each other. The table presented below will be the theoretical basis of this branch of the thesis research.

General mechanism for the governance of UA	Specific governance instruments
Regulations: required actions	Government zoning with or without compensation (e.g. Greenbelts)
	Other zoning and planning controls (e.g. indirect zoning through maximum subdivision of plots allowed).
	Government acquisition and redistribution of land
	Support for certain production methods through regulations
Economic incentives; the creation of 'economic space' for UA	Exactions (charges to developers, in the form of money or land reserves for schools or park land) may be required when lands are subdivided
	Purchase of Development Rights (PDR) for land
	Offset benefits: exchange for, e.g., increased building density elsewhere in exchange for UA at a location
	Tax cuts or abatement for actors engaged in UA where this is desired by the local government
	Government payment for delivery of environmental goods and services (e.g. clean water) or for production factors needed for UA
	Subsidy for UA, especially in the start- up phase of UA companies or UA under difficult circumstances
	Direct financial support or grants for UA, especially in the start- up phase of UA companies
	Establishing clear certification schemes for what food is locally grown and create effective marketing surrounding certified produce
Voluntary actions for enhanced security of UA	NGO-initiated land trust protected by legal covenant/perpetual conservation easement
	Government maintenance of food-producing facility, (e.g. fruit-bearing street trees) in public spaces
	Creating intellectual space showing the rationale and vision behind UA, and helping farmers to frame the need for UA effectively (Feenstra, 2002)
Information, advice, support and moral suasion	Support for voluntary decision to use land for food production, e.g. household gardens (e.g. providing information leaflets to those who ask for it)
	Support for locally produced food, e.g. farmers markets (Pearson et al 2010)
	Providing information on the potential for UA through land Inventories
	Providing information about the benefits of UA through general education or site-specific Environmental Impact Assessment
	Establishing clear certification schemes for what food is locally and sustainably grown in a city / metropolitan region.
Institutional measures:	Institution of a land-use policy or environmental review committee within the municipality
	Institution of a Food Policy council or similar multi-stakeholder board aimed specifically at promoting UA
	Making UA a part of the land-uses determined in the urban land-use plan, explicitly making it a planning issue

Table 2.4: governance instruments mentioned in the scientific literature; Sources: Bourque, 2000; Deelstra et al, 2001; Feenstra, 2002; Mendes et al, 2008; Pearson et al, 2010.

2.6. Conceptual model

In this chapter the way in which different types of urban agriculture can be distinguished from one another has been discussed. In table 2.1 a typology of different kinds of urban agriculture projects has been presented. It is based on (1) a projects physical properties, (2) the social project characteristics and properties of actors involved in a project and (3) the production properties of a project. Furthermore the potential sustainability impacts of UA have been discussed and included in the typology presented, mainly on the basis of the typology of Van Veenhuizen (2006). Next, the way in which urban agriculture projects encounter varying barriers and opportunities for their development because of the different characteristics of the locations within the urban environment at which they are developed have been discussed. These have also been incorporated into a theoretical framework (table 2.3). And lastly, a framework was developed through which the use of governance instruments by different actors involved in the development or governance of urban agriculture may be analyzed (table 2.4).

The literature that has been reviewed to create these three analytical tools also contained suggestions for the way in which the characteristics of different locations and the use of governance instruments may influence the development of different types of urban agriculture. These hypothetical relationships are visualized in figure 2.5, below:

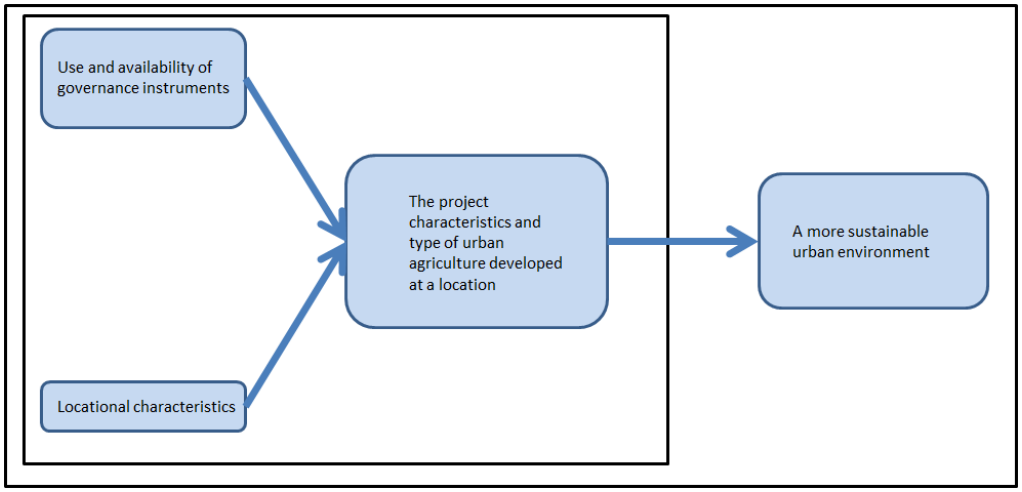


Figure 2.5: The conceptual model visualizing the relationship between the key concepts of the research.

The figure shows the following relationships:

- Locational characteristics form sets of barriers and opportunities for the development of UA. Through this they can influence the type of UA that is developed at a certain location because (depending on the project characteristics associated with a type of UA) one type of UA can make better use of the opportunities at a location, or is limited less in its development by barriers at a location, than another (e.g. The opportunity presented by an empty office space makes a space more suitable for a commercial project growing in an indoor controlled environment, than for a communal garden)
- The use of governance instruments such as zoning or enforcement of environmental or health and safety legislations can influence the locational characteristics (e.g. by changing the land-uses allowed at a location) or the project characteristics (e.g. when a subsidy which is available only for projects which hire a percentage of people with mild learning disabilities, leads to an increased hiring of these people)

- Lastly the project characteristics associated with a type of UA influence the kind of impact an UA project has on the urban environment. The scientific literature has shown that urban agriculture can have a direct impact on ecological, economic and social aspects of the urban environment as well as the urban metabolism of a city, and the research and typology of Van Veenhuizen (2006) suggest that the kind of impact that UA has may differ between different types of UA because these types have different project characteristics. As can be seen in figure 5 this assumed relationship between project characteristics and the sustainability impact of different types of UA will not be a part of the research.

Tools for theory building and testing

The relationships presented in figure 2.5 are hypothetical, the typology presented in table 2.1 as well as the potentially relevant locational characteristics and governance instruments presented in the tables 2.3 and 2.4 still need to be validated and probably adapted on the basis of empirical research, because of the following reasons:

- Because most typologies used to distinguish different types of UA from one another are more general or at least very different from my own typology, there is no strong scientific proof directly supporting all of the assumptions made in the table on different types of UA.
- Furthermore, the locational characteristics determining the suitability of a specific location for the development of UA listed in table 2.4 have been *assumed* to be of importance by a number of scientists. These assumptions are indirectly based on case studies of the barriers and opportunities faced by different urban agriculture projects, but little in-depth empirical research has been conducted to elucidate the relationship between locational characteristics and different types of urban agriculture in practice. Thus it is largely unknown how locational characteristics influence locational suitability for different types of UA and whether their relative importance differs between different types of UA. Moreover most of the (peer-reviewed) research in this regard relates to a North-American rather than a Western-European context or the Netherlands.
- The same reasoning holds true for policy instruments listed in table 2.4. It is very likely that the list of 'governance options' is incomplete, and one can also argue that some of the papers upon which the table is based (e.g. Pearson et al. 2010) although indirectly based on empirical research, offer little direct evidence of the role specific policy instruments have played in the development of particular UA projects, especially within the context of the Netherlands.

Although the typologies are still likely to change on the basis of the empirical research, they will eventually connect and integrate the existing scientific research and thus should provide a useful framework for future research; a 'common language' allowing scientists to compare different empirical research results. This integration and the existence of a common research language is something strongly advocated by researchers in this field (e.g. Mougeot, 2000; Pearson *et al,* 2010; Van Veenhuizen, 2006). In this chapter a first step in achieving this goal has been set by combining existing typologies on different types of urban agriculture, into one coherent framework which is a more suitable tool for answering the central research question. In combination with the framework on locational characteristics presented in table 2.3, it can be used to research in what way locational characteristics can pose a barrier or opportunity for different types of UA. At the same time table 2.1 can be used in combination with the framework on the different governance instruments which may be used by actors involved in the development or governance of UA (table 2.4), to elucidate the way in which the use of governance instruments by different actors influences the development of different types of UA. Thus, empirical research guided by these frameworks will allow for either a confirmation or an adaptation of the hypothetical interrelationships between these 3 variables as visualized in figure 2.5.

3. Research Methodology

In this chapter the research design, as well as the specific research methods used during the empirical research will be discussed. The general research strategy is discussed in section 3.1. In section 3.2 the selection of cases for the research are discussed and the methods for data collection are described in section 3.3. The operationalization of key concepts is presented in section 3.4, and the way in which the data is analyzed is presented in section 3.4. The limitations of the research strategy and methodology are discussed in the final section of the chapter: 3.6.

3.1. General research design: a qualitative research design based on eleven case studies

As discussed in chapter 2, the research methodology should enable the achievement of two goals: (1) empirical corroboration of the assumptions presented in table 2.1, 2.3 and 2.4 and (2) provide insight in the causal mechanisms through which the three main variables within these tables (specific types of UA, locational characteristics, and the use of governance instruments) interact with each other. Because the scientific literature on locational suitability for urban agriculture is largely based on empirical research in American cities, a third goal of the research design will be to generate knowledge on these issues within the context of the Netherlands.

In order to achieve these goals, a research strategy has been chosen that is based on the conductance of eleven case studies. In line with Gerring (2007, p. 20) a case study is defined as:

"*The intensive study of a single case where the purpose of that study is – at least in part – to shed light on a larger class of cases (a population).*"

Although case study research can include both quantitative and qualitative methods for data collection and analysis (Gerring, 2007, chapter 1), the methodology chosen for this thesis research is based solely on qualitative methods. The main reasons for this are (1) the doubtful validity and comprehensiveness of the theoretical framework and (2) the lack of a scientific theory explaining the causal mechanisms through which locational characteristics, the use of governance instrument and the development of different types of UA may influence each other.

As explained in chapter 2, the typology on different types of UA (table 2.1) as well as the two frameworks on locational characteristics (table 2.3) and the use of governance instruments in relation to the development of UA (table 2.4) are likely to be incomplete, and some of the types and characteristics mentioned in them, may not be relevant for the development and governance of UA in the Netherlands. Therefore, a research design is necessary which allows an exploration which can generate results beyond the confirmation or falsification or corroboration of the expectations expressed in these frameworks. A qualitative research design based on a limited number of cases is especially suitable for this kind of explorative, in depth research (Gerring, 2007, chapter 3).

Furthermore, the causal mechanisms visualized in the conceptual model (figure 2.5) have not been based on extensive empirical research. The scientific literature (as well as non-peer reviewed articles by De Graaf et al., 2011 and Van der Schans, 2010) provides reasons to assume that such relationships may exist, but provides no hard evidence for this. Nor is there any reason to assume that interrelationships between these variables that have not been mentioned in the theoretical framework do not exist in reality. Therefore it would be premature to focus on researching the causal effects between the variables, as specified in the conceptual framework. Instead a more open exploration is needed which will provide knowledge on the exact causal mechanisms and at the same time, bring to light other interrelationships between the variables if these exist. A qualitative case study based on a limited number of cases is particularly suitable for this kind of hypothesis generating research (Gerring, 2004; Gerring, 2007, chapter 3).

3.1.2 Defining the case study research

The specific case study methodology used for the empirical research will be what Gerring (2004, p.343) calls a *'Type II case study'*, in which the variation in variables will be analyzed at the same point in time, for a number of different cases within the same unit. In the case of the thesis the *variables* analyzed are: (1) the project characteristics which are associated with different types of UA, (2) the locational characteristics within the urban environment and (3) the use of governance instruments by different actors involved in the governance and development of UA. These variables are observed for a *sample* of in total 10 *cases* selected from the total population of urban agriculture projects within the four largest cities of the Dutch Randstad area: Amsterdam, Rotterdam, The Hague and Utrecht. Each of these cases is composed of a group of actors involved in the development and governance of one or more of these 10 UA projects.

The goal of this research design has not been a comparison between these four cities and the way in which UA has developed there. Conducting case studies in all four of these cities was a pragmatic choice: it was the only way to ensure that as many of the relevant *types* of UA identified in the theoretical framework as possible, could be included in the research. Comparing these types of UA is of key importance with regard to finding an answer to the central research question. Furthermore, through studying cases within more than one city, the comprehensiveness of the locational and governance frameworks resulting from the research will be improved.

3.2. Selecting Appropriate Cases

Because of the uncertainty regarding what phenomena would be encountered during the empirical research and the limited extent to which the theoretical framework could be seen as valid and complete, a *sequential approach* has been adopted for the selection of cases Verschuren en Doorewaard (2010). This means that a limited initial set of case studies has been selected for comparative research first. Only after an initial rough analysis (through notes rather than actual coding of the interviews) and adapting interview questions and the selection criteria where necessary, the next cases are selected. This had two advantages: (1) it allowed for a snowballing technique (Verschuren en Doorewaard, 2010, p. 181) and (2) it allowed for a selection procedure which took into account theoretical saturation. The snowballing approach was useful because it was difficult to find out which actors were involved with a particular project through desk research alone, whilst the sequential selection of projects allowed for adaptations in the cases selected when an UA project appeared to belong to a different type of UA than that for which it had been selected initially. Because of time restraints during the research, the sequential case study approach could not be followed exactly in the way it is described by Verschuren and Doorewaard (2010). The rough analysis between cases was based on notes and my own observations rather than a thorough in-depth analysis of the interviews and mainly aimed at establishing the type of UA to which a project belonged, and the modification of interview questions where this was necessary.

3.2.1. Explorative interviews as a first step

In order to gain some first rough insights in the kinds of UA that are present in the Dutch context and the way in which these are dealt with by city governments two exploratory interviews were conducted in the city of Amsterdam: one with Frank Bakkum, (a GIS specialist working on the municipal Food Vision for the Spatial Planning Department of the municipality of Amsterdam) and one with Ann Doherty (an Urban Farmer at Cityplot, Amsterdam). The city was a logical starting point since I had made some contacts there through UA networking events and discussion-evenings here, as well as an internship. These meetings and in particular the two interviews, provided me with a shortlist of relevant UA projects in Amsterdam as well as other cities and some first contacts. Together with additional research on the internet it gave me the information and contact details needed to select the cases for the first round of in depth empirical research.

3.2.2. The selection of cases

Interviewees were selected on the basis two criteria: the type of UA that the project to which they were connected seemed to belong to and their actor type. Based on the conversation with Mr. Bakkum (Explorative interview, 2013) it was concluded that the following 6 types of UA would be selected for the empirical research: *(1) communal gardening, (2) non-commercial rooftop gardening, (3) commercial rooftop gardening, (4) outdoor commercial farming (5) commercial farming in an outdoor controlled environment and (6) commercial farming in an indoor controlled environment.* Due to time restraints some selection had to be made in any case and Mr. Bakkum (Explorative interview, 2013) indicated that at that moment at least, the municipality was not involved in the governance of UA projects belonging to the category "guerilla gardening, edible landscapes" and "Backyard farming". Because projects in which the city-government was involved in some way were likely to provide more information on the use of governance instruments I left these categories out of the research. The government was involved in school and institutional gardens, but because of time restraints this type of UA was left out of the selection as well.

The second criterion for selection was that for each case study I wanted three kinds of actors which would be related to the UA project which would form the core of a case: *(1) an urban farmer or project leader, (2) a civil society actor and (3) a policy maker or implementer.* The definitions for each of these actor types are listed in table 3.1 below:

Actor type	Operationalization
Project leader or urban farmer	Any actor who: - Coordinates or manages the work at an UA project - And / or has been one of the initiators of the project, actively involved in the selection of its location and decisions regarding the purpose of the project and the development of the system required to achieve them.
Policy maker or implementer	Any actor who: - Works for a department of the public government, - And / or an organization mandated through the public government to fulfill part of its tasks - And who is through this work engaged in the governance of urban agriculture
Civil society actor	Any actor who: - Is not a project leader - Is not a policy maker - Works an organization which is involved in the governance and development of urban agriculture for purposes other than financial gains

Table 3.1: the definitions for the three types of actors included in the formal research

Mr. Bakkum (Explorative interview, 2013) indicated that the number of city government officials actively involved in the governance of specific projects would most likely be small. Furthermore, after attending a number of informal meetings in Amsterdam related to UA, there were indications that the number of civil society actors within the city which could be linked *directly* to a project was probably also quite limited. Because of this a pragmatic approach to selecting the cases for the research was preferred over an attempt to make a theoretically ideal selection. Where contacts with relevant policy makers or civil society actors were available, these were selected for the research even when they were not linked to a UA project directly. Due to time restraints actors operating in the private sector were not included in the research directly, but where empirical evidence on their behavior became available through interviews with the three types of actors defined above, it has been included in the analysis to a limited degree.

Based on these selection criteria a total of 31 actors have eventually been selected, in relation to 10 urban agriculture projects in the cities of Amsterdam, Rotterdam, The Hague and Utrecht. In table 3.2 an overview of these projects and the actors related to them is presented.

Project name	Type of UA to which the project seemed to belong based on desk-research and explorative interviews	City	Actors linked to case
Meat The Mushroom	Commercial farming (indoor)	Amsterdam	Wouter Hassin (PL)
De Tuinbutler	Commercial farming (outdoor)	Amsterdam	Robin Van Asperen (PL) Astrid Vermeulen (PM)
Growndowntown Amsterdam	Commercial farming (indoor)	Amsterdam	Phillip Van Traa: (PL) Sandra Konijn (PM)
General city actors**		Amsterdam	Anke De Vrieze (CS) Ellen Mensink (CS)
Uit Je Eigen Stad	commercial farming (outdoor)	Rotterdam	Huibert De Leede (PL) Hans Gerritse (PM) Willem van der Schans (PM)
De DakAkker	Non-commercial rooftop gardening	Rotterdam	Wouter Bauman (PL) Jos Hartman(PL)
Rotterzwam	Commercial farming (indoor)	Rotterdam	Siemen Cox (PL) Kees Koudenburg (PM)
General city actors**		Rotterdam	Alexandra van Huffelen (PM) Rachna Deenstra (PM) Agnes Van Ardenne (CS) Jan-Willem van der Schans (CS)
De Koningshof	Commercial farming in an outdoor controlled environment	Utrecht	Akke Bink (PL)
Food for Good	Communal gardening	Utrecht	Mariken Heiteman (PL)
Ondiep interview	Communal gardening	Utrecht	Marian Blom (PL)
General city actors**		Utrecht	Annemarie Gout (PM) Barbara Rijpkema (PM) Louis de Jel (CS)
De Schilde	Commercial rooftop gardening	The Hague	Mark Durno (PL) Ed de Jager (PM) Arjen Koene (PM)
De Pandertuin	Communal gardening	The Hague	Annechien Meijer (PL) Leo vd Meij (PM) Janssen - Van Raay (CS)
General city actors**		The Hague	Arno van Roosmalen (CS)

Table 3.2: Selected case studies and related actors for the cities of Amsterdam, Rotterdam, Utrecht and The Hague.

** In this column the actor linked to each case is given per type of actor: PL = Project leader or urban farmer PM = Policy maker or implementer, CS = civil society actors*

*** These are actors linked to the city and involved with urban agriculture, but not to a specific case study.*

3.3. Methods for data collection

Data collection for the research took place primarily through semi structured interviews. The empirical data gathered in this way was complemented by data collection through the analysis of relevant documents obtained through the persons that have been interviewed, or during desk research. When the data collected through these methods proved to be incomplete in some respect, additional questions were asked via e-mail correspondence.

3.3.1. Contacting respondents

Contact with potential respondents was usually arranged via e-mail or a phone call. In almost all cases where actors are linked to the same case, contacts were made via a 'snowballing process': using the name and contact details provided by one respondent to contact the other. In most cases, the suggestions of project leaders and urban farmers were the starting point for contacting other actors such as policy makers and implementers or civil society actors. Still, project leaders and urban farmers were not always the first actors to be contacted with regard to a selected case. In some cases the interview with a policy maker was conducted before any contact with the relevant farmers

was made. In the case of the De Schilde project in The Hague, for example, it was only possible to get in touch with the general manager of the project there after being introduced by some officials from the municipality of The Hague directly. This process was guided by pragmatism rather than methodological concerns: it was usually difficult to trace down which actors were most relevant with regard to a particular UA project purely through research on the internet or via phone calls. Although this method of contacting respondents took somewhat longer (at times it was necessary to wait for completion of one interview before other relevant actors could be contacted), it allowed me to trace down the actors most relevant to a particular project selected as a case study. Furthermore the chances of getting a positive response to a request for an interview were increased by the fact that I was often introduced by other actors, when contacting someone with a request for an interview. Maintaining the two selection criteria regarding the type of projects and actors to include in the research whenever possible has prevented a biased selection of cases or respondents.

3.3.2. The conduction of semi structured interviews

Most of the interviews that were conducted were conducted during face to face meetings with the respondents. Three actors preferred an interview over the phone: De Leede, Cox and Van Huffelen. The interview with Mark Durno was a video-conference call via Skype.

Face to face interviews were arranged whenever possible; it is the researchers' experience that during these interviews much more information and more detailed and in-depth information was gathered, as opposed to interviews over the telephone or Skype. Skype interviews were preferred over phone calls where face-to-face meetings were impossible or impractical, because they offer the advantage of being able to see the facial expression of the interviewee. All face to face interviews with urban farmers took place on the sites of the projects themselves, so that the information provided by the respondent could be complemented by observations on the site itself. The only exception to this is the interview with Robin Van Asperen, but in this case, for practical reasons, the project has been visited one week before the interview took place.

For each type of actor a list of relevant questions was created. Although these questions were always guiding and structuring the interview to some extent, respondents were explicitly told that they could emphasize certain topics they found particularly relevant or introduce new topics to the conversation when they felt this was necessary. This was an important element of the data-collection process: since the theoretical framework upon which the lists of interview-questions were based was likely to be incomplete, or possibly incorrect, there was a clear need to allow room for an inductive process within the interviews. On the other hand the fixed structured of the lists of questions based on the same framework ensured that the data gathered during the interview was at least comparable in regard to the structure and broader themes addressed and the resulting answers could be compared to those in different interviews.

All interviews were recorded and fully transcribed except for the interviews with Van Huffelen, Van der Leede and Cox. These interviews were conducted over the telephone and transcribed based on the notes taken during the interview, immediately after the interview was completed. The general list of questions guiding the interview for each actor type can be found in the Appendix (A). Additional correspondence via e-mail was used to complement the data gathered during the interviews with Meijer, Heiteman, Durno and Bauman. These E-mails have been analyzed in the same manner as the interview data where appropriate and necessary. Because the correspondence was very limited and aimed at establishing some basic facts which had remained unanswered after the conduction of the interviews, the inclusion of these e-mails does not introduce a bias in the research results.

3.3.3. Additional desk research: reviewing scientific literature and non-scientific literature

The desk research can be divided in two parts: (1) a review of non-scientific reports, online publications and websites on food systems governance and the relation between urban agriculture and planning and (2) specific background research on actors and organizations which were approached with an interview request. Sometimes the information was obtained simply by searching the World Wide Web. At other times it was provided to me by respondents, during or after interviews. Reviewing these documents and websites has provided me with contextual information which was useful for interpreting the answers of respondents during the interviews, or selecting new cases, but it was not included in the formal research, with the exceptions of 3 policy documents: (1) the food vision of the Municipality of Amsterdam (Gemeente Amsterdam, 2014a), (2) the food strategy of the municipality of Rotterdam (Gemeente Rotterdam, 2008) and (3) the food strategy of the municipality of The Hague (Gemeente Den Haag, 2013).

3.4. Operationalization of key concepts from the theoretical framework

The empirical research is focused on three themes: (1) Different types of UA and their characteristics, (2) the characteristics of locations at which these systems have been developed or could be developed and (3) the use of governance instruments by different actors involved in the governance and development of urban agriculture. For each of these themes, the key concepts relevant to the research are operationalized below.

3.4.1. The operationalization of different types of UA

The different types of UA encountered during the empirical research are operationalized on the bases of the characteristics which are central to the typology presented in table 2.1. This means that the following characteristics will be used to establish the type of UA to which a project belongs: (1) physical properties, (2) social and actor properties (3) production properties and (4) the potential sustainability impact of a project. The tables 3.3 through 3.5 provide details on the way in which the particular project characteristics belonging to the first three categories are measured.

Physical characteristics of UA projects:	Operationalization of the concept:
Kind of space used for agriculture:	The space used for UA is located outside *(outdoor environment)* or inside a building *(indoor environment)* The climate within the space is actively influenced by project leaders or urban farmers (controlled environment) or not (non-controlled environment)
Size of the space used for UA	The size of the space used for the actual production of food as well as other activities related to the project goals, measured in square meters
Sunlight dependency	Systems which use make use of light sources designed by humans to grow their crops (not sunlight dependent) and those which rely on the sun's rays for the growing process (sunlight dependent)
Kind of underground for growing	*Soil based:* UA projects in which the medium used for growing crops is soil (either existing open-soil at a location, or soil brought from elsewhere) *Non-soil based:* UA project in which another growing medium is used which is not soil (e.g. substrates, water)
Capital intensity of the system	*Capital intensive production systems:* the projects production system is reliant upon machines (e.g.: greenhouses with, automated climate control systems, aquaponics systems) *Non- capital intensive systems:* the projects production system is not reliant upon machines. Work is done by hand or with simple tools if work is done with machines this is for reasons of convenience, and incidental rather than structural.

Table 3.3: The operationalization of physical properties of UA systems

Social properties of UA systems	Operationalization of the concept:
Goal of the system from the farmers perspective:	*Food provision:* the goal of the actors is the provision of food for those working within a project either for purposes of sustenance or access to particular produce *Income generation:* the goal of the actors is the generation of financial revenues from sales of produce or other activities at the project site. *Employment:* the goal of the actors is the generation of financial revenues from sales of produce or other activities at the project site, and they derive part of their personal income from these activities *Recreation:* the goal of the actors engaged in the project is to gain personal pleasure and personal development during leisure time. *Education:* the goal of the actors is to educate either themselves or others through the activities taking place at the site of the project.
Ownership and tenure arrangement of the project site:	*Public:* the space is owned by the city or some other governmental organization and accessible to the general public at all times. *Semi-public:* the space is owned by the city or some other governmental organization, but used by other actors. Access for the general public is specified in an arrangement between this governmental organization and other users of the space. *Private:* the space is owned by a non-governmental actor and there is no requirement of public accessibility.
Kind of labor outputs and inputs used to run the system	*Voluntary labor*: on labor which is provided on a voluntary basis by actors and for which no formal or informal agreement of a financial reward has been drafted. *Paid labor*: labor which is provided by actors in return for financial compensation.
Education and skills of Urban farmers involved with the system	*Yes:* the actor has a specific agriculture-related education, or elaborate practical experience as a professional farmer. *No:* the actor has no specific agriculture-related education, or elaborate practical experience as a professional farmer.

Table 3.4: social properties of UA systems

Production properties of the UA system	
Scale and intensity of production taking place within the system:	*Production for sustenance with possible surpluses:* the scale and intensity of production of the system are such that crops are provided for those actors that are directly involved in the production process. Occasional surpluses can occur. *Production on a commercial scale:* the scale and intensity of production of the system is such that produce is available for the purpose of regular sales to third parties.
Economic processes taking place within the system	Three processes are distinguished from one another: *Production process*: the actual growing and harvesting of crops. *Processing of food*: activities aimed at adding value to the crops produced through the actual preparation of the food or the packaging and or / processing or conserving of the harvested crops, resulting in intermediate products. *Marketing and trading:* any activity aimed at selling either harvested produce or processed produce with the purpose of generating financial benefits.
What is being produced in the system:	The following produce types are distinguished from one another: *Food meant for human consumption* *Food meant for consumption by livestock or fish* *Non-food products:* ornamental crops or agro-industrial products (e.g. silk)
Origin and kind of inputs required for the UA system:	The kind of inputs vary per system, e.g.: Organic wastes / (chemical) fertilizers / (waste)water / (waste) heat / energy and electricity / fungicides / insecticides / seeds / seedlings Inputs are said to have a local origin when they have been obtained from within the city's spatial boundaries, or from industries on the fringes of the city. Otherwise they are seen as being of non-local origin.
Destination and kind of outputs resulting from the UA system:	Produce from the UA system is seen as having a local destination when it is consumed or used by individual consumers or organizations within the city's spatial boundaries. Other outputs of the system (e.g. organic wastes) are seen as having a local destination when they serve as an input to other production processes in the city.

Table 3.5: production related properties of UA systems

The potential sustainability impact of UA projects will not be measured directly. Instead they will be based on the perceptions of the actors, and categorized in accordance with the framework of Van Veenhuizen (2006, chapter 1) presented in figure 2.2 (p. 6 of this report).

3.4.2 The operationalization of locational characteristics

The operationalization of the locational factors mentioned in the theoretical framework is based on table 2.3 from the original framework, in the sense that the layers used to structure the characteristics in that table were also used to structure the empirical results. For each of the locational characteristics mentioned in this table, the aim of the research was to assess their relevant importance for the development of different types of UA. Therefore, each of locational measures was qualified as either being a prerequisite for the development of the UA or an advantage or disadvantage for its development. These qualifications were based on the perceptions of the actors interviewed. When locational characteristics were perceived by actors to be typical of the space in which a project was located, or in any other way explicitly mentioned by actors during the interviews, without a specific value judgment, they were classified as being 'generally descriptive'. The operationalization is presented in table 3.6 below:

Qualification of the relative importance of locational characteristics	Operationalization
A prerequisite for the development of UA	Locational characteristics which actors perceive to be a prerequisite for the development of the UA project at a location. The UA in question project cannot be developed at a location when it does not possess these characteristics.
An advantage for the development of UA	Locational characteristics which actors perceive to be advantageous for the development of the UA project in question.
A disadvantage for the development of UA	Locational characteristics which actors perceive to be disadvantageous for the development of the UA project in question.
Generally descriptive	Locations which actors perceive to be typical of the space in which a project was located, without attaching a specific value judgment to their existence with regard to the development of the UA project in question.

Table 3.6: the operationalization of locational characteristics

In the case of some locational characteristics which were identified as prerequisites for the development of UA project, a further operationalization was deemed useful. Because the purpose of this further operationalization was the specification of the minimum locational requirements for different types of UA, this was only done for prerequisites and not for (dis)advantages or general characteristics. This is presented in table 3.7:

Locational characteristic identified as a prerequisite for the development of UA	Operationalization
Amount of flat rooftops available	Number of square meters of flat surface minimally required for the development of UA
Amount of non-sealed land available	Number of square meters of non-sealed land minimally required for the development of UA
Amount of space available inside buildings	Cubic meters of space inside building minimally required for the development of UA
Soil quality at the location	These were operationalized in one of two ways: (1) A distinction was made between soils which were too polluted to be suitable for growing crops for human consumption, and those which were suitable for growing crops for human consumption. (2) Respondents gave a judgment on the quality of the soil related to its fertility. These judgments were not specified further.
Strength of the flat rooftops available	Carrying capacity in kg per square meter of rooftop surface minimally required for the development of UA
Access to drinking water, Availability of sunlight, Availability of (renewable) energy, Availability of organic wastes for composting	These variables were operationalized as a simple yes or no variable: either drinking water, electricity (the operationalization of energy) or sunlight was indicated by actors to be available at a location, or it was

or substrate at a location.	not.
Existing Infrastructure for transport	The specific infrastructure for transport which was not operationalized in any way other than through the actors specifications.
Accessible by (depending on distance): public transport / walking / bicycle	When actors indicated a specific traveling time or distance radius, this was mentioned in the results.
Accessibility of the site and safety concerns	Accessibility is operationalized according to one of three states of the variable: - Fully accessible: the location is accessible to the general without any restrictions and forms a part of the public space. - Partially accessible: the location is accessible only at certain times either because it is not part of the public space in a city or because access is limited by the actors engaged in the UA project even though it is a part of the public space, or because it is located in a privately owned space.
Likely development future of the location	This variable is not operationalized beyond the case specific details provided by the respondents.
Time for which the location is potentially available	Number of years for which a location must minimally be available in order to enable the successful development of an UA project at a location.
Juridical status of the locations and spatial legislation applicable	Is operationalized by looking at the spatial zoning status of a location and the spatial permits which adhere to a certain location, and the way actors indicate these hamper or enable the development of UA at a location.
Ownership and tenure modality of a space at a certain location	A distinction is made between three kinds of ownership: Public: the space is owned by the city or some other governmental organization and accessible to the general public at all times. Semi-public: the space is owned by the city or some other governmental organization, at times and occasions specified in an arrangement between this governmental organization and other users of the space. Private: the space is owned by a non-governmental actor and there is no requirement of public accessibility. Tenure arrangements are deemed to already be operationalized through the following locational characteristics: ownership, time for which the location is potentially available.*

Table 3.7: operationalization of locational requirements for the development of UA

* Where other factors (e.g. price) which are not explicitly included in the theoretical framework at the moment will rise as important from the empirical research these will complete the implicit operationalization of tenure arrangements.

3.4.3. The operationalization of governance instruments used by different actors

The operationalization of the governance instruments used by actors involved in the development and governance of UA is exactly the same as it was presented in table 2.4 and is therefore not repeated. They are measured on the basis of one criterion only: whether they are used or not according to the actors that have been interviewed. A *governance instrument* is defined as *"a specific action undertaken by an actor involved in the governance or development of UA with the intention to directly or indirectly influence (1) the development of a specific UA project or the perception other actors have of this project or (2) the development of a UA in general or the perception other actors have of UA in general."*. Governance instruments are classified as belonging to either one of five *governance mechanisms*: *"Regulations", "Economic incentives"," Voluntary actions for enhanced security of UA", "Information, advice, support and moral suasion", "Institutional measures".*

3.5. Analysis of the Data:

3.5.1. Qualitative Data Analysis with the NVIVO 10 coding software

The data collected through in-depth interviews as well as the additional documents reviewed, is of a qualitative nature. And the answers given by different actors have been diverse and at times almost incomparable in a direct manner. Therefore it has been necessary to structure and code the data in a way which makes it possible to relate it directly to the frameworks in table 2.1, 2.4 and 2.5. To do this the qualitative analysis software NVIVO (Version 10) was used to analyze the collected data.

Analysis 1: a coding process based on both deductive and inductive analysis

The coding structure set up to achieve the first research goal, the validation of the typology of UA and the theoretical frameworks on the locational characteristics and use of governance instruments which potentially influence the development of UA, was in first instance fully based on the theoretical framework presented in chapter 2. However, in order to avoid too much information loss, the next step in the coding process was one of open coding rather than a purely deductive approach based on the coding structure derived from the theoretical framework alone. This inductive approach allowed concepts and phenomena that had not been included in the theoretical framework in first instance to emerge from the collected data. The first round of open coding was based on all interviews conducted in the city of Rotterdam, with the exception of the interview with Jan Van der Schans (2014) because this interview was one of the last ones conducted. The original coding scheme based on the theoretical framework was adapted after the first round of open coding had been completed, by adding new coding nodes where this was necessary. After this the coding scheme was adapted once more where necessary, when all interviews related to cases in the city of The Hague and Utrecht were included (with the exception of the interview with Marian Blom, again for practical reasons), and a third and last evolution of the codes took place when the interviews from the city of Amsterdam (which was the last city in which all cases were completed) were coded. The coding became progressively less open as the process continued but it has never been a completely deductive process. For those interested in following the coding process in more detail, a set of Nvivo files copied at the different stages of the research is available upon request.

Analysis 2; the use of relationship nodes

The coding structure used to validate the conceptual framework (figure 2.5) and analyze the possible interrelationships between the variables visualized in the framework, was set-up through the creation of special relationship nodes within Nvivo. These nodes indicate a connected between two nodes within the structure that resulted from the coding process discussed above. Every time one of the answers provided during the semi-structured interviews indicated a possible relationship between locational characteristics, the use of governance instruments or the project characteristics of different types of UA, this reference was coded at a node specifying this relationship.

The nodes not created on the level of individual locational characteristics, project characteristics or governance instruments. Locational characteristics are grouped together in the 4 urban layers described in the theoretical framework and the nodes stipulate the kind of governance mechanisms rather than the specific governance instrument. Similarly project characteristics were grouped together as physical characteristics, social and actor characteristics or production characteristics.

The fourth project characteristic listed in table 2.1, the potential sustainability impact of different types of urban agriculture was not included in the analysis because the data collected through semi-structured interviews proved unfit to determine whether certain causal mechanisms operate between the potential impacts of UA projects and locational characteristics or the use of governance instruments. A list of the relationship nodes resulting from the analysis of the interrelationships between the locational characteristics, use of governance instruments and project characteristics is available on request.

3.5.3. Answering the research question

Through the data collection and analysis described above the five sub-questions guiding the research will be answered. The first of these questions (What are the main types of UA that can potentially be developed in a city?) can be answered based on the results of the results of the first analysis discussed above. The coding process will show which of the types of UA included in the typology on different types of UA have already been developed in the Dutch Randstad area or can potentially be developed in the near future. The expectations expressed in table 2.1 with regard to the project characteristics of different types of UA can only be evaluated for those types of UA to which at least one of the 10 selected cases belongs, and will be based solely on the interviews with project leaders and urban farmers. However, a number of questions have been included in the semi-structured

interviews with all actor types, which ensures that the extent to which those types of UA which are not directly researched are (or can potentially) be developed can also be evaluated on the basis of the research (see Appendix, section A).

The second research question (How do different locational characteristics influence the development of different types of urban agriculture?) is answered on the basis of the results of both the first and the second analysis mentioned above. The combination of inductive and deductive coding will show which of the locational characteristics mentioned in table 2.3 of the theoretical framework have an influence on the development of UA according to all of the actors that have been interviewed and this will allow a general evaluation of the framework. A more detailed analysis of the perception of these locational characteristics as prerequisites or (dis)advantages for the development of UA according to only the project leaders and urban farmers that have been interviewed will provide a first insight in how the influence of locational characteristics may differ for different types of UA. The results of the analysis of the interview data through the use of relationship nodes will provide the results necessary to uncover the causal mechanisms through which locational characteristics influence the development of urban agriculture.

The third research question (What are the different governance instruments available to different actors when developing and establishing different types of urban agriculture within a city?) will be answered on the basis of the first analysis alone, the questions which are related to answering this questions can also be found in the Appendix. The answer to the fourth sub-question will be based entirely on the analysis of the data through coding with relationship nodes.

3.6. Limitations of the research methodology

It is argued at the start of this chapter, that the research methodology is well suited to achieve the main goal of this research, which is the building of a theory which explains the way in which the use of governance instruments as well as specific locational characteristics influence the development of different types of urban agriculture. The close, in-depth observation of a small number of cases means that the methodology is well suited to explore new relationships between variables or confirm the presence of certain relationships which are expected on the basis of the theoretical framework.

However, a case study design of this kind does not allow for the assessment of the strength of these relationships in terms of a causal effect of one variable upon the other (see Gerring, 2007 p. 44). Furthermore the small number of cases included in the research means that it will be difficult to refute the assumptions made in the theoretical framework altogether, even when they are not confirmed by the empirical research. Unless explicit evidence of the fact that such assumptions are wrong is encountered during the research there is no ground for arguing that they are falls in all situations that could be studied, especially there is little reason to assume that the sample cases studied in the research is representative of the larger population, After all, the selection criteria guiding the selection of cases for the research were not in any way guided by considerations regarding the representativeness of the sample for the entire population of UA projects in the Randstad or the Netherlands. Instead the aim was to generate as diverse a sample as possible. Both the size of the sample of selected cases and the fact that the methodology for its selection was not aimed at ensuring that it is representative of the larger population, mean that the results of the external validity of the research is low and that it provides a poor basis for generalizations.

4. Results of the research

In this chapter the results of the empirical research will be presented. For purposes of clarity the general characteristics of the cases selected for the empirical research and their location are discussed first in section 4.1. The purpose here is not to exhaustively compare the 4 cities or the cases studies within them, but rather to provide the reader with some context for better understanding the more detailed discussing of the results of the empirical research that will follow.

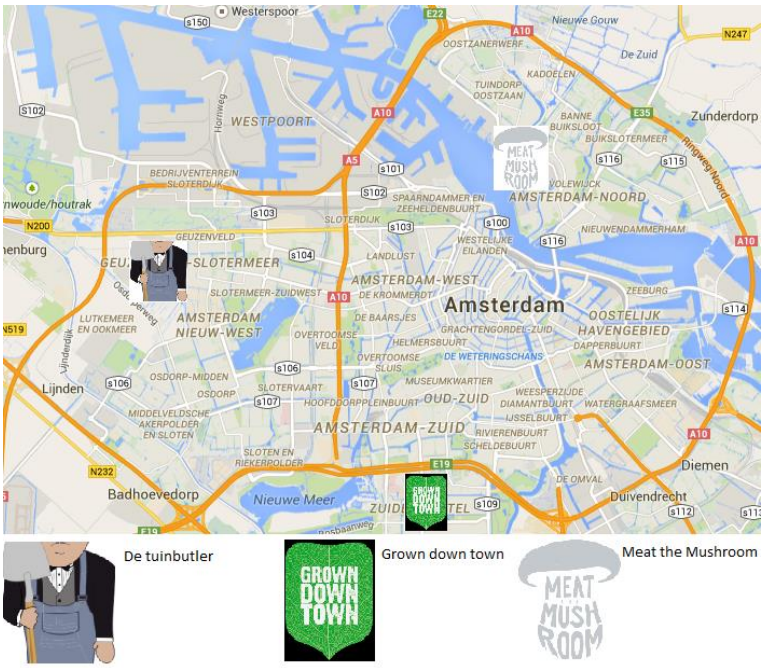
In section 4.2, the typology on different types of UA (table 2.1) is verified and adapted based on the results of the empirical research, and the same is done with the framework on locational characteristics (table 2.3) and that on the use of governance instruments (table, 2.4). The evaluation of these three analytical frameworks on the basis of the empirical research will provide the results necessary to answer the first, second and third sub-questions guiding the research: (1) what are the main types of UA that can potentially be developed in a city? (2) How do different locational characteristics influence the development of different types of urban agriculture? And (3) What are the different governance instruments available to different actors when developing and establishing different types of urban agriculture within a city?

In section 4.3, the empirical data related to the interrelationships between the three variables central to the research will be analyzed to complete the answer to the third research question and also provide the results necessary to answer the fourth and fifth research question: (4) how do governance instruments influence the availability and suitability of locations for urban agriculture? An unexpected result of the analysis of the empirical data, the fact the locational characteristics of the site at which urban agriculture project are developed and the use and availability of governance instruments are also related, is discussed in this section as well.

4.1. Overview of city and case characteristics

Amsterdam:

Three projects have been selected to become part of the research here, (see figure (4.1)



De tuinbutler Grown down town Meat the Mushroom

Figure 4.1: The location of selected cases in Amsterdam. Source: adapted from Google maps.

Meat the mushroom:
This project is located in the north of the city in a former harbor and industrial area called Buiksloterham. The area will be redeveloped in the near future to include a mix of residential and commercial uses (Gemeente Amsterdam, 2014b) but at the moment the main land uses are still industry, commercial and office spaces. Meat the mushroom is situated in on the terrain behind one of these office spaces, the New Energy Docks, close to the IJ River. The project is a small-scale mushroom farm housed in 2 sea-containers which aims to allow people to 'meet' new varieties of mushroom through cooking workshops and other events at the farm, whilst at the same time conducting research on the production of protein rich meat replacers from fungi and different organic waste streams such as brewers grain residues (Hassink, Interview, 2014).

Wouter Hassink, one of the two founders of Meat the Mushroom has been interviewed as a part of the thesis research. Originally Jeroen Oe, who works at the environmental protection agency ODNZKG, which treated the case of Meat the Mushroom with regard to the operating permit and possible environmental impacts, was included in the research as well. Sadly the results could not be incorporated in the report because the interview recording was inaudible.

Growndowntown:
Is an Amsterdam co-operation founded with the aim to develop urban agriculture in the city of Amsterdam (Growndowntown, 2014). A large variety of projects has been initialized supported or developed by the co-op, including several educational projects for school children and a number of roof gardens. The case included in the research was Growndowntown Amsterdam. This project is projected to become the 'first professional comprehensive concept for urban agriculture in the Netherlands' (Growndowntown, 2014). The concept features a greenhouse, communal gardens, a roof-farm and, and this is the most interesting part for the research, several types of commercial farming in an indoor controlled environment. At the moment of writing, no definitive location had been found at which the concept was going to be developed, although serious negotiations were underway for a plot of land located in the Zuid As business district. (Van Traa, Interview, 2014).

Phillip van Traa, who is one of the founders of Growndowntown was the project leader linked to this case. Sandra Konijn, who researches the possibilities for urban farming in a variety of buildings such as office spaces and parking garages, was included as a policy maker linked to this type of urban development.

De Tuinbutler:
*I*s a commercial urban agriculture project in the Tuinen van West, an area on the western edges of the city which is being redeveloped by the municipality of Amsterdam into a green recreational area explicitly dedicated to urban agriculture (Vermeulen, Interview, 2014). The project allows clients to rent a plot of land at this location on which they can grow their own food, and furthermore offers them the opportunity to buy the inputs required for this from the company, as well as the services of a professional gardener if they feel this is more convenient. It supports the clients through software which features a personal growing plan, as well as a prepaid system through with the services of the Tuinbutler (which translates to Gardenbutler) can be ordered (Van Asperen, Interview, 2014).

Robin Van Asperen, who is the owner and founder of the Tuinbutler project was interviewed as a project leader and urban farmer with regard to this case, while Astrid Vermeulen, who coordinates the development of the Tuinen van West area on behalf of the city district Nieuw-West completes the case with the perspective of policy makers.

Two civil society actors were included in the research to complement the perspectives of the aforementioned actors: Ellen Mensink, who has been engaged in the development of urban agriculture through a foundation called Creative-City Lab which aims to stimulate and accelerate innovative and sustainable developments (Creative City Lab, 2014), and Anke de Vrieze who has promoted and research the development of urban agriculture as a part of a more sustainable urban food system on behalf of CITIES, an independent research organization focusing on urban development issues. (Farming the City, 2014)

The Hague

With 505 856 inhabitants in 2013 (CBS 2014), The Hague is the third largest city in the Netherlands. It is located on the West-coast of the Netherlands slightly above Rotterdam. The Westland area, where the horticulture industry of the Netherlands is clustered, is located just outside the city on its South-West side. Two urban agricultural projects have been selected as the basis of a case study for the research: De Schilde and Panderplein (see figure 4.2).

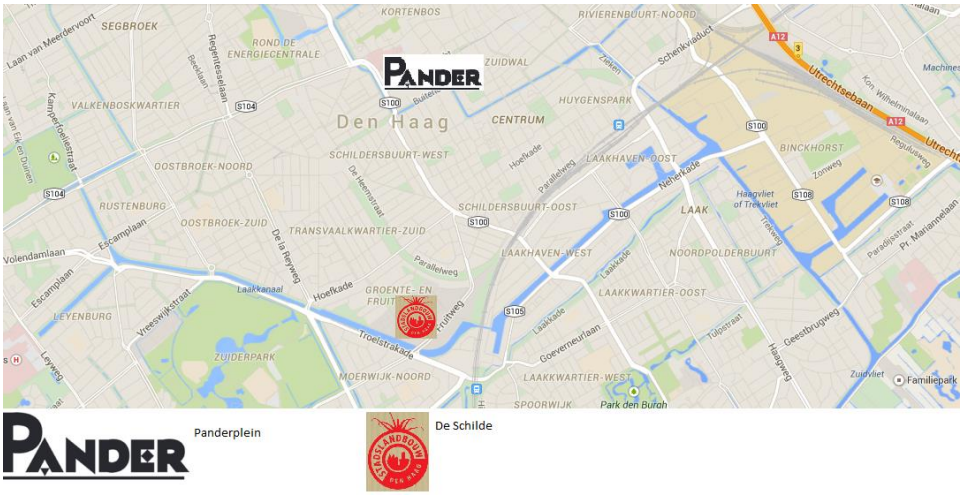


Figure 4.2:The location of selected cases in Den Haag. Source: adapted from Google maps.

De Schilde:

Located on the rooftop of a complex formerly used by Phillips Television and Phone division as an industrial production facility (Gemeente Den-Haag: Stadslandbouw Den-Haag, 2014), the De Schilde is projected to become the "Times Square of Urban Agriculture" according to the Swiss company behind its development: Urban Farmers (Urban Farmers, 2014). The project features a production system based upon aquaponics production techniques and will grow vegetables as well as fish, for individual consumers, supermarkets and local restaurants. Aside from the actual production of food the project will also provide a showcase for the technologies used in its production system, and serve as a platform for the urban farmers company to engage with the horticulture cluster sector located in the Westland area, which is located just outside the city of The Hague (Durno, Interview, 2014). Mark Durno, who will be general manager at De Schilde once the projects development is complete, has been interviewed as a project leader with regard to this case.

Both Ed de Jager, who is engaged in the development of urban agriculture in a broader sense on behalf of the municipality of the Hague, and Arjen Koene, who specifically support the entrepreneurs who aim to develop urban agriculture projects within the De Schilde complex for the municipality, have been interviewed in relation to the project of Urban Farmers.

Panderplein:
The location of the second case study selected within the city of The Hague can also be traced back to a former factory: in this case for the production of furniture (Meijer, Interview, 2014). However, unlike the very recent developments at the De Schilde complex, the communal garden that has been created on the square in in 2010 by the inhabitants of the adjacent, formerly squatted, factory buildings (the Pandercomplex) does not serve any commercial purposes. Here the main goal of the project is to increase the livability of the neighborhood and adding green to an otherwise very stony environment. The project was explicitly designed to 'draw inhabitants back into the square' (Meijer, Interview, 2014) and provides local inhabitants with a small plot of land upon which they can grow their own vegetables.

Annechien Meijer, an inhabitant of the Pandercomplex and an artist, who has designed the Panderplein project and coordinated the building process with other inhabitants, is interviewed as a project leader with regard to this case. Leo van der Meij, who was engaged in the provision of financial support as well as the drawing up of the user agreements with regard to the square on behalf of the central city district of the municipality of The Hague was linked to the case as a policy maker.

Two civil society actors were included in the research to complement the perspectives of the aforementioned actors: Arno van Roosmalen, the director of STROOM, The Hague, an independent organization which focuses on the promotion of arts and culture in urban environments and has hosted a special project on urban food systems from 2009 to 2012 (STROOM, 2014), and Carien Janssen-Van Raay, who works at Fonds1818, an independent foundation which financially supports project in public spaces amongst which urban agriculture (Janssen-Van Raay, Interview, 2014).

Rotterdam:

With a total of 616 294 inhabitants in 2013 (CBS, 2014) Rotterdam is the second largest city in the Netherlands. It is located in the river delta of the Maas in the South-West of the Netherlands, and of major importance to the country due to the location of one of Europe's largest harbor. Three cases of UA development have been selected within the city to become part of the research: Uit Je Eigen Stad, DakAkker, and Rotterzwam.

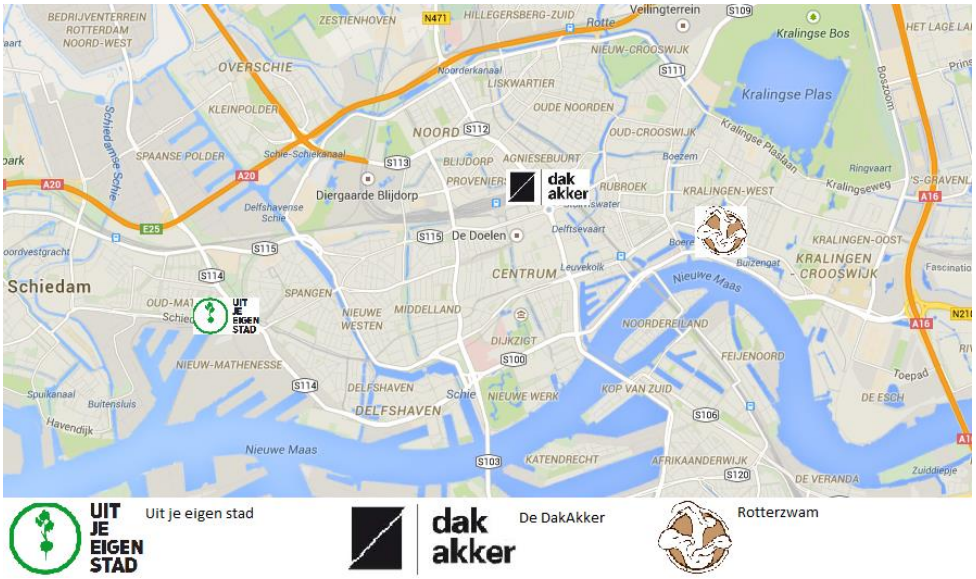


Figure 4.3: The location of selected cases in Rotterdam. Source: adapted from Google maps.

Uit Je Eigen Stad

The Rotterdam harbor has progressively moved west, away from its original location in the city center towards the edges and eventually, with the development of the Maasvlaktes, outside of the city limits. Because of these developments there is a need for redevelopment and revitalization of many former harbor areas (Deenstra, Interview 2014) and eventually most of the former harbor and industrial areas will be redeveloped as residential and working areas. (Jan Van der Schans, Interview, 2014) However, due to the economic recession of the past years in the Netherlands some of the developments have been delayed. The first initiative studied in the city of Rotterdam for this thesis, Uit Je Eigen Stad (literally translated: From Your own Town), has played into these development: the residential developments planned by housing cooperation Havenstede on the 'Marconi strip', a former shunting ground of the city, have been delayed, and for the foreseeable future a farm rather than apartments blocks have been build up here (De Leede, Interview, 2014; Jan Van der Schans, Interview, 2014). With almost 1000 square meters of growing beds dedicated to the production of vegetables for consumption at an adjacent restaurant, or sales to other restaurants in the city, Uit Je Eigen Stad is one of the largest UA initiatives in the Netherlands. Aside from the vegetable production outside, the site is also used for the production of eggs and meat from chicken and contains a greenhouse and an aquaponics system for the breeding of fish and growth of leafy green and herbs.

Huibert de Leede, one of the founders of Uit je Eigen stad, has been interviewed as a project leader with regard to this case while Hans Gerritsen, who was responsible for treating the permit application of Uit je Eigen Stad at the DCMR, the environmental protection agency of the Rotterdam region, has been linked to the case as a policy maker. In addition Jan van der Schans, who was the director of Havensteder at the time that Uit Je Eigen Stad was developed, has been interviewed as well.

De DakAkker

Other than the presence of the current harbor and the redevelopment of the old, the (temporary) underuse of office spaces in the city center is seen as a major issue in terms of spatial planning by policy makers. It generates economic opportunity costs in terms of interested for the owners of the buildings and degenerates the livability of the public spaces in which these buildings are located (Deenstra, Interview, 2014; Hartman, Interview, 2014). Here too, urban agriculture has proven its worth. The DakAkker (which roughly translated to RoofGarden in English) is located on an unused office building in the heart of the city, right behind Rotterdam central station. Together with a number of other initiatives in the public spaces in and around the building the architectures bureau Zones Urbaines Sensibles (ZUS) has addressed issues of green spaces, local economy and general livability in temporarily underused public spaces. In cooperation with the Environmental Centre Rotterdam, the rooftop of the Schieblok office complex has been transformed into a social and recreational space in which volunteers grow a wide variety of vegetables. The DakAkker has been developed together with the Rotterdam center for Environment and Education.

Both Wouter Bauman who works at the Environmental Centre Rotterdam and Jos Hartman, who works at ZUS have been interviewed as project leaders for this case. No policy maker or implementers were interviewed specifically with regard to the DakAkker project.

Rotterzwam:

The third initiative studied within the city of Rotterdam also makes use of a temporarily unused space: The old dressing rooms of the Tropicana swimming pool on the banks of the river Maas. Entrepreneurs Siemen Cox and Mark Slegers are growing a variety of mushrooms within them. The project, conveniently dubbed Rotterzwam (Zwam means fungus, in Dutch) is the last of the three cases selected for the research in the city of Rotterdam. Siemen Cox has been interviewed as a project leader with regard to the case, while Kees Koudenburg who works at the DCMR Environmental protection agency and has looked at the project to see whether a special permit was required for it to operate, has been interviewed as a policy maker or implementer.

Two additional policy makers and implementers have been interviewed in Rotterdam: Alexandra van Huffelen, who was engaged in the governance of urban agriculture as an alderman for the municipality of Rotterdam at the time of the research, and Rachna Deenstra, who worked at the central government of Rotterdam and was involved in the governance of urban agriculture and the implementation of the food strategy of the municipality of Rotterdam from this position.

Two civil society actors were also interviewed as a part of the research: Jan-Willem Van der Schans, one of the founders of Eetbaar Rotterdam, a civil society organization which aims to reinforce the network around urban agriculture in Rotterdam and stimulate its development (Jan-Willem Van der Schans, Interview, 2014). Jan-Willem van der Schans also works as an academic for the University of Wageningen, specifically its Agro-Economic Institute, but has been included in this research because of his work for Eetbaar Rotterdam. The second civil society actor included in the research in the city of Rotterdam is Agnes van Ardenne, who is the president of the Rotterdam Regional Food Council (Van Ardenne, Interview, 2014).

Utrecht:

With 321 916 inhabitants in 2013 (CBS, 2014), Utrecht is significantly smaller than the other 3 cities featured in this study. It is located a little bit more inland and unlike Amsterdam, Rotterdam and The Hague it does not have any direct connection to the sea. Three urban agriculture projects have been selected as a case study within the city Of Utrecht: De Koningshof, Food for Good and Eetbaar-Ondiep. The location of the initiatives can be seen in figure 4.4:

Figure 4.4: The location of selected cases in Utrecht. Source: adapted from Google maps.

De Koningshof
Located on the South-Eastern edge of the city of Utrecht on a plot of land formerly actually used for horticulture, the Koningshof is one of the few initiatives that continue a tradition of farming at its location rather than changing its land use. Some of the old greenhouses have been taken back into use, along with two plots of open soil alongside of them, at which people living in the city of Utrecht can rent a plot of land to grow vegetables and improve their gardening skills. They are assisted by the core group of volunteers behind the project, who offer them workshops and advice on both traditional and biological production methods. In this way the project has moved beyond the conventional horticulture production that used to be practiced here and focusing on the educational and recreational values rather than production alone. (Bink, Interview, 2014)

Akke Bink, a landscape architect and one one of the initiators of the project has been interviewed as a project leader for this case, while Barbara Rijpkema, who works for the municipality of Utrecht in the department managing the public green spaces of the city and who has been involved in an experimental urban agriculture subsidy which was dedicated to De Koningshof, amongst other projects, was interviewed as a policy maker and implemented linked to the project.

Food for Good:
Food for good is located in the South-West of the city of Utrecht, in Park Transwijk. Like the Koningshof the project combines the production of food with a broader set of goals, by providing people with a 'distance to the labor market' such as people that have been unemployed for a very long time of people with learning disabilities with a way to gain working experience and practical knowledge through gardening. At the same time the inhabitants of the adjacent neighborhood, Kanaleneiland, are also offered the possibility to work in the garden so as to stimulate social cohesion. The produce of the project is meant for the volunteers, the food bank and other charity organizations in the city (Heiteman, Interview, 2014).

Mariken Heiteman, who works at the Food for Good project as a professional gardener and a coordinator of the volunteers, was interviewed as a project leader and urban farmer. Annemarie Gout, who works for the public health department of the municipality of Utrecht and attempts to link urban agriculture to policy goals such as public health and social cohesion, was linked to the case as a policy maker or implementer.

Eetbaar Ondiep:
The last of the three initiatives selected in Utrecht is Eetbaar Ondiep, a communal garden located on a schools grounds rather than a public space, in the neighborhood of Ondiep Utrecht. Ondiep is one of the neighborhoods in the city which have been the focus of recent redevelopment efforts and both the physical aspects of the neighborhood as well as the demographic and socio-economic make-up of the area have undergone changes in the last years and decades (Blom, Interview, 2014). One of these changes is the emergence of communal gardens in several public spaces in the neighborhood. The initiators behind Eetbaar Ondiep were originally looking for a public space as well but have ended up developing their garden on the premises of a local school. Here they grow their own vegetables, but also provide a space for the education of young children through the construction of school gardens. Marian Blom, one of the initiators of the project, has been included in the project as a project leader and urban farmer. No policy makers or implementers were linked to this casus,

Louis de Jel, one of the initiators of Eetbaar Utrecht, a civil society organization which aims to stimulate the development of urban agriculture through advice, the provision of information and the organization of symposia (De Jel, Interview, 2014), is the only civil society actor included in the research, from the city of Utrecht.

4.2. Results related to the typologies within the theoretical framework.

In this section, the empirical data gathered during the empirical research is used to evaluate the validity of the tables 2.1, 2.3 and 2.4 presented in chapter 2, within the context of the Netherlands. The adaptations to the theoretical frameworks resulting from them will be presented as well. Throughout all of the sections in which these three frameworks are reviewed (the sections 4.2.1 up and until 4.2.3), the results in the tables are depicted in red letters or numbers when theoretical assumptions and empirical data contradict each other, or theoretical expectations on a specific characteristic are not confirmed by the data, for a type of UA, locational characteristic or governance mechanism or governance instrument used. Where the results complement but do not contradict the original typology they are depicted in green letters or numbers.

4.2.1. Empirical evidence related to typology for different types of urban agriculture within the Netherlands

From the discussion of the cases included in the research (section 5.1), it is already apparent that the many different kinds of urban agricultural projects have been encountered during the research. Based on the empirical data gathered on these different types of urban agriculture and their characteristics, table 2.1 will now be evaluated in more detail. The validity and usefulness of the different types of UA distinguished in the framework (so the most left column of table 2.1) will be evaluated first. After this the characteristics of the types of UA that have been the subject of in-depth research are reviewed. At the end of this section, table 2.1 will be adapted based on this evaluation.

A general review of the typology of urban agriculture based on empirical evidence

The general evaluation of the typology will be based on the fact whether the interviewees recognized a certain type of agriculture as: (1) present in their city or (2) a type of urban agriculture that was under development, or could potentially be developed, in their city in the near future. The different types of urban agriculture mentioned by interviewees are presented in table 4.1, below:

Type of UA	Number of actors mentioning this type of UA as present in their city	Number of actors mentioning this type as potentially developing in the future
Aquaculture / Aquaponics	1	4
Art projects	1	0
Beekeeping	2	0
Communal gardens	14	0
Community Supported Agriculture (CSA)	1	1
Experimental UA	1	0
Edible landscapes	5	2
Indoor controlled environment	3	7
Institutional gardens	8	0
Livestock	3	0
Mobile urban agriculture	1	0
Open soil commercial	8	4
Open soil recreational	4	0
Open soil social/commercial	6	0
Outdoor controlled environment (commercial/noncommercial)	3	2
Peri-Urban Agriculture	9	0
Private-space gardening	2	0
Rooftop (commercial)	3	4
Rooftop (non-commercial)	4	1
Volkstuinen	9	0

Table 4.1: the types of urban agriculture present or with a concrete potential for development according to respondents.

The most important conclusion that can be deduced from table 4.1 is that each of the types of UA included in the original typology is supported to some extent by the empirical data. All types UA have been recognized as being present in the Randstad area by at least one actor.
Eleven kinds of UA which were not included in the original table, namely: “Aquaculture / aquaponics”, “Art Project”, “Beekeeping”, “Community Supported Agriculture (CSA)”, “Experimental UA”, “Livestock”, “Mobile urban agriculture”, “Open-soil Recreational”, “Open-soil Social” “Peri-Urban Agriculture” and “Volkstuinen”. Although mentioned as distinct ‘types’ of UA by respondents, most of them will not be added to the original typology as a distinct category, because they reflect *aspects* of other systems, such as a production method (e.g. aquaponics), the physical properties of a production system (e.g. mobile urban agriculture) a choice for a particular kind of produce (e.g. livestock, aquaculture), or the goals of project leaders and urban farmers (e.g. experimental UA, art projects), rather than constituting an independent type of urban agriculture. They are therefore not included as a separate type in the typology. Furthermore, “Peri-Urban Agriculture” is defined solely on its locational characteristic, namely a location at the outer edges of the city, rather than a combination of the characteristics evaluated in table 2.1. Thus it is not included in the typology as a separate category either. After all: any of the types in the table can be located at the edge of urban areas and therefore be peri-urban. Lastly, CSA is a marketing *strategy “where consumers buy "shares" in the farm before planting begins and receive a portion of whatever is available each week of the growing season”* Brown and Miller (2008), rather than a distinct type of UA, and is therefore not added to the typology either.

Volkstuinen (rough translations: ‘peoples gardens’) can be defined as *“a piece of land in a park meant specifically for Volkstuinen upon which one may grow ornamental and or edible plants and upon which one usually is allowed to place a small house, in which one can sleep from the period from April up to October”* (Bond van Volkstuinders, 2014). A contribution is paid to the union of Volkstuinders, which in turn usually rents the piece of land upon which the gardens are located directly from the municipality. This type of UA is the only one which will be added to the original typology based on this first general review of the original typology, because the definition shows that it does not fit any of the types derived from the review of the scientific literature. Its characteristics will not be specified any further because it is not included as a case in the research.

A classification of the projects in included in the research on the basis of the typology for different types of urban agriculture

For the other types of UA that were suggested as additions to the framework (“Open soil recreational”, and “Open soil social”) a decision is not so easily made. They were mentioned by Heiteman (Interview, 2014) and Bink (Interview, 2014) as additions to the original framework when these project leaders to classify their respective project on the basis of the proposed framework. This question was asked to all project leaders and urban farmers, to test the usefulness and appropriateness of the framework as a tool for analyses of this kind. The results are presented in table 4.2.

Case name	Interviewee	UA type as labeled by project leaders	When hesitant: other possibilities	Theoretical 'fit'?
Uit Je Eigen Stad	Huibert de Leede	Open soil-commercial*	Indoor controlled environment (commercial), Outdoor controlled environment commercial,	In part
DakAkker	Wouter Bauman	Rooftop Non-Commercial		Yes
Rotterzwam	Siemen Cox	Indoor controlled environment (commercial)		Yes
De Schilde	Mark Durno	Rooftop-Commercial		Yes
Panderplein	Annechien Meijer	Communal Garden*	Art project	In Part
Koningshof	Akke Bink	Recreational open soil		No
Food for Good	Mariken Heiteman	Open-Soil Commercial	Community garden Hybrid: open soil-social/commercial	In part
Eetbaar Ondiep	Marian Blom	Communal garden	Institutional garden	Yes
Meat the Mushroom	Wouter Hassink	Indoor (commercial) controlled environment		Yes
Growndowntown	Phillip Van Traa	Indoor (commercial) controlled environment	Rooftop (commercial), outdoor controlled environment commercial, communal garden	Yes
De Tuinbutler	Robin van Asperen	Outdoor commercial		Yes

Table 4.2: The type of urban agriculture to which a project belonged according to the project leader interviewed
**In these cases the question of what type of urban agriculture a project belongs to was not explicitly answered by the respondent but can be derived from the interview nonetheless. The data from which these deductions have been made is located under the same node structure as the explicit answers of respondents, for example in the case of Annechien Meijer the node is: "Project type: communal garden: project leader self".*

The results listed in Table 4.2 indicate that the basic typology as proposed in the theoretical framework can indeed be a useful for distinguishing one type of urban agriculture from another, since all of the cases selected for research could (partially) be assigned to one of the types proposed in the original typology. Still, the classification of some project as one of the types mentioned in the original table proved difficult or at times impossible for some actors.

The typology was said to be incomplete because it did not include large scale open soil agriculture which was not driven by commercial motives. For this reason the Koningshof, which was identified by Bink (Interview, 2014) as recreational and based on volunteer work, could not be classified with the original typology. Furthermore the classification was too rigid at times because some project leaders indicated that their project belonged to several types of UA at once (Van Traa, Interview, 2014; Blom, Interview, 2014; Heiteman, Interview, 2014). In both cases the characteristics associated with the types mentioned in the framework caused difficulties in determining the type to which a particular project belonged.

Therefore the extent to which the project characteristics which the typology assumes for different types of UA (physical properties, social and actor properties, production properties and potential sustainability impacts) are in line with the data gathered during the interviews with project leaders and urban farmers is analyzed. This analysis shows whether it is indeed necessary to add to new types of UA to the typology, or whether the assumptions regarding the project characteristics need to be changed instead. Because empirical data on the origin of inputs and outputs for the production system was unavailable for most cases, this production characteristic is not included in the analysis.

Reviewing the project characteristics of the cases included in the research

For this analysis it is assumed that the UA projects included in the research belong to the types of UA suggested by the project leaders and urban farmers (see the third column from the left in table 4.3). When these classifications fit one of the types mentioned in the original typology the assumptions made on the characteristics of that type are used as a benchmark. When this is not the case, the type mentioned in the original typology which is the closest alternative to the description of the project leader or urban farmer, is used as a benchmark. For Grown Downtown, and Uit Je Eigen Stad the analysis is only conducted based on the one UA type in the most left column, because otherwise the presentation of the result would become unclear.

Case name	UA type as labeled by project leaders	Benchmark based on table 1
Uit Je Eigen Stad	Open soil- based commercial	Open soil commercial
DakAkker	Rooftop Non-Commercial	Rooftop Non-Commercial
Rotterzwam	Indoor controlled environment (commercial)	Indoor controlled environment (commercial)
De Schilde	Rooftop-Commercial	Rooftop-Commercial
Panderplein	Communal Garden	Communal Garden
Koningshof	Open-Soil Recreational	Open soil commercial
Food for Good	Hybrid: open soil-social/commercial	Open-Soil Commercial, Community garden
Eetbaar Ondiep	Communal garden, Institutional garden	Communal garden, Institutional garden
Meat the Mushroom	Indoor controlled environment (commercial)	Indoor controlled environment (commercial)
Grown Downtown	Indoor controlled environment (commercial)	Indoor controlled environment (commercial)
De Tuinbutler	Outdoor commercial	Outdoor commercial

Table 4.3: the types of UA to which project belong to according to project leaders and urban farmers

Communal gardens: Panderplein, Eetbaar Utrecht and Food for Good

The three cases included in the research that were (partially) qualified as communal gardens by their project leaders were Eetbaar Ondiep, Panderplein and Food For Good (Blom, Interview, 2014; Heiteman, Interview, 2014; Meijer, Interview, 2014). The characteristics of the projects are presented in the table below. Eetbaar Ondiep was also explicitly classified as an institutional garden by Blom and will be reviewed in this respect as well. Heitemans classification of Food for Good as a commercial project will be discussed in a later section.

Kind of urban agricultural system	Physical properties of the UA system**	Social and actor (farmer) properties	Production properties	Potential Sustainability effects:
School / institutional gardens **(Based on Eetbaar Ondiep)**	- Size: 100/ 150 m2 - NCE - Outdoor - Sunlight dependent - Soil based - Non-Capital intensive	Goal: food provision, education, recreation, community building. Land ownership and tenure: private Labor: voluntary Education/skills: no	Scale of production: Production for sustenance with possible surpluses Production of food for humans	Social Food system
Community gardening **(Based on Eetbaar Ondiep)**	- Size: 100/ 150 m2 - NCE - Outdoor - Sunlight dependent - Soil based - Non-Capital intensive	Goal: food provision, education, recreation, community building. Land ownership and tenure: private Labor: voluntary Education/skills: no	Scale of production: Production for sustenance with possible surpluses Production of food for humans	Social Food system
Community gardening **(Based on Panderplein)**	- Size: 490 cm2 - NCE - Outdoor - Sunlight dependent - Soil based - Non-Capital intensive	Goal: food provision, Education/recreation, Development and livability of spaces. Land ownership and tenure: public. Labor: voluntary Education/skills: no	Scale of production: Production for sustenance with possible surpluses Production of food for humans	Social

Community gardening **(Based on Food for Good)**	- Size: 1000 m2 - NCE - Outdoor - Sunlight dependent - Soil based - Non-Capital intensive	Goal: food provision, Education/recreation, Community building. Income generation and employment Health generation for participants Community Building Land ownership and tenure: public. Labor: voluntary and paid Education/skills: yes	Scale of production: Production on a commercial scale Production of food for humans	Social Food system

Table 4.4: Analysis of the project characteristics of Eetbaar Ondiep, Panderplein and Food for Good

Classification of the cases

The results presented in the table indicated that, although Food for Good was described by Heiteman (interview, 2014) as a communal garden in cannot be classified as such based on the project characteristics of paid labor and the goal of income generation and employment. Another indication that the project does not belong to this type of UA is its physical size and the scale and intensity of production: with 1000 meters square surface dedicated to growing food crops, Food for Good is an order of size larger than Panderplein and Eetbaar Ondiep; although exact data on the data were not available Heiteman (Interview, 2014) indicated that the scale and intensity of production structurally went beyond what was needed for the sustenance of volunteers and indicated that this was in fact one of the major goals of the project: *"the two main pillars of the project are: (1) bringing people together through green spaces and food and (2) really the production of food".*

Eetbaar Ondiep is best classified as both an institutional garden and a community garden. It can be seen as an institutional garden because it is located on a privately owned terrain, namely that of a school. (Blom, Interview, 2014). Furthermore the goal of education and raising awareness, explicitly aimed at schoolchildren, was very prominent in this project. Nevertheless, the local inhabitants who initiated the project also have their own separate gardens and their own key to ensure access to these plots which are used only for their own food production and recreational purposes. Furthermore Blom (Interview, 2014) also indicates that a connection with the surrounding neighborhood is actively sought by these gardeners through view days and the donation of surplus produce to the neighboring houses. This broader set of goals shows that the project also has many characteristics related to community gardening. Because there is no difference with a communal garden in terms of project characteristics, aside from the issue of ownership the project is also classified as belonging to this type of UA.

Because Panderplein is located in a public space and explicitly meant for use by the local community, it is best classified as a communal garden. Its physical and production characteristics do not deviate at all from the theoretical framework, but the project goals mentioned in the interview do: food provision and education and recreation were not explicitly mentioned during the interview. Instead, increasing the livability of the neighborhood and addressing issues of nuisance caused by a lack of social control on the square were emphasized (Meijer, Interview, 2014).

Concluding remarks

Food for Good was the only one of the projects for which the project characteristics encountered in reality deviated in significantly from the theoretical expectations, but because the case is not classified as a communal garden this has no implications for the characteristics as mentioned in the typology in relation to community gardening. Eetbaar Ondiep is classified as a combination of two types of UA: it is both a communal garden and an institutional garden. Because of this there is no need to change the physical or production characteristics in either one of these categories. However, the project does show that school gardens can have a broader set of goals and related sustainability impacts than those presented in the original typology. These 'new' policy goals will be included in the revised typology, and so will the broader set of goals and impacts that are associated with both Eetbaar Ondiep and Panderplein when analyzed as a communal garden. Lastly, some of the project goals expected to be present based on the theoretical framework were not confirmed during the interview with Meijer (2014) and Blom (2014). However, because the interviews were semi-structured it is impossible to say whether these goals are not also a part of the project. The data collection methodology does allow for elaboration on the project goals associated with different types of UA, but they cannot be excluded from the framework because they have not always been addressed explicitly during the interview by the researcher. Therefore the fact that these goals that were not mentioned during the interview are not considered as sufficient evidence for falsification and they will remain in the theoretical framework after it has been revised.

Open space outdoor commercial farming: Uit je Eigen Stad, De Tuinbutler, Food for Good, De Koningshof

Of these four cases the Koningshof is the only one which was not identified by its project leader as any of the types mentioned in the original framework (Bink, Interview, 2014). Instead the set of characteristics associated with the type "Open space outdoor commercial farming" has been chosen as a benchmark for analysis by the researcher to verify whether the suggestion of Bink for the addition of a new type of UA "Open space outdoor recreational farming" is justified.

Kind of urban agricultural system	Physical properties of the UA system**	Social and actor (farmer) properties	Production properties	Potential Sustainability effects:
Open space outdoor commercial farming **(Based on Uit Je Eigen Stad)**	- Size: 19880 m2 total - NCE and CE - Outdoor and Indoor - Sunlight dependent - Soil and non-soil based - Capital intensive	Goal: Income generation and employment, Development and livability of spaces. Reconnect consumers and producers of food Reconnect rural and urban areas Land ownership and tenure: private. Labor: paid, voluntary, interns Education/skills: yes	Scale of production: Production on a commercial scale Production of food for human consumption/ agro-industrial products. marketing/trading of food for human consumption Processing of food for consumption at a restaurant	Economical Spatial Food System
Open space outdoor commercial farming **(Based on De Tuinbutler)**	- Size:4 hectares - NCE - Outdoor - Sunlight dependent - Soil based - Non-capital intensive	Goal: Income generation/ employment Creating more sustainable food system Attract clients from al layers of society Land ownership and tenure: private. Labor: paid, voluntary, interns Education/skills: yes	Scale of production: Production on a commercial scale Production of food for human consumption/ agro-industrial products. marketing/trading of food for human consumption	Economical Social
Open space outdoor	- Size:1000m2 - NCE	Goal: Income generation/ employment. Education and awareness raising	Scale of production: Production on a	Economical Social

***commercial farming* (Based on Food for Good)**	- Outdoor - Sunlight dependent - Soil based - Non-capital intensive	Social cohesion and health Community Building Land ownership and tenure: public Labor: paid, voluntary Education/skills: yes	commercial scale Production of food for human consumption/ agro-industrial products. marketing/trading of food for human consumption	
***Open space outdoor commercial farming* (Based on De Koningshof)**	- Size: 768 m2 (2 hectares in total) - NCE - Outdoor - Sunlight dependent - Soil based - Non-capital intensive	Goal: Income generation/ employment, Development and livability of spaces, Education and awareness raising Creating more sustainable food system Recreation, Social cohesion and health Land ownership and tenure: private. Labor: paid, voluntary, Education/skills: yes	Scale of production: Production for sustenance with possible surpluses Production of food for human consumption/ agro-industrial products. . marketing/trading of food for human consumption	Social

Table 4.5: Analysis of the project characteristics of Uit Je Eigen Stad, De Tuinbutler, Food for Good and De Koningshof

Classification of the cases

Based on the results presented in table 4.5 it would seem that the project characteristics of De Koningshof do indeed merit the addition of a new type of UA to the original typology: although the size of the project is similar to the other cases within the "Open space outdoor commercial farming" category, the project does not include any paid labor, nor does Bink (Interview, 2014) state that the generation of income or provision of employment is a goal of the project; the scale and intensity of production are a further confirmation of these statements. Economic impacts are not mentioned explicitly by Bink either. The project runs on volunteer labor and springs from recreational and educational goals rather than commercial ones; marketing and sales activities that do take place are small and since the project is officially registered as a foundation all revenues earned through these activities are used to pay for inputs required for the production process (Bink, Interview, 2014). Therefore the project is not classified as a commercial type of UA but rather as "Open space outdoor recreational farming", and this type will be added to the original typology.

Of the other cases in the table, the characteristics of Uit Je Eigen Stad are least in line with the theoretical expectations. Most of these deviations are caused by the fact that the project incorporates several types of UA at their location at once. Additional to soil-based commercial agriculture (the largest share of its activities in terms of surface) the project also includes an aquaponics system and an 874 m2 greenhouse (Gerritsen, e-mail, 2014). If Uit Je Eigen Stad is treated as *both* "open space outdoor commercial farming" *and* "Commercial farming in an indoor controlled environment" *and* "Commercial farming in an outdoor controlled environment", than all of its physical characteristics would fit the theoretical expectations again. Because soil based commercial agriculture is the largest activity at the location of Uit Je Eigen Stad the project will remain classified as "open space outdoor commercial farming". The deviation of the projects characteristics from theoretical expectations regarding the characteristics of this type of UA, is explained by the fact that several other types of UA are incorporated in the project as well. Therefore this classification will have no consequences for the revision of the physical characteristics of this type of UA as stated in the original typology.

The physical characteristics of Food for Good and De Tuinbutler are in line with those listed in table 2.1 originally, except for the fact that their production systems are non-capital intensive. This is not an indication of a misclassification by the project leaders: both Heiteman (Interview, 2014) and

Van Asperen (Interview, 2014) indicate that they do feel that their projects should be commercially viable and that they themselves as well as others involved in the projects derive income from them. In their case the lower capital intensity can be explained by the business model which they use to achieve the goal of an economically independent or even commercial business. In the case of Heitemans Food for Good project the business model is based on volunteer laborers and the provision of learning and working experience for people 'with a distance to the labor market' (e.g. those who are long-term unemployed or have a learning disability). These people as well as local inhabitants of the neighborhood provide the voluntary labor required for the production while Heiteman, who earns a part-time income for her work, manages the project and coordinates and coaches the volunteer laborers where necessary (Heiteman, Interview, 2014). The fact that a commercial project is located on public ground and even receives financial support from the local government can also be explained by this broader business model and the social impacts it has for both individuals working there and the surrounding neighborhood. Van Asperen (Interview, 2014) also indicates that his business model in part relies on voluntary laborers who have a 'distance to the labor market', in one way or another. Aside from that a large part of his business case is based on renting out land to people who will, at least partially, do the work required themselves (see section 4.1). Thus his terrain is split up into many smaller plots and again, most of the work is done manually. Because the deviations from the theoretical framework in terms of capital intensity, ownership of the location and additional project goals can be explained by a broad business case in which the generation of income and provision of employment is combined with broader societal goals and impacts, Food for Good and De Tuinbutler are classified as "open space outdoor commercial farming".

Concluding remarks

The three projects that are classified as "open space outdoor commercial farming", all have a much broader set of policy goals than those listed in the original typology, and this partially explains their reliance on unpaid labor rather than capital goods, at least in the case of Food for Good and De Tuinbutler. In accordance with the empirical results, the assumed set of potential project goals, the expectations regarding the use of machines and different sources of labor during the production process and the potential sustainability impacts of these projects will be broadened in the revised typology. The project characteristics of food for good show that these broader business cases can lead to a situation in which commercial UA takes place on publicly owned land and therefore this possibility will also be included in the new framework as well.

Indoor Controlled environment: Growndowntown, Meat the Mushroom, Rotterzwam

The three projects for which the characteristics associated with "Commercial farming in an indoor controlled environment" are Growndowntown Amsterdam, Meat the Mushroom and Rotterzwam. The empirical data gathered on these projects is presented in the table below:

Kind of urban agricultural system	Physical properties of the UA system**	Social and actor (farmer) properties	Production properties	Potential Sustainability effects:
Commercial farming in an indoor controlled environment (Based Growndowntown, Amsterdam)	- Size: 2500 m2 - NCE and CE - Indoor and outdoor - Partially sunlight dependent - Both non-soil and soil based - Capital intensive	Goal: Income generation and employment, Education and awareness raising, Innovation research and development, Showcase or billboard function, Marketing Land ownership and tenure: private. Labor: paid, voluntary, interns Education/skills: yes	Production on a commercial scale Production of food for human consumption marketing/trading of food for human consumption Processing of food for consumption at a restaurant.	Economical Food System
Commercial farming in an indoor controlled environment (Based on Meat the Mushroom)	- Size: 36/144 m2 - CE - Indoor - Not sunlight dependent - Non-soil based - Capital intensive	Goal: Income generation/ employment, Innovation, research and development, Creating more sustainable food system, Education and awareness raising, Showcase or billboard function Land ownership and tenure: private. Labor: paid, interns Education/skills: yes	Production on a commercial scale Production of food for human consumption Marketing/trading of food for human consumption.	Economical Ecological Social Food System
Commercial farming in an indoor controlled environment (Based on Rotterzwam)	- Size: NA - CE - Indoor - Not sunlight dependent - Non-soil based - Capital intensive	Goal: Income generation /employment, Education and awareness raising Creating more sustainable food system Land ownership and tenure: private. Labor: paid, voluntary, interns Education/skills: no	Production on a commercial scale Production of food for human consumption Marketing/trading of food for human consumption.	Economical Ecological Social Spatial Food System

Table 4.6: Analysis of the project characteristics of Growndowntown Amsterdam, Meat the Mushroom and Rotterzwam

Classification of the cases

It is immediately apparent from table 4.6 that, although the empirical data on Growndowntown Amsterdam are compared to those that the theoretical framework associates with commercial farming in an indoor controlled environment, the concept of the project is much broader than this type of UA alone. When asked to classify the project as one of the types listed in the original framework, Van Traa (Interview, 2014) replied that this was impossible, as long as he could only choose one type: *"actually they are all incorporated in the larger plan. There is high-tech indoor growing with LED lights, community-garden like locations outside, well, there is a greenhouse, a roof garden. What type of UA would that be then?"* The notion that multiple types of UA are incorporated within the concept for the project is confirmed by the empirical evidence with regard to the physical characteristics and the goals of the project. Furthermore, because there is no clear empirical evidence of dominance of any UA type within the project, it is regarded as a 'mixed concept' and therefore not classifiable. Because of this the empirical data is not used to change the expectations

listed in the theoretical framework with regard to "Commercial farming in an indoor controlled environment" or any other single project type with regard to the physical project characteristics.

The empirical data gathered on Meat the Mushroom matches all of the expectations listed in the original typology and can therefore be classified as a "Commercial farming in an indoor controlled environment" type project. Rotterzwam is also classified as this type of project. Some reservations with regard to this classification should be made explicit. Both Cox (Interview, 2014) and Hassink (Interview, 2014) indicate that the scale at which production is taking place within both projects at the time of writing is relatively small when compared to conventional large scale agriculture. Hassink (Interview, 2014) states that professional growers easily reach a production of 5000 kg a week, and Cox is thinking in similar magnitudes when he states:

"You should remember the growing of mushrooms usually takes place on a scale much larger than that which we are doing here. In the conventional agrarian sector a farm usually produces around 10.000 kilograms of mushrooms a week, while we hope to eventually reach a production of 10.000 kilograms annually. Well, not literally, but that's the order of magnitude which you should think about." (Cox, Interview, 2014)

This is not to say that the scale of production will remain as small as mentioned in table 4.6. During the interview Cox states that although the capacity for production is currently limited due to imperfections in the production process, the learning curve is steep in this regard and demand can't be met at the moment. Hassink (Interview, 2014) indicated that he could produce up to 1200 kg of mushrooms a week at his current facility and also that the expansion of the modularly designed system he used would be relatively straightforward. In his case the demand for produce rather than the capacity of the UA system limits the scale of production. Thus there are indications that the scale and intensity of production will increase.

Aside from the scale and intensity of production which were just discussed, the one deviation from the theoretical framework in this case is the fact that neither the project leaders nor other workers involved in the project had extensive skills when they started the project. This is not to say that they had no relevant experience whatsoever of course with regard to running a project. Siemen Cox indicates that his partner did have a lot of experience as an independent entrepreneur, which is of course also an essential part of running a project. Nevertheless, although one might expect that a skillset or some experience would be necessary and therefore present when an actor starts an UA project inside an unconventional space such as a swimming pools former dressing rooms, the theoretical assumption that such an education is always present with such types of urban agriculture, must be rejected on the basis of the empirical evidence.

Concluding remarks

The empirical data collected with regard to Rotterzwam and Meat the Mushroom largely confirmed the characteristics listed in the theoretical framework and therefore allowed these projects to be classified as "Commercial farming in an indoor controlled environment". However, although the scale and intensity of production are well beyond production properties that would be associated with sustenance and occasional surpluses, they are much smaller than one might expect of a commercial mushroom grower. The project goals mentioned by Hassink (Interview, 2014) and Cox (Interview, 2014) can provide a possible explanation for this and show that this type of UA is about more than the generation of income alone. Cox explicitly states this when he says:

"We are a commercial business, but our goal is certainly not profit maximization. We do want to eventually make a living from this, but that is something else. In that sense the added value of the company can be found much more in the vision based on the closing of cycles." (Cox, Interview, 2014)

Hassink (Interview, 2014) expressed similar sentiments when discussing the goals of the Meat the Mushroom projects, indicating that the location was meant for the production and sales of

mushrooms, but also for introducing new varieties of mushrooms to the general public and demonstrating the way in which urban or industrial organic waste flows could be used to create new protein rich meat replacers based on the growth of fungi. Both projects show that, as with the previous "open space outdoor commercial farming" projects, the connotation of a 'commercial' project must often be interpreted differently in the case of urban agriculture since the project leaders and farmers engaged in its practice often have a must broader set of goals they try to achieve with a project than the generation of income or the provision of employment alone.

Commercial Rooftop Farming: De Schilde

The only case included in the research belonging to the type "Commercial rooftop farming" was De Schilde. The project is still in development at the moment of writing (Durno, Interview, 2014). Its characteristics are listed at in the table below:

Kind of urban agricultural system	Physical properties of the UA system**	Social and actor (farmer) properties	Production properties	Potential Sustainability effects:
Commercial rooftop farming(based on De Schilde)	- Size: 1200m2 - CE - Indoor - Sunlight dependent - Non-soil based - Capital intensive	Goal: Income generation/ employment, Showcase or billboard function Land ownership and tenure: private. Labor: paid, voluntary, interns Education/skills: yes	Production on a commercial scale Production of food for human consumption Marketing/trading of food for human consumption	Ecological. Economical Spatial Food System

Table 4.7:Analysis of the project characteristics of De Schilde

Classification of the case

As can be seen in table 4.7 the empirical data collected on the De Schilde project does not contradict the characteristics as suggested by the original framework. Therefore the project is classified as a "Commercial rooftop farm", as suggested by Durno (E-mail, 2014). This can be done without any reservations since both the scale and intensity of the production projected to be achieved at De Schilde (40 tons of mixed vegetables and 12 tons of fish; Durno, E-mail, 2014) and the statements of Durno regarding the main goals of the project make it clear that the project is indeed a commercial endeavor:

"We need to and we want to have a commercially viable business case for the project because we really want to look eye level with the Westland growers." [..] "We have to be able to get the farm to stand on its own two feet, and to be able to offer an interesting investment proposition." (Durno, Interview, 2014)

Concluding remarks:

Although the empirical data gathered on the De Schilde project does not contradict any characteristics listed in the original typology, it does complement them. Although the De Schilde project can definitely be classified as commercial, this does not mean that the main goal of the project is the generation of income through the sales of produce. As Durno puts it: *"we sell farms not tomatoes"*. The business case of the Urban Farmers, the company behind the De Schilde project is built on the sales of farming systems, and De Schilde is in fact a huge demonstration project of which the main goal is to prove that the concept and systems developed by Urban Farmers are a commercially interesting investment. The farm at the Schilde is used to create a market for the produce of these systems and show their potential to the Westland growers, who can then buy similar systems from Urban Farmers or hire the company to have their own systems adapted (Durno, Interview, 2014). Thus the creation of a commercially viable production system and business case is a means to an end rather than a goal in itself.

Non-Commercial Rooftop Farming: De DakAkker

The last case included in the research, The DakAkker project, was classified by its project leaders as a non-commercial rooftop farm (Bauman, Interview, 2014; Hartman, Interview, 2014). The data gathered on the project is presented in table 4.8, below:

Kind of urban agricultural system	Physical properties of the UA system**	Social and actor (farmer) properties	Production properties	Potential Sustainability effects:
Non-Commercial rooftop farming (Based on DakAkker)	- Size: 700m2 - NCE - Outdoor - Sunlight dependent - Non-Soil based - Non Capital intensive	Goal: food provision, recreation, Development and livability of spaces, Education and awareness raising, Creating more sustainable food system, Showcase or billboard function Social cohesion and health Tenure: private Labor: voluntary, paid Education/skills: no	Production on a commercial scale Production of food for human consumption Marketing/trading of food for human consumption	Economical Ecological Social Spatial Food System

Table 4.8: Analysis of the project characteristics of the DakAkker

Classification of the case

The DakAkker project is listed as a "non-commercial rooftop" project because the generation of income and provision of employment is not stated as the main goal of the project by either Bauman or Hartman. Both Bauman (Interview, 2014) and Hartman (Interview, 2014) state that the main goal of the project is to provide a real life example of how urban agriculture be used to achieve a variety of goals ranging from the (re)development of temporarily unused urban areas through placemaking and community development, to stimulating biodiversity in an urban environment. This broader set of goals is described by Hartman as follows:

"It is a showcase project. A project which provides an example of how one can use the potential of flat roofs. How can you get the process of producing food back into the city? So shorten the production chains of food, less food-miles. So, how can you introduce sustainability directly on top of a roof. Aside from that, the added value is.. Well: we've added a place to the are here. So, like I said before: we want to make it a publicly accessibly place. As much as possible. This has become a place where people come to visit. Volunteers every Friday morning, there are days when the site is open to the general public, people who work at the office below visit the rooftop during breaks. So it is also an addition of place." (Hartman, Interview, 2014)

Both Hartman and Bauman explicitly state that the project is designed to achieve these goals and not to produce food as efficiently as possible. In fact the kind of production that takes place at the roof garden is a result of considerations for the abovementioned volunteers: Bauman (Interview, 2014) explicitly states that although it would be more efficient to sow one kind of crops based on profit margins, this is not done because this would make the work unappealing for volunteers and also make the roof a less appealing place, visually.

The inclusion of paid labor in a non-commercial project may seem more problematic, but although both Bauman and Hartman are indeed paid for their work at the DakAkker, they also indicate that this payment is not directly derived from the project itself and that the project does not (and does not need to) break-even in terms of costs and revenues at the moment of writing. Bauman (Interview, 2014) receives his salary for activities related to the Rotterdam Environmental Centre which are much broader than those going on at the DakAkker alone, and Hartman (Interview, 2014) works for the architecture firm ZUS which does not derive any revenues from the DakAkker directly, although Hartman does state that the project is valuable for the company's image and marketing, as well as indirectly stimulating the renting out of office spaces in the Schieblok building, from which

ZUS does derive revenues. For the abovementioned reasons, the project is classified as a "non-commercial rooftop" project.

Concluding remarks

The classification of the DakAkker project as a non-commercial rooftop farm means that insofar as the empirical data gathered on the project differ from the characteristics linked to this type of UA in the original typology, these will be adapted. This means that, as with Rotterzwam, the assumption that professional skills or a specific education is always present in projects where farming occurs in unconventional places is not maintained. Again this is not to say that such skills are completely absent: Bauman indicated that he had a lot of personal practical experience as a gardener and that a professional gardener had provided support through sharing knowledge and giving advice occasionally, especially at the start of the project (Bauman, E-mail, 2014).

However, the same ambiguity regarding the connotation of the term 'commercial' to a project that was discussed earlier applies to this case as well. Although the goals and production properties of the DakAkker place the project firmly in the category of a non-commercial rooftop farm, both Bauman (Interview, 2014) and Hartman, Interview, 2014) indicate that a broader business model is explored upon the basis of which an attempt to break even and provide an income for one full-time employee are being explored:

"At the moment it is a non-commercial roof garden. But we are looking at possibilities to create a business model which would allow one person to make a living from the garden. But they should really be a centipede so to say. You should be able to provide education, be a farmer, and be able to sell your produce, host tours.. Well if you can do all that than it might be possible. (Bauman, Interview, 2014)

A revised typology for urban agriculture in The Netherlands

After (1) reviewing the empirical data in relation to the existence and relevance of the different urban agriculture types mentioned in the first column of table 2.1 and 2.2 evaluating all four of the categories through which these types have been differentiated from each other in the table based on the 10 case studies that have been conducted, the typology can be adapted based on the results of the empirical research. The new typology is presented in table 4.9, below. Those types of UA which have not been included in the empirical research and have not changed in any way based on the empirical data gathered during the research are not included in the table although they do remain a part of the typology based on the general review discussed at the start of this section These types are: *Backyard urban farming, Guerilla gardening, edible landscape movement, Non-Commercial farming in an indoor controlled environment, Commercial farming in an outdoor controlled environment Non-Commercial farming in an outdoor controlled environment.*

Kind of urban agricultural system	Physical properties of the UA system	Social and actor (farmer) properties	Production properties	Potential Sustainability effects:
School / institutional gardens (based on Eetbaar Ondiep)	- Size: 100/ 150 m2 - NCE - Outdoor - Sunlight dependent - Soil based - Non Capital intensive	Goal: food provision, education, recreation, community building. Land ownership and tenure: private Labor: voluntary Education/skills: no	Scale of production: Production for sustenance with possible surpluses Production of food for humans Inputs and outputs: local and non-local scale	Social Food system
Community gardening (Based on Eetbaar Ondiep and Panderplein)	- Size: 100/ 150 m2 or 0,5 to 1 m2 per person - NCE - Outdoor - Sunlight	Goal: food provision, education/recreation, community building, increasing the livability of public spaces Land ownership and tenure: private, public or semi-public.	Scale of production: Production for sustenance with possible surpluses Production of food for	Social Food system

	dependent - Soil based - Non-Capital intensive	Labor: voluntary Education/skills: no	humans Inputs and outputs: local and non-local scale	
Open space outdoor commercial farming (Based on Uit Je Eigen Stad, De Tuinbutler and Food for Good)	- Between 1000 to 40.000 m2 - NCE - Outdoor - Sunlight dependent - Soil based - Can be capital intensive or non- capital intensive	Goal: Income generation/ employment, Development and livability of spaces. Reconnect consumers and producers of food, Reconnect rural and urban areas, Creating more sustainable food system, Attract clients from al layers of society, Education and awareness raising Social cohesion and health Community Building Land ownership and tenure: private or public Labor: paid, voluntary, interns Education/skills: yes	Scale of production: Production on a commercial scale Production of food for human consumption marketing/trading of food for human consumption Processing of food for consumption at the location of the project itself Inputs and outputs: usually non-local scale	Economical Social Spatial Food System
Open space outdoor recreational farming (Based on De Koningshof)	- Size: 768 m2 (2 hectares in total) - NCE - Outdoor - Sunlight dependent - Soil based - Non-capital intensive	Goal: Development and livability of spaces, Education and awareness raising Creating more sustainable food system Recreation, Social cohesion and health Land ownership and tenure: private. Labor: voluntary, Education/skills: yes	Scale of production: Production for sustenance with possible surpluses Production of food for human consumption/ . Marketing/trading of food for human consumption	Social
Non-Commercial rooftop farming (Based on DakAkker)	- Size: 700m2 - NCE - Outdoor - Sunlight dependent - Soil based or non-soil based - Non Capital intensive	Goal: food provision, recreation, Development and livability of spaces, Education and awareness raising, Creating more sustainable food system, Showcase or billboard function Social cohesion and health Land ownership and tenure: private Labor: voluntary, or paid Education/skills: yes or no	Scale of Production: Production for sustenance with possible surpluses or Production on a commercial scale Production of food for human consumption Marketing/trading of food for human consumption Inputs and outputs: usually local scale	Economical Ecological Social Spatial Food System
Commercial rooftop farming(based on De Schilde)	- Size: 1200m2 - CE - Indoor - Sunlight dependent - Both non-soil and soil based - Capital intensive	Goal: Income generation/ employment, Showcase or billboard function Land ownership and tenure: private. Labor: paid, voluntary, interns Education/skills: yes	Scale of Production: Production on a commercial scale Production of food for human consumption Marketing/trading of food for human consumption	Economical Ecological Spatial Food System
Commercial farming in an indoor controlled environment (Based on Meat the Mushroom, and Rotterzwam)	- Size: 36/144 m2 - CE - Indoor - Not sunlight dependent - Soil based or not soil based - Capital intensive	Goal: Income generation/ employment, Innovation, research and development, Creating more sustainable food system, Education and awareness raising, Showcase or billboard function Land ownership and tenure: private. Labor: paid, voluntary, interns	Scale of production 5 to 100 kg a week Production of food for human consumption Marketing/trading of food for human consumption.	Economical Ecological Social Spatial Food System

			Education/skills: yes or no		
Volkstuinen	- Size: ? - NCE - Outdoor - Sunlight dependent* - Soil based - Non Capital intensive		Goal: food provision, education/recreation, Land ownership and tenure: semi-public Labor: voluntary Education/skills: no	Scale of production: Production for sustenance with possible surpluses Production of food for humans or ornamental crops Inputs and outputs: local and non-local scale	Social

Table 4.9: A revised typology of urban agricultural systems and their most important characteristics

Concluding remarks:

As discussed earlier the UA type "Volkstuinen" has been added to the revised typology. The assumptions regarding this type of UA are based upon the definition of this type of UA provided by the Bond van Volkstuinders (see page 48), and additional information on their website (Bond van Volkstuinders, 2014). These assumptions have not been the subject of any empirical research. With the classification of the Koningshof project as "Open space outdoor recreational farming" a second new type of UA has been added to the original typology, of which these characteristics are based on empirical research. Although Food for Good was initially also seen as a type of UA which was not included in the typology, there was no need to add a new type of UA to the table on the basis of this case: a broader set of project goals other than the generation of income were found to be present in the case of Uit Je Eigen Stad and De Tuinbutler as well, necessitating a broadening of the social and actor characteristics associated with "Open space outdoor commercial farming" rather than the addition of a new type of UA.

In fact the biggest change with regard to the social and actor characteristics in the typology is the fact that most types of UA have a much broader set of goals that expected on the basis of the theoretical framework, including the 'commercial' types of UA. In fact for all projects aside from De Schilde, the generation of income and employment is a means to an end rather than a goal on itself. On the other hand some of the UA types identified as 'non-commercial' do include production processes such as the marketing and trading of food for human consumption, where this was not expected in the theoretical framework. The broader set of project goals and production processes of the different types of UA are also reflected by the fact that all types of UA except for "Open space outdoor recreational farming" have a broader set of sustainability impact that is attributed to them by project leaders and urban farmers, than would be expected on the basis of the theoretical framework. In several cases (e.g. Food for Good, Eetbaar Ondiep) this broader set of goals possibly explains why the land ownership and tenure arrangements encountered in reality deviate from those in the theoretical framework but the analysis that was just presented does not provide prove for such a causal mechanism.

Lastly, some additional information on the physical characteristics listed in the original typology has been added to table (4.9), but none of the original characteristics could be removed based on the empirical research.

4.2.2. A typology for locational suitability for different types of urban agriculture within the Netherlands

In this section table 2.4 of chapter 2, on the locational characteristics deemed important for the development of urban agriculture, is evaluated. This is done in two steps: first the table is evaluated on a general basis, which means that empirical evidence is used to evaluate the relative importance of the locational characteristics mentioned in table 2.4, without relating them to a specific type of urban agriculture. The results of this evaluation are presented in table 4.9, below and used to evaluate the validity of table 2.4 and where necessary adapt it. The results of these adaptations are shown in table 4.10. After these results have been discussed, the locational characteristics are linked to the 7 types of UA included in the empirical research, in order to set a first step towards answering the central research question and test the usefulness of the framework as an analytical tool.

A general evaluation of the typology locational characteristics

Urban 'layer' in which the locational property is located	Locational characteristic deemed of importance for UA	Seen as prerequisite	Seen as an advantage or disadvantage	Mentioned as being a location characteristic
Physical-Spatial	Amount of flat rooftops available	X	x	X
	Amount of non-sealed land available	X	x	X
	Amount of space available inside buildings	X	x	X
	Availability of sunlight	X	x	
	Availability of storage or other indoor spaces		x	X
	Slope of the land on the location		X	X
	Soil quality at the location	X	X	X
	Strength of the flat rooftops available	X	x	
	Microclimate and wildlife at location	X	X	X
Environmental-Technical	Access to drinking water and electricity at the location	X	x	
	Availability of heat outputs from industries or other adjacent buildings and households			X
	Availability of wastewater flows for irrigation			X
	Availability of organic wastes for composting or substrate	X	X	X
	Availability of rainwater for irrigation		x	
	Existing Infrastructure for transport	X	x	
Socio-Cultural	Accessible by (depending on distance): public transport / walking / bicycle	X	X	X
	Accessibility of the site and safety concerns	X	X	X
	Active local community or actors	X	X	
	Availability and reachability of markets or restaurants as sales channels	X	X	
	Broader characteristics of surrounding neighborhoods	X	X	X
	Competition from other land uses		X	
	Demographic and socioeconomic characteristics of the area		X	X
	Likely development future of the location		X	
	Price of the land or building		X	X
	Time for which the location is potentially available	X	X	X
	Regional context and reputation of a city		X	
	View from or visibility of the location	X	X	
Laws and regulations	Juridical status of the locations and spatial legislation applicable	X	X	
	Ownership and tenure modality of a space at a certain location	X	X	x

Table 4.10: the locational characteristics mentioned by interviewees during semi-structured interviews

The relative importance of the locational characteristics mentioned in the original framework

From the table we can see that all of the locational factors mentioned in the original theoretical framework have been to some degree verified by the empirical research. Nevertheless there are large differences in the extent to which these locational characteristics are supported by the empirical evidence. Those locational factors that have been mentioned as a prerequisite for urban agriculture are arguably the most important ones for the framework, followed by those characteristics mentioned as (dis)advantageous by respondents.

Of the locational characteristics described by respondents as a prerequisite for the development of UA, the ones mentioned by the largest number of individual interviewees are (1) Soil quality at the location (2) the amount of non-sealed land available (3) juridical status of the locations and spatial legislation applicable and (4) the time for which the location is potentially available. As can be seen in the table, all but two characteristics are considered to be an advantage or disadvantage with regard to the development of urban agriculture. It would require too much space to discuss them each individually. Instead both the locational prerequisites and (dis)advantageous characteristics will be discussed in more detail later, when they are directly related to the 10 selected projects. For now it is important to know that the fact that all of the locational characteristics are identified as a prerequisite or (dis)advantage for the development of UA is considered to be empirical prove of their relevance. Therefore they will remain a part of the revised framework presented in table 4.11.

The two locational factors that are most weakly supported by the results are (1) Availability of heat outputs from industries or other adjacent buildings and households and (2) Availability of wastewater flows for irrigation. Both are mentioned by Jan-Willem van der Schans (Interview, 2014) as potentially being of relevance for the development of urban agriculture, but not tied to a specific project or development in the near future. The example provided by Jan-Willem Van der Schans (2014) of the way in which urban agriculture could make use of the availability of residual heat from other urban land uses exemplifies his way of thinking:

"There is supposed to be a vineyard on the Maasvlakte, in between the oil silos. Because they radiate heat and provide a buffer against the cold. Like the snake walls people used to have on large estates in the Netherlands. They used walls which would curl, an s shaped pattern, and in all of the niches of these walls you could then grow grapes because of the radiation. Well you can to that on a very large scale as well!" (Jan-Willem Van der Schans, Interview, 2014)

This kind of reasoning is in line with the literature on circular urban metabolisms discussed briefly in chapter 2. Aside from make passive use of the waste flows that are emitted in the urban environment, Jan-Willem Van der Schans (2014) also indicates that an active creation of synergies between locations in terms of inputs and outputs could potentially be sought. In fact he states that these kinds of synergies are already in place: CO2 emissions from the harbor of Rotterdam are transported to the Westland greenhouses to stimulate crop growth. Jan-Willem Van der Schans (Interview, 2014) indicates that the potential for these kinds of relationships is also there in the case of wastewater flows:

"Well yes and the thought to go and see whether it is possible to get phosphates from the city to the horticulterers in the Westland greenhouses basically stems from the same kind of reasoning. So slowly you can see.. But that is still on the very abstract level of agenda setting, not in the sense of 'where the funds are and what should the trajectory of the pipeline be?' But people are thinking about these kinds of issues now." (Jan-Willem Van der Schans, Interview, 2014)

Considering that the framework should contain all characteristics that can potentially be of importance for the development of urban agriculture and not just the once that are at the moment already being experienced as a prerequisite or (dis)advantage, I will leave both of the variables in the framework despite the weak and indirect evidence for their relevance at the moment.

Additions and changes to the original framework

Aside from an evaluation of the locational characteristics already present in table 2.4, the data also shows some locational characteristics that have not been mentioned in the literature reviewed when table 2.4 was constructed. These are:

- Access to drinking water and electricity at the location
- Active local community or actors
- Availability of storage or other indoor spaces
- Availability and reachability of markets or restaurants as sales channels
- Broader characteristics of surrounding neighborhoods
- Demographic and socioeconomic characteristics of the area
- Microclimate and wildlife at location
- Price of the land or building
- Regional context and reputation of a city
- View from or visibility of the location

Three of these locational characteristics are changes within the original framework rather than additions to it. The categories “Access to drinking water at the location” and “Availability of (renewable) electricity” have been merged during the empirical research because they were usually mentioned by actors as a combination of utilities to which access was required. The characteristic “Demographic and socioeconomic characteristics of the area” is a broadening of “Inhabitants from adjacent neighborhoods with sufficient income to become a sales channel”, because the demographic characteristics of neighborhood also were important with regard to the availability of volunteers and not just related to a possible client base. Lastly the name of the characteristic “Availability of markets or restaurants as sales channels” has been changed to “Availability and reachability of markets or restaurants as sales channels” to reflect the fact that some initiatives (e.g. Rotterzwam, DakAkker) indicate that they require markets and sales channels to be close enough to enable the transport of produce to occur by bicycle or on foot (Cox, Interview, 2014; Bauman, Interview, 2014).

In addition to the characteristics of inhabitants not directly involved in the running of the project, the importance of an active local community to initiate and maintain UA activities of various types (especially communal gardens) is mentioned by both project leaders (Meijer, Interview, 2014; Blom, Interview, 2014) and policy makers (Deenstra, Interview, 2014). Some neighborhood characteristics that are not related to local inhabitants but that are of importance for the development of urban agriculture are captured in the category “Broader characteristics of surrounding neighborhoods”. These can be other local activities that can embed urban agriculture projects into the local economy and community (e.g. Hartman, Interview, 2014; Konijn, Interview, 2014), architectural features such as the presence of old warehouses which fit well with the business case of a project (De Leede, Interview, 2014) or the general identity and history of an area which can be connected to by projects located there (e.g. Bink, Interview, 2014; Konijn, Interview, 2014). Aside from the neighborhood or wider area in which a location is embedded the empirical evidence suggests that for some projects (e.g. De Schilde) the “Regional context and reputation of a city” are of importance. In the case of De Schilde this is mainly related to the connections between the Westland horticulture cluster and the city of The Hague:

"It will be our first facility there and it's got a strategic importance here because it also engages a large section of the agro-sector within the Netherlands and the wider Benelux Area, with Westland. So we can actually have an interface and a discussion with existing growers." (Durno, Interview, 2014)

The microclimate and wildlife at the location also turned out to be of importance (e.g. Bauman, Interview, 2014; Van Asperen, Interview, 2014) and were added as a separate category because the issues related to this theme were not fully capture in the "Availability of sunlight" and "Soil quality at the location node". These issues will be discussed in more detail in section 5.2.2 when the interrelationship between locational characteristics and the characteristics of different types of urban agriculture are elaborated upon.

Lastly some more basic characteristics of the locations such as the "Availability of storage or other indoor spaces", the "Price of the land or building" (Hartman, Interview, 2014; Van Asperen, Interview, 2014; De Jager, Interview, 2014) and the "View from or visibility of the location" (e.g. Bauman, Interview, 2014; Hassink, Interview, 2014; Durno, Interview, 2014) were mentioned as relevant locational characteristics. The price of a piece of land or real-estate of course reflects some of the other characteristics mentioned in the framework such as the competition of other land uses. Nevertheless, as we shall see in the next section on governance instruments, price is not influenced by the mechanism of a free market alone; specific regulations are in place to stimulate the development of urban agriculture. Thus price cannot be assumed to be fully represented in an indirect manner by other factors in the framework and must be added as an explicit locational characteristic. The importance of the view from and visibility of locations will, like microclimate and wildlife, be elucidated by examples tied to the Schilde and DakAkker below. However, before discussion the locational characteristics on a case by case basis, the general framework presented in table 2.4 will be adapted on the basis of the empirical evidence. The results of this revision are presented in table 4.11, below.

Urban 'layer' in which the locational property is located	Locational characteristic deemed of importance for UA
Physical-Spatial	Amount of flat rooftops available
	Amount of non-sealed land available
	Amount of space available inside buildings
	Availability of sunlight
	Availability of storage or other indoor spaces
	Slope of the land on the location
	Soil quality at the location
	Strength of the flat rooftops available
	Microclimate and wildlife at location
Environmental-Technical	Access to drinking water and electricity at the location
	Availability of heat outputs from industries or other adjacent buildings and households
	Availability of wastewater flows for irrigation
	Availability of organic wastes for composting or substrate
	Availability of rainwater for irrigation
	Existing Infrastructure for transport
Socio-Cultural	Accessible by (depending on distance): public transport / walking / bicycle
	Accessibility of the site and safety concerns
	Active local community or actors
	Availability of markets or restaurants as sales channels
	Broader characteristics of surrounding neighborhoods
	Competition from other land uses
	Demographic and socioeconomic characteristics of the area
	Inhabitants from adjacent neighborhoods with sufficient income to become a sales channel
	Likely development future of the location
	Price of the land or building
	Time for which the location is potentially available
	Regional context and reputation of a city
	View from or visibility of the location
Laws and regulations	Juridical status of the locations and spatial legislation applicable
	Ownership and tenure modality of a space at a certain location

Table 4.11: a general typology of locational characteristics of relevance for the development and governance of UA in a city.

Concluding remarks:
As was discussed earlier, no characteristics have been removed from the original table because there is reason to believe that even those that are not seen as being a hard prerequisite or (dis)advantage for the development of urban agriculture at the moment ("Availability of heat outputs from industries or other adjacent buildings and households" and "Availability of wastewater flows for irrigation") could become so in the near future. The synergies described by Jan-Willem Van der Schans (Interview, 2014) on a regional scale between the Rotterdam and the Westland greenhouse could in theory also be achieved on a local scale. Rotterzwam already proves this by using organic waste flows as an input for its production processes (Cox, Interview, 2014) and the aquaponics systems of Uit Je Eigen Stad and De Schilde show that wastewater flows can be used as a valuable input as well, albeit internally for the moment. (Durno, Interview, 2014; Gerritsen, 2014a)

The locational prerequisites for the development of different types of urban agriculture

When relating the locational characteristics from table 4.11 to the specific urban agriculture projects included in the research, we can start to see in what way the locational needs differ per type or urban agriculture. The most important locational characteristics, those seen as prerequisites for the development of the project in question, are listed in table 4.12.

UA project and project leader	Locational characteristics seen as prerequisites for the development of the project
School / institutional gardens (based on Eetbaar Ondiep)	Reachable by (depending on distance) public transport walking bicycle (5 min)
Community gardening (Based on Eetbaar Ondiep and Panderplein)	Accessibility and safety issues Active local community or actors Availability of sunlight Reachable by (depending on distance) public transport walking bicycle (5 min) Time for which a location is available (2 to 5 year minimum)
Open space outdoor commercial farming (Based on Uit Je Eigen Stad, De Tuinbutler and Food for Good)	Accessible by (depending on distance): public transport / walking / bicycle Access to drinking water and electricity at the location Amount of non-sealed land available (3000 m2 1 hectare and 2 hectare minimum) Availability of sunlight Broader characteristics of surrounding neighborhoods (former industrial are is a requirement for the business concept) Juridical status of the locations and spatial legislation applicable Microclimate and wildlife at location (no health risks) Ownership and tenure modality of a space at a certain location Price of the land or building (not much more than 1200) Soil quality at the location Time for which a location is available (3 to 10 year minimum)
Open space outdoor recreational farming (Based on De Koningshof)	None mentioned
Non-Commercial rooftop farming (Based on DakAkker)	Accessibility and safety issues Access to drinking water and electricity at the location Active local community or actors Availability and reachability of markets or restaurants as sales channels Strength of the flat rooftops available Soil quality at the location Time for which a location is available (1 or 2 years minimum)
Commercial rooftop farming(based on De Schilde)	Amount of flat rooftops available (1000m2 minimum) Strength of the flat rooftops available (around 1,5 tons per meter squared)
Commercial farming in an indoor controlled environment (Based on Meat the Mushroom, and Rotterzwam)	Amount of non-sealed land available (3 to 4 containers of around 40 m2) Amount of space available inside buildings Availability of organic wastes for composting or substrate Availability and reachability of markets or restaurants as sales channels Broader characteristics of surrounding neighborhoods Competition from other land uses (no compost centrals nearby) Price of the land or building (varies per location) Time for which the location is potentially available (3 years)
Growndowntown (unclassified)	Amount of non-sealed land available (1 hectare to min 2500 m2) Price of the land or building (not a multitude of 100.000 s) Reachable by (depending on distance) public transport walking bicycle (with PT) Time for which the location is potentially available (4 years or more) Visibility

Table 4.12: Locational characteristics of relevance for each of the urban agriculture projects included in the research

The four locational characteristics which were most often mentioned as a precondition by all actors combined (Soil quality at the location, the amount of non-sealed land available, the juridical status of the locations and spatial legislation applicable and the time for which the location is potentially available) are also indicated by many of the urban farmers that have been interviewed as an important precondition for the development of their projects. One or two of these are mentioned by each of the actors, with the exception of the Koningshof project in which case no preconditions are mentioned at all. In this analysis "the amount of space available inside buildings" and "the amount of flat rooftops available" have been treated as if being the same as "the amount of unsealed land available" because the function of each of these characteristic to the projects is the same).

However, the only type of UA for which all 4 of these locational characteristics are perceived as a prerequisite for the development of UA by the project leaders is "Open space outdoor commercial farming". And is this case the chances of each of the four locational characteristics being mentioned by a project leader are larger than with other types of UA, because of the fact that this category of UA includes the largest amount of individual cases, namely three. Indeed when the locational characteristics mentioned as a prerequisite for the development of UA are reviewed on a case to case basis, none of the individual project incorporates all four of them.

This is an unexpected result at first sight. One would expect that every project requires a certain predefined amount of space for a certain time in order to be able to develop a project and make the investment of time, money and effort worthwhile. Furthermore, all project that use soil as their growing medium require a certain quality of soil (at least it should not be polluted) to grow food which is fit for human consumption. And lastly: none of the projects is illegal so one would also expect zoning regulations and other permits related to the project to have to be in order. So why are these four kinds of characteristics not mentioned by all projects leader as locational prerequisites?

Urban farmers adapt to local circumstances

In part this is because of the attitude of the urban farmers and project leaders and their capacity to adapt to local circumstances. The Locational characteristics listed in the column "prerequisites" were mentioned by the urban farmers as being necessary for the development in its current form. However, many urban farmers also cautioned against a black and white approach in this regard: they felt that although these characteristics were important to the success of their projects and necessary to allow the development of the projects in their current form, they could have adapted to other locational characteristics had this been necessary. Hartman (Interview, 2014) for example explicitly states that urban agriculture is an adaptive practice which can take a variety of forms and sizes depending on the goal one wishes to achieve with it. Meijer (2014) shares this sentiment and feels that as an artist she usually sees a challenge in difficult or unusual locations rather than a real barrier. And even Huibert de Leede, who initially was very decisive when listing the preconditions under which the business case of Uit Je Eigen Stad was viable, later added:

"What I want to say about the provision of 'general laws', and looking for prerequisites: that is just not possible. It varies tremendously per location and also the list of demands is very different for different projects. Just think about the Tuinen van West area in Amsterdam: we would never have developed our project there, because it is too far away from the city. But that does not mean that someone else cannot come up with a viable business case at that location. It just does not fit our preconditions. The same is true for the prerequisite we have for a minimum of 1 hectare of space that should be available: that is not always necessary. We want to keep animals and keep fish. We really want a sizable production outside of the warehouses as well. But if you just want to start a trendy restaurant with a vegetable garden, than 3000 meters square may also be fine." (Huibert de Leede, Interview, 2014)

Thus the suitability of locations seems to important in the sense that there are characteristics which are advantageous or disadvantageous for particular urban agriculture types but the urban farmers themselves warn against any deterministic statements regarding the suitability of locations for a particular type of UA. Even the advantageous and disadvantageous are not always apparent from the start, as is illustrated by this quote from Siemen Cox, who states that the locational characteristics he now finds to be a major advantage did not actually fit within the initial plan he had when approaching the owner of the Tropicana.

"Well we really found out in hindsight to be honest. Like I said: we started out with a much broader plan than that which we have developed at the moment. We only realized that all of the characteristics that I just mentioned, such as sinks, having separate spaces, concrete floors, all of that) were actually very important and convenient." (Cox, Interview, 2014)

From these examples it can be concluded that even those locational characteristics labeled as a prerequisite are not a definitive barrier or precondition for the development of urban agriculture in all cases. To some degree urban farmers are capable of adapting the project characteristics, such as the amount of space a project requires or the mobility of the production system, to the locational characteristics in a particular place such as amount of space or unsealed land or the time for which a location is available (e.g. Hassink, Interview, 2014; Cox, Interview, 2014; Heiteman, Interview, 2014).

Local circumstances are adapted to fulfill project needs

A second reason for the 'lack' of prerequisites in the results of the interviews is that, where urban farmers are not able to adapt to the local circumstances, they are sometimes able to adapt the local circumstances to their needs. Soils conditions for example would be a clear requirement for the development of urban agriculture. However, they can be remediated in several ways. In fact this can be *achieved* by particular kinds of urban agriculture such as the growth of hemp or other plants not meant for human consumption (Meijer, Interview, 2014). Thus even physical locational characteristics such as soli quality are not static and even soils that are heavily polluted and for example contain heavy metals can in time be remediated (Khan et al, 2000) Of course this is not to say that such processes are an easy undertaking: urban farmers need to have the skills and knowledge and particularly patience for completing the process:

"With permaculture it is possible to grow certain types of vegetation which remediate and clean the soil, but that easily takes 5 to 7 years. So then I thought: do I want to do that to the people living here? Because that is what it comes down to really. You're not growing any vegetables then, but just remediating the soil. Well, this is a place which is used very intensively by people who live here. And tensions had already gone up during the project. So I chose not to do it, because I suspected that people would not really have the patience for it." (Meijer, Interview, 2014)

If remediation is not a viable option than actually bringing on a layer of new ground can be an option as has been the case with Uit Je Eigen Stad, Panderplein and several other projects (Gerritse, Interview, 2014; Meijer, Interview, 2014; Deenstra, Interview, 2014). Locations where such measures are not necessary are obviously much more suitable for the development of urban agriculture, in the sense that this would require fewer inputs and lower the costs of production. Nevertheless, the examples presented above show that both locational characteristics and project characteristics can be adapted by project leaders and urban farmers to some extent, which explains why the amount of land or space available at a location, the soil quality at a location or the time for which a location is available are not always a prerequisite for the development of a type of UA at that location. These issues will be discussed in more detail in section 4.3.1.

The juridical status of the locations and spatial legislation applicable to it

The juridical status of the locations and related spatial legislation applicable to it, such as the zoning status of a location, are only mentioned as prerequisite by the project leaders and urban farmers behind cases in the category "Open space outdoor commercial farming". This can have a number of explanations. First of all, exceptions can be made to the zoning status of a location by policy makers when they deem this appropriate (e.g. Deenstra, Interview, 2014; Van der Meij, interview, 2014) or the zoning status of an area can be interpreted in such a way that urban agriculture is allowed without changing the zoning status even if this does not fit perfectly (Konijn, Interview, 2014). The cases of De Schilde and DakAkker are examples of this: in both cases the building upon which they are located already had a commercial zoning-status. Although this does not literally include urban agriculture, the municipality treats the urban agriculture projects as a commercial land-use and therefore no change in the zoning status of the plot is required (Bauman, Interview, 2014; Koene, interview, 2014; De Jager, interview, 2014). Secondly, some project leaders select locations at which zoning is not an issue: Food for Good for example is located in a park and therefore the location already has an appropriate zoning status (Heiteman, Interview, 2014). In the case of Koningshof the zoning status of the land actually had remained the same since the time when the horticulture business that used to be located there originally was still in place (Bink, Interview, 2014). In such cases project leaders likely did not mention the juridical status of the locations and related spatial legislation such as zoning status because there was no problem with this in their experience. However: although farmers may not experience regulations as a barrier or problem in such cases, they do of course remain a prerequisite for the development of UA. There are situations in which policy makers and implementers will not allow the development of urban agriculture and will not feel that a temporary exception or somewhat flexible interpretation is possible.

All of the above shows that the results presented in table 4.12 are of limited value when they would be used in a deterministic sense to select possible locations for each project or a type of urban agriculture. Some of the prerequisites that are in fact in place, such as the zoning status of a location, are not perceived as such by project leaders because they are not a direct barrier to the particular project they are involved in. Other prerequisites can be dealt with by either adapting project characteristics or locational characteristics. This clearly shows that a prerequisite is in fact a dynamic and changeable suitability indication rather than a static determinant of what can or cannot be done at a certain location. Nevertheless such adaptations would definitely make a location much less *suitable* for a particular type of project and thus it can be said that these locational characteristics are the most important ones to take into account when trying to select the optimal location for a particular type of urban agriculture.

Locational advantages and disadvantages

Because the prerequisites are strong suitability criteria rather than actual prerequisites, it is important to also look at the locational characteristics that were mentioned by urban farmers as either advantageous or disadvantageous. After all, the difference between (dis)advantages and prerequisites may not be as large as one might think.

Therefore all references coming from project leaders coded as an advantageous locational characteristic and all references coded as disadvantageous locational characteristics have been counted. The three most mentioned locational advantages and disadvantages per case, were combined together with the three most mentioned (dis)advantages of other cases of the same type. The results are presented in table 4.13 below.

UA project and project leader	Locational characteristics seen as an advantage for the development of the project	Locational characteristics seen as a disadvantage for the development of the project
School / institutional gardens (based on Eetbaar Ondiep)	Access to drinking water and electricity at the location Availability of storage or other indoor spaces Availability of sunlight	Ownership and tenure modality of a space at a certain location Soil quality at the location
Community gardening (Based on Eetbaar Ondiep and Panderplein)	Accessibility of the site and safety concerns Access to drinking water and electricity at the location Active local community or actors Availability of storage or other indoor spaces Availability of sunlight Microclimate and wildlife at location	Broader characteristics of surrounding neighborhoods Soil quality at the location Ownership and tenure modality of a space at a certain location Soil quality at the location
Open space outdoor commercial farming (Based on Uit Je Eigen Stad, De Tuinbutler and Food for Good)	Amount of non-sealed land available Competition from other land uses Demographic and socioeconomic characteristics of the area Juridical status of the locations and spatial legislation applicable	Accessible by (depending on distance): public transport / walking / bicycle Availability of markets or restaurants as sales channels Demographic and socioeconomic characteristics of the area Microclimate and wildlife at location Soil quality at the location
Open space outdoor recreational farming (Based on De Koningshof)	Availability of markets or restaurants as sales channels Accessible by (depending on distance): public transport / walking / bicycle Juridical status of the locations and spatial legislation applicable	Amount of space available inside buildings Competition from other land uses
Non-Commercial rooftop farming (Based on DakAkker)	Accessible by (depending on distance): public transport / walking / bicycle Amount of flat rooftops available Availability of markets or restaurants as sales channels	Accessibility of the site and safety concerns Existing Infrastructure for transport Microclimate and wildlife at location
Commercial rooftop farming(based on De Schilde)	Availability of markets or restaurants as sales channels Competition from other land uses Regional context and reputation of a city	Amount of flat rooftops available Availability of markets or restaurants as sales channels
Commercial farming in an indoor controlled environment (Based on Meat the Mushroom, and Rotterzwam)	Accessible by (depending on distance): public transport / walking / bicycle Availability of markets or restaurants as sales channels Broader characteristics of surrounding neighborhoods Juridical status of the locations and spatial legislation applicable Price of the land or space View from or visibility of the location	Accessible by (depending on distance): public transport / walking / bicycle Ownership and tenure modality of a space at a certain location Time for which the location is potentially available View from or visibility of the location
Growndowntown (unclassified)	Accessible by (depending on distance): public transport / walking / bicycle Broader characteristics of surrounding neighborhoods Time for which the location is potentially available	Competition from other land uses

Table 4.13: Locational characteristics of relevance for each of the urban agriculture projects included in the research

The perfect location according to farmers and project leaders

The locational (dis)advantages mentioned by project leaders and urban farmers for each of the types of UA can now be combined with the locational prerequisites listed earlier. This way a much clearer picture of which locational factors are important determinants in the suitability of a location for a certain type of project, arises.

Type of UA leader	Locational characteristics seen as prerequisites or (dis)advantages for the development of the type of UA
School / institutional gardens (based on Eetbaar Ondiep)	Access to drinking water and electricity at the location Availability of storage or other indoor spaces Availability of sunlight Ownership and tenure modality of a space at a certain location Reachable by (depending on distance) public transport walking bicycle (5 min) Soil quality at the location
Community gardening (Based on Eetbaar Ondiep and Panderplein)	Accessibility and safety issues Access to drinking water and electricity at the location Active local community or actors Availability of storage or other indoor spaces Availability of sunlight Broader characteristics of surrounding neighborhoods Microclimate and wildlife at location Ownership and tenure modality of a space at a certain location Reachable by bicycle (5 min) Soil quality at the location Time for which a location is available (2 to 5 year minimum)
Open space outdoor commercial farming (Based on Uit Je Eigen Stad, De Tuinbutler and Food for Good)	Accessible by (depending on distance): public transport / walking / bicycle Access to drinking water and electricity at the location Amount of non-sealed land available (3000 m2, 1, 2 hectare minimum) Availability of markets or restaurants as sales channels Availability of sunlight Broader characteristics of surrounding neighborhoods (former industrial are is a requirement for the business concept) Competition from other land uses Demographic and socioeconomic characteristics of the area Juridical status of the locations and spatial legislation applicable Microclimate and wildlife at location (no health risks) Ownership and tenure modality of a space at a certain location Price of the land or building (not much more than 1200) Soil quality at the location Time for which a location is available (3 to 10 year minimum)
Open space outdoor recreational farming (Based on De Koningshof)	Accessible by (depending on distance): public transport / walking / bicycle Amount of space available inside buildings Availability of markets or restaurants as sales channels Competition from other land uses Juridical status of the locations and spatial legislation applicable
Non-Commercial rooftop farming (Based on DakAkker)	Accessibility and safety issues Accessible by (depending on distance): public transport / walking / bicycle Amount of flat rooftops available Access to drinking water and electricity at the location Active local community or actors Availability and reachability of markets or restaurants as sales channels Existing Infrastructure for transport Microclimate and wildlife at location Strength of the flat rooftops available Soil quality at the location Time for which a location is available (1 or 2 years minimum)
Commercial rooftop farming(based on De Schilde)	Amount of flat rooftops available (1000m2 minimum) Availability of markets or restaurants as sales channels Competition from other land uses Regional context and reputation of a city Strength of the flat rooftops available (around 1,5 tons per meter squared)
Commercial farming in an indoor	Accessible by (depending on distance): public transport / walking / bicycle

controlled environment (Based on Meat the Mushroom, and Rotterzwam)	Amount of space available inside buildings Amount of non-sealed land available (3 to 4 containers of around 40 m2) Availability of organic wastes for composting or substrate Availability and reachability of markets or restaurants as sales channels Broader characteristics of surrounding neighborhoods Competition from other land uses (no compost centrals nearby) Juridical status of the locations and spatial legislation applicable Ownership and tenure modality of a space at a certain location Price of the land or building (varies per location) Time for which the location is potentially available (3 years) View from or visibility of the location
Growndowntown (unclassified)	Amount of non-sealed land available (1 hectare to min 2500 m2) Accessible by (depending on distance): public transport / walking / bicycle Broader characteristics of surrounding neighborhoods Competition from other land uses Price of the land or building (not a multitude of 100.000 s) Reachable by (depending on distance) public transport walking bicycle (with PT) Time for which the location is potentially available (4 years or more) Visibility

Table 4.14: The 'perfect' location for each of the urban agriculture projects included in the research

Concluding remarks:

It would require too much space to discuss each of the eleven cases individually and in depth. However, a few more generally applicable, valuable lessons can be drawn from the application of the framework presented in table 4.14 to each of the types of UA.

The application of the evaluation of the framework through the empirical data gathered in the research has shown that the framework can be a useful analytical tool, but must not be used in a deterministic way. Urban farmers and project leaders have an idea of the locational characteristics which make a site more or less suitability for the development of their projects; a review of the data gathered during the semi structured interviews indicates that they are both willing and able to adapt the characteristics of their project where they feel this is necessary and at times are even able to adapt the locational characteristics which they see as (dis)advantageous for the development of their project. The nature of these possible interrelationships will be discussed in more detail in section 4.3.1. Therefore locational prerequisites must be treated as 'strong suitability criteria' rather actual prerequisites. Because the difference between these strong suitability criteria and the locational factors which urban farmers see as (dis)advantageous is less clear that was expected at the start of the research, both kinds of characteristics are included in order to gain a more complete list of the characteristics which may influence the development of a particular type of UA.

4.2.3. A typology of the governance instruments available to different actors engaged with urban agriculture within the Netherlands

The empirical research has generated two kinds of descriptive data with respect to the governance instruments used in relation to UA in the Netherlands: an oversight of the different kinds of actors that are involved in the governance of urban agriculture, and the governance instruments which were available to these actors at the moment they were interviewed. Both kinds of data are combined in the table below. Academic and knowledge institutes and private sector actors were not the focus of this research but they are also included in the results.

Actor	General governance mechanism	Specific governance instrument used by the actors
Academics and knowledge institutes: **(E.g. Universities and Higher Vocational Education institutes, National Network of Urban Agriculture)** **(9 sources in total)**	Regulations: required actions	None mentioned
	Economic incentives; the creation of 'economic space' for UA	None mentioned
	Voluntary actions for enhanced security of UA	None mentioned
	Information, advice, support and moral suasion (9 sources)	Creation and spreading of knowledge regarding urban agriculture practices and production techniques
	Institutional measures:	None mentioned
Civil Society: **(E.g. Foundations, inhabitants, primary schools, urban agriculture platforms (e.g. Eetbaar Rotterdam), sectorial organizations, sports clubs, art institutions and individual artists, NGO's)** **(18 sources in total)**	Regulations: required actions	None mentioned
	Economic incentives; the creation of 'economic space' for UA (5 sources)	Direct financial support or grants for UA from foundations, Loans or investment in a projects by foundations
	Voluntary actions for enhanced security of UA	None mentioned
	Information, advice, support and moral suasion (10 sources)	Agenda setting, Business case development for a specific site or project, Generating general exposure and awareness for UA developments, Knowledge sharing and education on (best) practices, Knowledge sharing and education on funding possibilities, The creation of (in)formal networks for support and problem solving, providing legitimization to projects, Participation in a food council or similar multi-stakeholder board, Providing information about the benefits of UA through general education, Support for locally produced food,
	Institutional measures: (4 sources)	Institution of a food council or similar multi-stakeholder board
Policy makers or implementers: **(E.g. Several departments in municipalities, environmental protection agencies, emergency services, national and provincial government departments, public health services)** **(27 sources in total)**	Regulations: required actions (20 sources)	Case specific permissions, exceptions and regulations, Environmental regulations, Government acquisition and redistribution of land, Government zoning with or without compensation, Health and Safety regulations, Making UA a part of the land-uses determined in the urban land-use plan, explicitly making it a planning issue, Other zoning and planning controls, Sales of Development Rights (PDR) for land with preconditions
	Economic incentives; the creation of 'economic space' for UA (22 sources)	Contest related financial and support, direct subsidies at provincial and European level, Direct subsidies for UA, Financing personal (professional) support and knowledge and skills provision Government payment for delivery of environmental goods and services, (e.g. clean water) or for production factors needed for UA, Government payment for delivery of social goods and services, Steering project design through financial guidelines, Indirect subsidies

		through other themes or price manipulation.
	Voluntary actions for enhanced security of UA (4 sources)	User agreements
	Information, advice, support and moral suasion (16 sources)	Active provision of information on available locations (location broker), Advice on constructing a business case, Advice on regulations subsidies and procedures, Communication campaigns and general media exposure, Network provision and creation, Providing information about the benefits of UA through general education, Providing information on the potential for UA through land Inventories, Provision of knowledge on a specific location or neighborhood, Support for locally produced food (e.g. farmers markets)
	Institutional measures (14 sources):	Creating one information point within the municipality for urban agriculture, Food visions, strategies and other broad policy agreements, Institution of a Food Policy council or similar multi-stakeholder board,
Private sector actors **(E.g. Banks, urban farmers and project leaders)** **(19 sources in total)**	Regulations: required actions	None mentioned
	Economic incentives; the creation of 'economic space' for UA (1 source)	Loans for the funding of UA projects
	Voluntary actions for enhanced security of UA	None mentioned
	Information, advice, support and moral suasion (1 source)	Communication and marketing by urban farmers, Participation in a food council or similar multi-stakeholder board
	Institutional measures:	None mentioned

Table 4.15: The governance instruments used by the different kinds of actors involved in the governance and development of urban agriculture.

The table shows that all of the general governance mechanisms are indeed used by actors in practice. In this sense the expectations presented in table 2.4 are confirmed. The table also provides an indication of the division of roles between these actors. Academic and knowledge institutes are solely involved in the governance of urban agriculture through "Information, advice, support and moral suasion", whereas actors in the private sector also make use of economic incentives. Civil society actors and policy makers and implementers use a much broader array of governance instruments. Aside from the instruments in the category of "Information, advice, support and moral suasion", civil society actors also make use of economic incentives and institutional measures when they are engaged in the governance of urban agriculture. Policy makers and implementers have even more possibilities to their disposal because they are the only actor governing through regulations and voluntary actions.

'New' governance instruments

Aside from specifying the actors involved in the governance of urban agriculture, something which was not done in table 2.4, the empirical results also allow the framework to be expanded in terms of the specific governance instruments used by these actors. Many of the instruments encountered during the empirical research had not been mentioned in the scientific literature on the subject. These have been colored green in table 4.15. These 'new' governance instruments and the reason for their absence in the original theoretical framework will be discussed briefly before presenting a revised frame work based on the empirical data collected.

The theoretical framework was biased towards government actors and the instruments they use

The theoretical framework presented in table 2.4 was largely built on the assumption that the actor engaging in the governance of urban agriculture would a municipality or other governmental actor, while in practice the range of actors involved with the governance of urban agriculture turned out to be much broader, and the kinds of instruments used by these actors were more diverse than predicted in the theoretical framework.

A clear example of this is the possible governance instruments listed as an economic incentive in table 2.4. Of the 8 specific instruments mentioned in this governance mechanism category, only the last two ("direct financial support or grants for urban agriculture" and "establishing clear certification schemes for what food is locally grown and creating an effective marketing surrounding for certified produce") are likely to be used by actors other than governments. Because of this bias the economic instruments used by civil society actors such as loans and investments in urban agriculture by foundations such as Fonds 1818 (Janssen-Van Raay, 2014) have been overlooked, and the role of housing corporations in the development of urban agriculture (Jan Van der Schans, Interview, 2014) has not been predicted either.

The bias is even stronger in the case of the institutional measures included in the framework: none of these are likely to be carried out by an actor other than the local government, although the second measure, the institution of a Food Policy council, does implicitly include other stakeholders of course. However, because civil society actors, the only other kind of actor that engages in institutional measures, use exactly this governance instrument the actor bias with regard to institutional measures, does not have any consequences for this research.

The theoretical framework was biased towards pro-active and top-down governance rather than reactive or facilitative governance instruments

Still two of the institutional measures that have been encountered during the empirical research and that were used by the *municipality* (namely "Creating one information point within the municipality for urban agriculture" and "Food visions, strategies and other broad policy agreements", were not included in the theoretical framework either. This is because of a second blind spot in the theoretical framework: most of the governance instruments mentioned in the theoretical framework are fit for a kind of governance in which the governing actor takes a pro-active and at times top-down approach to governance. In the case of regulations, a category of governance instruments which is indeed more in line with this top-down approach, this bias is not such a problem. However, more reactive governance instruments used by the local government to facilitate certain developments rather than deciding what these developments should look like are overlooked because of this bias.

The bias towards top-down governance becomes even clearer when we look at the vast array of governance instruments in the category "Information, advice, support and moral suasion". Governance tools such as research and development, the creation of informal networks and the role these networks play in the spread of skills and knowledge or the solving of concrete problems that act as a barrier for the development of urban agriculture are not acknowledged in the framework of table 5. Especially in the case of civil society platforms such as Eetbaar Rotterdam or NGO's such as farming the city, this means that the framework misses the instruments that are at the core of their activities. As Jan-Willem Van der Schans (Interview, 2014) puts it:

"Look, a city is complex. A city is dynamic. Food is complex, food is dynamic. So you should actually just come together every three months or so, with a very large group of people, and say: this is my problem at the moment, who can help me? The formation of networks, that is important! But that is not a bureaucracy with which you can force things to happen.. That is purely inspiration! That's all there is to it!" (Jan-Willem Van der Schans, Interview, 2014)

Clearly these 'softer' governance tools, although not included in the original theoretical framework, are of key importance to civil society actors. They will therefore be included in the renewed framework.

'Missing' governance instruments

Some of the governance instruments that would have been expected to be used by municipalities or other actors according to table 5 have not been encountered during the empirical research. These are presented in table 4.16, below. The possible reasons for their absence are largely the same as those discussed earlier: here it suffices to say that both policy makers and implementers and other actors rarely engaged in top-down, pro-active governance. For most instruments listed in table 4.16, this explains why they have not been encountered during the empirical research.

General mechanism for the governance of UA	Specific governance instruments
Regulations: required actions	Support for certain production methods through regulations
Economic incentives; the creation of 'economic space' for UA	Exactions (charges to developers, in the form of money or land reserves for schools or park land) may be required when lands are subdivided
	Offset benefits: exchange for, e.g., increased building density elsewhere in exchange for UA at a location
	Tax cuts or abatement for actors engaged in UA where this is desired by the local government
	Establishing clear certification schemes for what food is locally grown and create effective marketing surrounding certified produce
Voluntary actions for enhanced security of UA	NGO-initiated land trust protected by legal covenant/perpetual conservation easement
	Government maintenance of food-producing facility, (e.g. fruit-bearing street trees) in public spaces
Information, advice, support and moral suasion	Site-specific Environmental Impact Assessment
	Establishing clear certification schemes for what food is locally and sustainably grown in a city / metropolitan region.
Institutional measures:	Institution of a land-use policy or environmental review committee within the municipality

Table 4.16: governance instruments mentioned in the scientific literature but not encountered during the empirical research

A renewed framework of the governance instruments that may be used by actors engaged in the governance and development of urban agriculture

The original framework has been shown to be incomplete with regard to the kinds of governance instruments available to those actors engaged in the governance and development of urban agriculture. These 'missing' governance instruments will be included in the revised theoretical framework. Furthermore some of the governance instruments mentioned in the original framework were not encountered during the empirical research. Because these instruments could become more important when actors would engage in more pro-active forms of urban governance of urban agriculture, these will not be excluded from the framework for now, except for one: "Offset benefits". This planning instrument is more commonly used in Anglo-Saxon planning systems such as that of the United States; the practice rarely takes place in the Netherlands (Spit en Zoete, 2006). In combination with the fact that the instrument was not mentioned by any of the actors interviewed, it would therefore seem to be very unlike that the instrument of offset benefits will play a large role in the governance of urban agriculture in the near future. For these reasons I do not include it in the revised framework presented in table 4.17:

General mechanism for the governance of UA	Specific governance instruments
Regulations: required actions	Case specific permissions and regulations
	Direct commands and sanctions related to the development of UA
	Environmental regulations
	Health and Safety regulations
	Government zoning with or without compensation (e.g. Greenbelts)
	Other zoning and planning controls (e.g. indirect zoning through maximum subdivision of plots allowed).
	Government acquisition and redistribution of land
	Support for certain production methods through regulations
Economic incentives; the creation of 'economic space' for UA	Exactions (charges to developers, in the form of money or land reserves for schools or park land) may be required when lands are subdivided
	Purchase of Development Rights (PDR) for land
	Connecting initiatives with funding through exposure
	Direct financial support or grants for UA from foundations
	Loans or investment in a projects by foundations
	Tax cuts or abatement for actors engaged in UA where this is desired by the local government
	Government payment for delivery of environmental goods and services (e.g. clean water) or for production factors needed for UA
	Subsidy for UA, especially in the start- up phase of UA companies or UA under difficult circumstances
	Direct financial support or grants for UA, especially in the start- up phase of UA companies
	Establishing clear certification schemes for what food is locally grown and create effective marketing surrounding certified produce
	Contest related financial and support,
	Direct subsidies at provincial and European level,
	Indirect subsidies through other themes or price manipulation.
	Steering project design through financial guidelines,
	Direct financial support for UA, Provision of vacant land for UA of private actors
Voluntary actions	NGO-initiated land trust protected by legal covenant/perpetual conservation easement
	Government maintenance of food-producing facility, (e.g. fruit-bearing street trees) in public spaces
	Creating intellectual space by showing the rationale and vision behind UA, and helping farmers to frame the need for UA effectively (Feenstra, 2002)
Information, advice, support and moral suasion	Advice on regulations subsidies and procedures Financing personal (professional) support and knowledge and skills provision media exposure and books and other publications Municipal governments as active location broker, research and development activities
	Ad hoc knowledge provision on relevant locational characteristics for a project
	Agenda setting
	concrete problem solving within the network
	Communication and marketing by urban farmers,
	creation and spreading of knowledge regarding urban agriculture
	creation and maintenance and strengthening of a network of relevant actors
	Direct (in)formal connections throughout the municipality
	direct cooperation with different government levels
	Support for voluntary decision to use land for food production, e.g. household gardens (e.g. providing information leaflets to those who ask for it)
	Support for locally produced food, e.g. farmers markets (Pearson et al 2010)
	Providing information on the potential for UA through land Inventories
	Providing information about the benefits of UA through general education or site-specific Environmental Impact Assessment
	Establishing clear certification schemes for what food is locally and sustainably grown in a city / metropolitan region.
Institutional measures:	Institution of a land-use policy or environmental review committee within the municipality
	Institution of a Food Policy council or similar multi-stakeholder board aimed specifically at promoting UA
	Making UA a part of the land-uses determined in the urban land-use plan, explicitly making it a planning issue
	Broader policy agreements support the development of UA,
	Contest related institutional support,
	Creating one information point within the municipality for urban agriculture,
	Initiate 'legal anchoring' UA,
	Permitting of small regulatory or procedural transgressions,
	Personal support within the municipality,
	Pro-actively connect relevant actors,
	Sectorial bridging,

Table 4.17: A revised framework for governance instruments

Concluding remarks

The original range of governance instruments available to different actors with regard to the development and governance of urban agriculture has been expanded on the basis of the empirical research, which has shown that the governance instruments used by both governments and civil society actors are facilitative and supportive rather than proactive or prohibitive. The scientific literature focused mostly on more pro-active top down governance instruments such as support for specific production methods or the acquisition and redistribution of land; this difference in focus may explain why the use of ten of the governance instrumented mentioned in the literature was not confirmed through the empirical research.

However, the data is almost certainly biased with regard to the prohibitive effect of regulations. This is because governance instruments such as regulations which have an influence on project characteristics in the sense that they do not allow a project to be developed, will not be mentioned by any of the actors interviewed during the research. After all: actors were selected that had successfully developed an UA project, or were still (and with reasonable chances of success) developing one at the moment of writing. Therefore the final framework is likely to be incomplete with regard to restrictive and prohibitive governance.

There are many other questions which remain unanswered: Table 4.17 still does not provide any insight regarding the extent to which different actors adapt the kind of governance instruments they use to different types of urban agriculture projects. Nor does the table provide any insight suitability of different governance instruments for different kinds of urban agriculture. Lastly the table does not answer any questions regarding the extent to which the location of an urban agriculture project influences the suitability and availability of governance instruments for different actors. To provide more insight into these issues a revised conceptual framework will be developed in section 4.3 in which the interrelationships between the three central concepts of the research, locational characteristics, governance instruments and different types of urban agriculture, is elucidated, and the conceptual framework that was presented in section 2.6 is evaluated.

4.3. The interrelationships between urban agriculture systems, their location and governance instruments

The empirical research has provided data to test the assumptions made in the conceptual framework (figure 2.5) on the way in which locational characteristics and the use of governance instruments influence the development of UA. The analysis of the (inter)relationships will be presented in this section. First, the relationship between locational characteristics and the characteristics of urban agriculture systems will be discussed. Second the interrelationship between the physical and social characteristics of different types of urban agricultural projects and their governance is presented and third, the interrelationship between locational characteristics and governance is elaborated upon.

4.3.1. The interrelationship between locational characteristics and the characteristics of different types of urban agriculture

We can already conclude from table 4.14 that there is *some kind* of interrelationship between locational characteristics and project characteristics. The purpose of this section is to establish the nature of these interrelationships. This is done through an analysis of the qualitative data with regard to (1) the influence of locational properties on project characteristics and (2) the extent to which locational properties are adapted to match the needs resulting from project characteristics. First the empirical evidence indicating that project characteristics are dependent from locational characteristics is evaluated for the 10 case studies. In the second part of this section the empirical data indicating the opposite is discussed.

The selection procedure of locations

Before doing so, the selection procedure of urban farmers and project leaders is reviewed, as a first indicator for the direction of a possible interrelationship between locational characteristics and project characteristics. The results are presented in table 4.18 below:

Case	Idea before location	Location before Idea
UIT JE EIGEN STAD	X	
DakAkker	X	
Rotterzwam	X	
De Schilde	X	X
Panderplein		X
Koningshof		X
Food for Good	X	
Eetbaar Ondiep	X	
Meat the Mushroom	X	
Growndowntown	X	
De Tuinbutler	X	

Table 4.18: selection procedure per cases

As can be seen in the table, the majority of project leaders indicated that there was an idea for the kind of project that urban farmers or project leaders wanted to develop. This suggests that in the majority of cases, locations were sought to match the criteria that were required for the kind of project that actors had in mind and development started once a location that met these criteria had been secured. However, things are not always as straightforward as that. Mark Durno (2014) for example indicates that:

"It was a conscious choice to end up in The Hague […] "but the location was purely by luck. Our business development director was in The Hague in the beginning of 2013. And he happened to be invited to go and visit the De Schilde building because of the Stadslandbouw initiative. And he stood there and he said that he was standing on the rooftop and he thought that he was looking at the sea, because there was this kind of reflection on the water, and then somebody said: "no they're greenhouses". And since then it became really a top priority and a strategic position for us as a company." (Durno, Interview, 2014)

De Schilde is the only project with a marking in both columns of table 4.18, because this is the only interview in which a 'mixed' situation, in which the sequence between an idea and locational decision do not follow an exact sequence, is expressed explicitly by a project leader or urban farmer. Nevertheless there are more indications that the sequence of the process for locational selection is not always straightforward. Heiteman (2014) indicates that although the idea for the food for good project clearly was conceived by two of its board members before they had any specific idea about the location, the location was found almost coincidentally because another board member involved in the project already had an educational farm next to the current location of the project in Transwijk Park and knew that there might be possibilities to develop something there. And Bauman indicates that although the idea of an urban agriculture project on a roof was there well before a location was found, the selection of the location was a pragmatic and somewhat coincidental decision:

"We actually wanted to do this at our last office, but that building was renovated and the owner did not want to cooperate. Than we moved to this location and found out that ZUS had plans for the roof. The moment we knew that we joined forces and went on together. We really did it because we had a big black roof available here, and the people to do it with, so that is what made the decision to develop the DakAkker here, a very logical one." (Bauman, Interview, 2014)

These examples indicate that, even for initiatives geared at a more commercial business model, it is not uncommon to in part base their locational selection on the fact that an opportunity arises which they feel they can make use of, even when the location does not fulfill all of the requirements or wishes. Huibert de Leede feels that the decisive factor in the choice of location for the Uit Je Eigen Stad project, was that a good opportunity arose which largely fitted the requirements for the project:

"There were already some plans for urban agriculture in Rotterdam, even before it became clear that this location was available. So the idea was there before the location. But it is true that we adapted the plans on the basis of the location, when it became clear that this was where the project would be developed. But the idea was there before the location, if that is your question." (De Leede, Interview, 2014)

Concluding remarks

The conception of urban agriculture to be an 'opportunistic' movement (De Graaf et al., 2011) is supported by the empirical evidence discussed above, which complements the analysis in section 4.2.2. Urban farmers and project leaders clearly do have a certain list of suitability criteria in terms of locational characteristics and some of these are seen as prerequisites because of project characteristics such as the goal of the project and its physical production system. Nevertheless it is clear that both variables (locational characteristics and project characteristics) influence each other and that the relationship is one of interdependence rather than a one-way relationship in which project characteristics are completely adapted in accordance to locations or the other way around.

The dependency of project characteristics on different types of locational characteristics

The way in which different types of locational characteristics influence different types of project characteristics will now be analyzed, based on the data gathered on this relationship during the semi-structured interviews. Locational characteristics can in theory influence, or be influenced by, 4 kinds of project characteristics: the physical properties of a system, the social or actor properties of a system, the production properties of a system and its potential sustainability impact.

Determining the influence of locational characteristics on the potential sustainability impact is beyond the scope of the research because the only data available are the perceptions of the actors that are interviewed and there is no way to assess whether these are correct. Wouter Bauman (Interview, 2014), for example, specifically relates the ecological impact of de DakAkker in terms of biodiversity to the location of the project. When asked what locational characteristics make the location of the DakAkker suitable for the development of urban agriculture he answers:

"A flat, barren rooftop. And I'll explain why. These days there are a lot of urban agriculture project which are being developed in existing green spaces such as parks. And this can in fact cause a decrease of biodiversity in such areas. Many people think that urban agriculture is a sort of silver bullet, that it has a positive impact everywhere it is developed. But if it is being developed in existing green spaces, it definitely has its downsides. Also because, usually, people work with plants that are not indigenous species. And that is why roofs, flat, barren roofs, are very suitable for the development of urban agriculture: because you only add green surfaces here, instead of replacing green surfaces which might cause a loss of biodiversity." (Bauman, Interview, 2014)

Mariken Heiteman, (2014) on the other hands indicates that the existing biodiversity in a park and the ecological impact of urban agriculture projects might complement each other. And Jan Willem van der Schans explicitly states that urban agriculture could be a means to boost the biodiversity in parks and other green public spaces, as long as the right type of UA is developed there (Interview, 2014).

On the basis of the research conducted for this thesis it is impossible to state which perception is the correct one, if any. Yet if I would include the statement of Bauman quoted above in my analysis (e.g. by coding it at a relational node stating that physical-spatial locational characteristics influence the potential ecological sustainability of a project), this would imply that the relationship is proven, which it is not. Bauman thinks that the relationship is present and his reasoning may sound logical or not but he did not show me any empirical evidence to prove this claim, nor did the scope of the research allow for an evaluation of this relationship at the site.

This problem does not occur with physical, production or social actor properties. When Huibert de Leede, for example, states that the physical project characteristic of the Uit Je Eigen Stad project (e.g. a production system largely based on horticulture using open-soil as a growing medium) triggered a change in the physical-spatial locational characteristics of the site at which Uit Je Eigen Stad is located (e.g. the soil conditions at the location were changed because polluted soil was dug away and fresh soil was administered on the site instead) than chances are that his observations as a project leader can be trusted. After both the outcome of the causal relation (a replacement of the soil) and the causal mechanism leading to this outcome the execution of the decision made by the project leaders, as well as its direct cause (the initial soil conditions at the site) were observed and experienced by De Leede at first hand. Unless he would have a clear reason to lie on this subject during the interview, there is no reason to mistrust his observations. Therefore the projects potential sustainability impacts are not included in the analysis.

For each of the other project characteristics the dependence on locational characteristics has been analyzed based on the data collected during the interviews with project leaders and urban farmers, and to a lesser extent civil society actors and policy makers and implementers. Where respondents indicated an instance where project characteristics were influenced by locational characteristics, the references were coded at special relationship nodes. The result can be seen in figure 4.5 below.

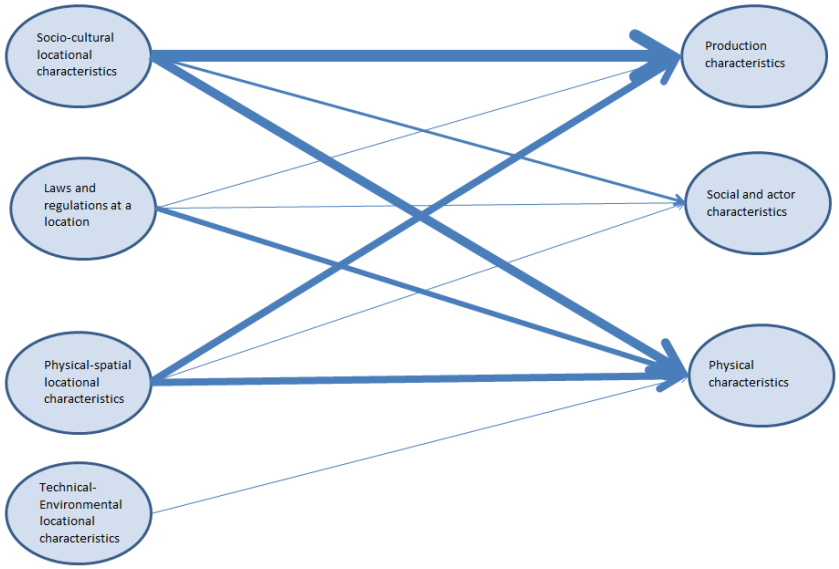


Figure 4.5: The influence of locational characteristics on project characteristics

From this figure it can be seen that the physical properties of an UA project were perceived to be influenced by all of the different kinds of locational characteristics. Production properties and social and actor properties were influenced by all kinds of locational characteristics but the technical-environmental ones. The influence of socio-cultural locational characteristics on production properties was mentioned by 8 separate sources and with that is the strongest relationship. Perhaps the best example of this kind of relationship is the fact that urban farmers adapt the kind of produce to the availability and reachability of markets or restaurants as sales channels. Bauman (Interview, 2014) for examples states that the produce on the DakAkker is diversified specifically to meet local demand and that the edible flowers he grows are especially benefited by the fact that hardly and transport needs to occur before they reach the clients:

"Yes well we did also grow some more uncommon species this year. Instead of regular potatoes we used what are called 'banana-potatoes', which are those small curved ones, and 'blauwe annelies' those are the purple variety here. We also focus on edible leaves now: there is a mix of Italian leaves over there, which you can use for your salad instead of regular lettuce. [..] And those edible flowers: just try and package one of those in plastic, transport it to the store, and then make it look nice after one or two days. That costs a lot of packaging materials and a lot of money, so that's a very exclusive product." (Bauman, Interview, 2014)

Other examples are the influence of the time for which a location is available on the kind of crops that can be grown there (Heiteman, Interview, 2014), or the influence of the accessibility by bicycle which influenced to the sales of surplus produce at the Koningshof project. The vegetables were specifically marketed as 'omfietsgroenten' (Bink, Interview, 2014).

As can be seen in figure 4.5, there are more indications of a dependency between locational characteristics and project characteristics. The strongest of these are the influence of socio-cultural locational characteristics on the physical project characteristic (7 sources) and the influence of physical spatial locational characteristics on both physical project characteristics and production characteristics (both 6 sources). The most mentioned example in the first of these three examples is the influence which the time for which a location is available has on the physical project characteristics. A quote from Hassink (Interview, 2014) provides a clear example:

"Eventually we ended up using sea containers, because that made the most sense when you look at the investment and the time for which we can rent this location. It ensures that we are very mobile; makes things a lot more configurable. Just as the new trend in modular building.. This is modular farming so to say!" (Hassink, Interview, 2014)

Cox (Interview, 2014) and Heiteman (2014) also explicitly indicate that the physical properties of the production system of Rotterzwam have been adapted because of the short time for which the availability of the location is available with certainty. A different example is the influence of the local community on the physical properties of the Panderplein project mentioned by Meijer (Interview, 2014). Examples of physical-spatial locational characteristics influencing the physical project characteristics are: the soil quality of the location leading to the growing of crops in containers instead of open soil (Blom, Interview, 2014; Vermeulen, Interview, 2014), the adaptation of the roof surface used to grow food on because of limits in the available amount of flat rooftop surfaces (Durno, Interview, 2014) or the carrying capacity of the roof (Hartman, Interview, 2014) and the not using, or very limited use of machines for in the agricultural process because of the small amount of unsealed land available for growing crops at a location (Heiteman, Interview, 2014). An example of the last type of relationship, the influence of physical spatial properties on the production characteristics of a project is the adaptation of the kind of crops grown at a location because of the soil conditions at a location (Van Asperen, Interview, 2014) or the microclimate and wildlife at a location (Bauman, Interview, 2014).

Empirical results indicating that locational characteristics depend on locational characteristics

However there is also data pointing at a reverse relationship in which locational characteristics are manipulated because of project characteristics. These references have been coded as well and the results are visualized in figure 4.6.

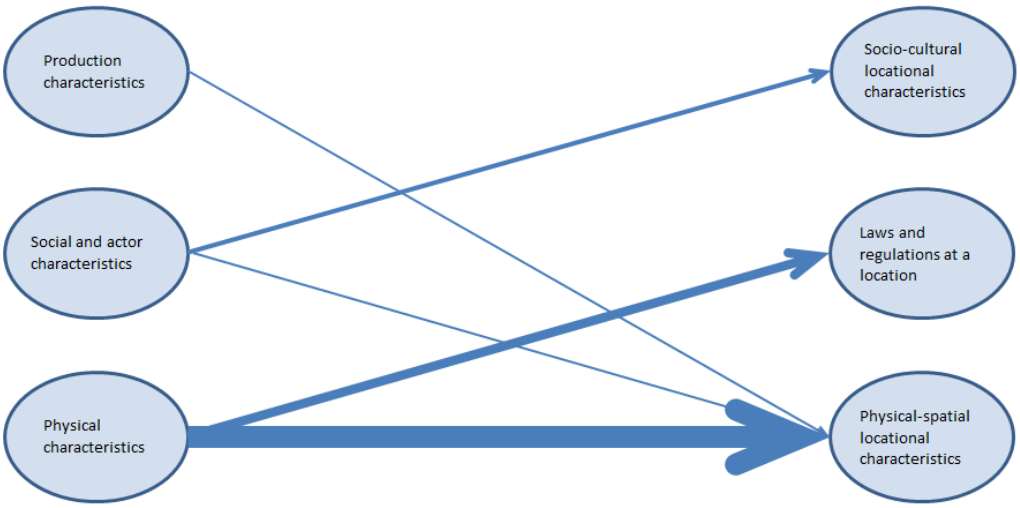


Figure 4.6: The influence of project characteristics on locational characteristics

The analysis shows that the influence of project characteristics on locational characteristics is more limited than the reverse relationship. Ten respondents (or "sources" in the Nvivo file) refer to cases in which the physical characteristics of a production system of a project lead to changes in physical-spatial location characteristics. Examples of this are the replacement of polluted ground at the location of Uit Je Eigen Stad with clean soil (De Leede, Interview, 2014) or the removal of tiles and

addition of clean soil on top of lightly polluted soil at the Panderplein (Interview, 2014), but also the transport of growing substrate on top of the Schieblok building for the DakAkker project (Bauman, Interview, 2014). The second largest influence visualized in the figure is that of the physical characteristics on laws and regulations (4 sources). Physical properties of the projects that were going to be developed there have led to an actual adaptation of the site specific laws and regulations in two cases: Uit Je Eigen Stad, and the whole area of Tuinen van West (De Leede, Interview, 2014; Gerritse, Interview, 2014; Vermeulen, Interview, 2014). At the project site of Uit Je Eigen Stad a temporary addition to the local zoning status has been made officially adding urban agriculture as a possible land use, although this change is not yet permanent:

"Just to get back to the zoning status of the location. What has happened is that urban agriculture has been added as a possible land-use at the location. That was going to happen eventually in any case in 2016 and in fact this was just a speeding up of that process. It was a situation in which it was difficult for the municipality to determine what to do: heavy industry was allowed but agriculture was not? That is why they have chosen for a kind of temporary construction in which urban agriculture is tolerated for the moment, with the prospect of a genuine change in the zoning status around 2016. I think the municipality also found it difficult to deal with the situation." (De Leede, Interview, 2014)

In the case of the Tuinbutler project and Tuinen van West the zoning destination for the location of the Tuinbutler project and the wider area has already been changed, and had in fact been changed even before specific projects were targeted for development (Vermeulen, Interview, 2014; Van Asperen, Interview, 2014).

Concluding remarks

The results of the analysis of the empirical data indicates that project characteristics (at least partially depend) on the characteristics of the location at which a project is developed. This shows that urban farmers adapt to the urban environments and the possibilities and limitations it presents to them. All four of the locational characteristics have been shown to lead to adaptations on the side of project leaders and urban farmers. Most of the respondents mentioned instances in which the socio-cultural characteristics or physical-spatial characteristics triggered such adaptations.

However, as can be seen in figure 4.6, this relationship is not a one way street: the analysis indicates that project characteristics can also lead to changes of locational characteristics. Locational changes which are a result of the wish of actors to accommodate certain physical characteristics of a project were mentioned by the largest number of sources; both the location specific laws and regulations and the physical-spatial characteristics of a place, were changed in these kinds of relationships. No evidence was found for the influence of project characteristics on locational characteristics belonging to the environmental technical layer of the theoretical framework, and in general the number of sources mentioning changes of locational characteristics in relation to project characteristics was smaller than those mentioning the reverse relationship

4.3.2. The interrelationship between the characteristics of different types of urban agriculture and their governance

The interrelationship between the use of governance instruments by different actors and the characteristics of different types of urban agriculture projects will be evaluated by looking at (1) empirical data gathered in interviews with policy makers and civil society actors (as well as, to a lesser extent, the interviews with urban farmers and project leaders) and (2) information provided in a number of relevant policy documents: the respective food strategies of the cities of Rotterdam, Amsterdam, The Hague. Before a more in-depth analysis is conducted the reasons the data indicating dependence between these variables is briefly discussed as well as the data which points to the contrary.

Governance instruments and project characteristics seen as independent variables

Initially most policy makers indicated that, just as with locational characteristics, they did not feel that it was the role of the municipality to decide what kinds of urban agriculture should be developed. When asked whether the municipality explicitly supports certain kinds of urban agriculture more than others, Van Huffelen (Interview, 2014) answers:

"No, we do have a number of policy goals but because we mainly provide the space needed for the development of urban agriculture, and do not really push in a certain direction regarding what should be developed and where, no priorities have been established with regard to certain types of urban agriculture that should be developed." (Van Huffelen, Interview, 2014)

Rijpkema (Interview, 2014) expresses a similar attitude when she is asked this question and feels that the municipality looks at user value that local inhabitants gain through public green rather than the type of development that takes place in the spaces. She states that the municipality *'does not have a specific urban agriculture policy'* and that communal gardens are *"a way of using public green spaces which make people happy. It could also be a soccer field in that sense."* Deenstra (2014) also states that the municipality of Rotterdam tries to facilitate but does not actively prioritizes a particular type of urban agriculture. She provides an additional reason for this when I ask her in what way the policy goals mentioned in the Rotterdam food strategy influence decisions on whether or not support an urban agriculture:

"We just have a very limited amount of hours we can spend on this to be honest. So it's really more a question of ad-hoc support, looking at what can realistically be achieved" (Deenstra, Interview, 2014)

These statements seem to indicate that there is no specific relation between the type of urban agriculture that is developed and the usage of governance instruments. None of the civil society actors mentioned an explicit prioritization based on the 'type of urban agriculture either. When asked whether Fonds1818 specifically targeted particular types of UA, Janssen-Van Raay (2014) initially replied: "*we basically do everything that is going on at the moment".*

When reading idea the food strategies of Rotterdam (*"zowel de commerciële initiatieven als de niet-commerciële projecten (zoalsbuurtmoestuinen die meestal een sociaal-maatschappelijke achtergrond hebben) worden gefaciliteerd door de gemeente Rotterdam."*) and The Hague (*"Het is aan de stad om ideeën over voedsel uit te werken en in te vullen")*. Similarly the food vision of the municipality does state that Stadslandbouw should become an 'integraal onderdeel van de stedelijke ruimte' (integral part of the urban space) but does not include an explicit prioritization of different types of UA.

Empirical results indicating that the use and availability of governance instruments and project characteristics are interrelated

However, when reading on in the food policy documents it becomes clear that, although there is no notion of prioritization of certain 'types' of urban agriculture per se, the municipalities of The Hague, Rotterdam and Amsterdam do explicitly state which policy goals they aim to achieve through the support of urban agriculture (Gemeente Rotterdam, 2012 p. 10-12; Gemeente Den Haag, 2013, p.8; Gemeente Amsterdam, 2014a p. 13-17 and 23-25). As we shall discuss below, these policy goals can act as an intermediate variable which can cause the project characteristics and use and availability of governance instruments to influence each other.

Several responses of policy makers and implementers support this hypothesis. Van der Meij (Interview, 2014) and Gout (Interview, 2014) for example, explicitly state that those project which they see as 'commercial' (so of which one of the project goals is the generation of income and employment for those involved in it) as less likely to receive support from city governments. And Deenstra (Interview, 2014) follows the statement quoted on the page above by saying that the decision on the kind of governance instruments used by the municipality in support of an UA project, as well as the department from which the project is supported, are influenced by the project goals associated with it:

"What can generate an added value for the city? And usually the social, neighborhood oriented project are picked up by the authorities at the neighborhood or district level. We do play a role in those, but more to make them enthusiastic about the idea. We're not really on top of those kinds of projects.

The empirical research has also provided data from which it must be concluded that, just as policy makers and implementers, civil society actors indirectly prioritize which type of urban agriculture through setting their own goals or, in the case of Fonds 1818, criteria for the provision of donations of the use of other economic incentives (Janssen-Van Raay, Interview, 2014).

Empirical results indicating that the use and availability of governance instruments depends on project characteristics

For each of the project characteristics, the dependence on locational characteristics has been analyzed based on the data collected during the interviews with civil society actors and policy makers and implementers, and to a lesser extent project leaders and urban farmers. Where respondents indicated an instance where project characteristics were influenced by project characteristics, the references were coded at special relationship nodes. The relationship between project characteristics and the use of governance instruments is first analyzed for civil society actors. The results are presented in figure 4.7 below.

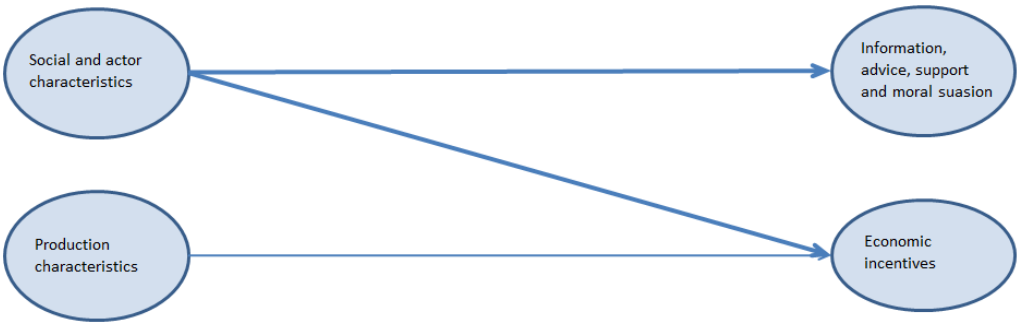


Figure 4.7 the influence of project characteristics on the use of governance instruments by civil society actors

As can be seen in figure 4.7 the civil society actors that were interviewed indicated that both social and actor characteristics and project characteristics influenced the use and availability of governance instruments related to the provision of information, advice support and moral suasion. One example of this is the fact that project which were supported by STROOM Den-Haag as a part of this organizations 'Foodprint' program, were specifically selected based on the types of actors that were involved in the project, and the goals of these projects. Anke de Vrieze mentions the production characteristics of projects as a possible 'trigger' of support from her organization Farming the city, when she states:

"Projects which go one step further so to say. That for example start out as a communal garden but then start to think about what they can do with their harvest, whether it is possible to start composting the organic wastes of the neighborhood… Projects which develop a kind of innovation that goes beyond growing vegetables with your neighbors, so that the impact of the project grows. Those are also the kind of projects we have published in our book I think." (De Vrieze, Interview, 2014)

An example of the way in which the use of economic incentives is influenced by social and an actor characteristic was already briefly discussed earlier, namely the criteria for donations of Fonds1818. This is just one example of the governance instruments used by the foundation. Janssen-Van Raay (Interview, 2014) indicates that other economic incentives such as interest free loans or investment of Fonds1818 in a project also depend largely on the projects goals. As can be seen in figure 4.8, the way in which project characteristics influence the use and availability of governance instruments by policy makers and implementers is more complex.

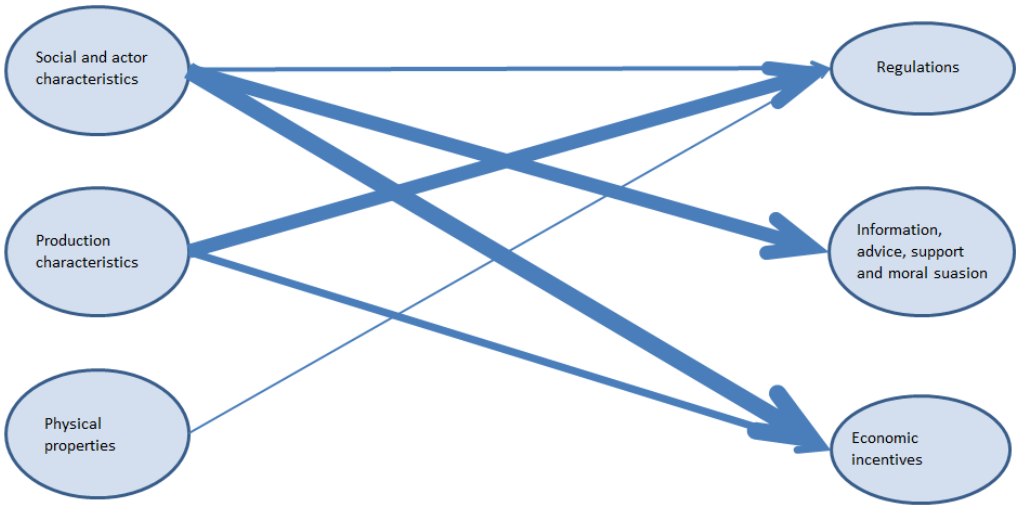


Figure 4.8: The influence of project characteristics on the use and availability of governance instruments by policy makers and implementers

It would require too much space to discuss each of these relationships in details but the three influences which are mentioned by the largest number of respondents are briefly discussed below. These are: the influence of social and actor characteristics on the use and availability of governance instruments related to "the provision of information, advice, support and moral suasion" (6 sources), the influence of social and actor characteristics on the use and availability of economic incentives (7 sources) and (3) the influence of production properties on the use of regulations (6 sources). One of the social and actor characteristics which can influence the use and availability of economic

incentives are project goals. Rijpkema (Interview, 2014), for example, indicates that the livability and even specific UA subsidies in the municipality are never granted to project with commercial goals. On the other Gout (Interview, 2014) indicates support from the municipality in terms of "information, advice, support and moral suasion" is still provided despite more commercial project goals:

"It is a bit of a gray area so to say. There is an initiative in Utrecht, 'De Voedseltuin', and those are people that would like to develop a commercial farm of 6 hectares in or around Utrecht. The business model is one in which people with a low income or which are long-term unemployed, are enabled to engage in gardening. In that case the municipality did help to look for a location, but that failed."

Most examples from the influence of production characteristics on the use of regulations come from Koudenburg (Interview, 2014) and Gerritse (Interview, 2014) and are related to environmental legislation. One example is the use of waste flows as an input for the production of mushrooms by Rotterzwam, which is allowed only under a certain quantity (Koudenburg, Interview, 2014) and another is the fact that the production of fish at the location of Uit Je Eigen Stad made in necessary for the project to apply for a special permit procedure (Gerritse, 2014).

Empirical results indicating that project characteristics depend on the use and availability of governance instruments

As can be seen in figure 4.8 only a few respondents have mentioned instances in which the use of governance instruments directly influence project characteristics. Both civil society (1 source) and policy makers and implementers (4 sources) mentioned instances in which economic incentives were used to influence the social and actor characteristics of a project. The influence of regulations, used by policy makers and implementers, on these characteristics was explicitly mentioned during interviews as well (1 source).

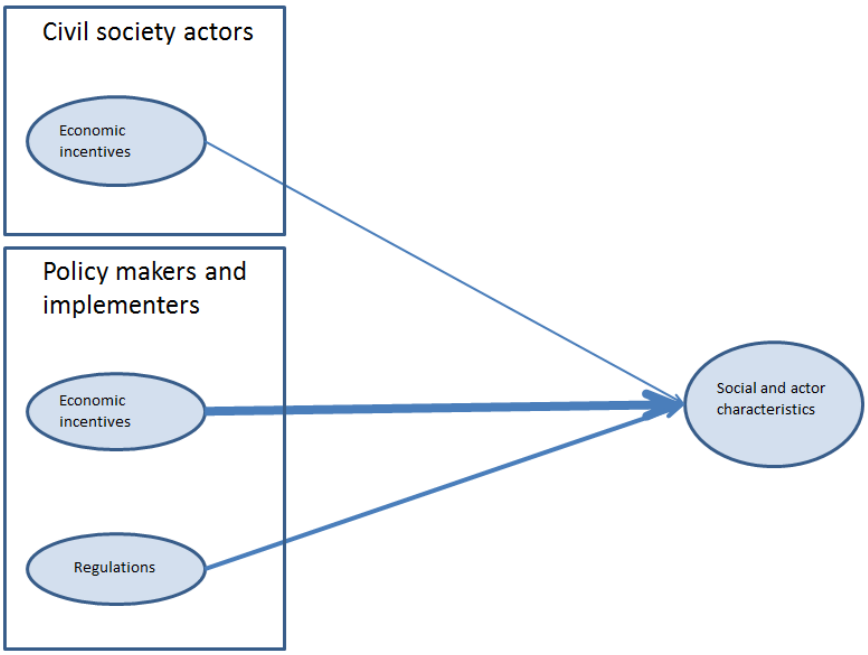


Figure 4.9: The Influence of governance instruments on project characteristics

For both types of actors the project characteristics influenced through these governance instruments are the goals of the project leader. Economic incentives do not directly influence these goals in the case of Fonds1818. Here, the organizational structure is mentioned as a precondition for the provision of larger donations (Van-Janssen Raay, Interview, 2014), such as the formation a foundations. Since foundations cannot make a profit, this kind of economic incentive is only used in cases where there are no commercial goals. In some cases such indirect preconditions are also formulated by the municipality (e.g. De Jager, Interview, 2014), but Jan Van der Schans (Interview, 2014) also mentions a case in which the policy goals were more directly stipulated through regulations, by the municipality of Rotterdam. The development rights to the terrain upon which Uit Je Eigen Stad is currently located, were only granted to the housing corporation Havensteder under certain preconditions:

"Actually, is supposed to be a big building site at which 5000 residences are to be developed. But back in 2008/2009 the recession was already beginning to have an effect on the housing market I think. In any case the demand for the development right to such locations was not that high at the moment. But we still wanted to get a position there at the time. A position means that you get the right to develop real estate at a location in the future. And that is why we got those two warehouses more or less for free from the municipality, for a period of 10 years. On the condition that we the temporary use of the space would attribute to some kind of placemaking process for the area." (Jan Van der Schans, Interview, 2014)

Concluding remarks

The analysis of the empirical data gathered during the semi-structured interviews shows that there is an interrelationship between the use and availability of governance instruments and project characteristics. Contrary to the expectations expressed in the conceptual model (figure 2.5) of the theoretical framework, the results indicate that the use of governance instruments does not only influence the development of different types of UA, but that it is also influenced by the characteristics of a project rather than the other way around. Social and actor properties such as the goals of a project leader or urban farmer are most often mentioned as an influence on the use of economic incentives while the physical characteristics are mostly linked to the use of regulations by policy makers or implementers. The number of sources indicating an instance in which governance instruments are actively used to influence the characteristics of a project rather than that they are 'triggered' by certain characteristics of a project. This is an indication of the fact that the governance by both civil society actors and policy makers is reactive rather than pro-active, at least in most of the cases included in the research.

4.3.3. The interrelationship between locational characteristics and the governance of urban agriculture

The interrelationship between locational characteristics and the governance of different types of urban agriculture have been analyzed by looking at (1) empirical data gathered in interviews with policy makers and civil society actors (as well as, to a lesser extent, the interviews with urban farmers and project leaders) and (2) information provided in a number of relevant policy documents: the respective food strategies of the cities of Rotterdam, Amsterdam and The Hague. For Utrecht, no food strategy was available (Gout, E-mail, 2014) and therefore only the data collected during the interview is used. Locational characteristics and project characteristics could be assumed to affect each other, based on the scientific literature and the previous evaluation of empirical results in section 4.2.2. For the use of governance instruments and locational characteristics no proof has been provided yet. Therefore, the empirical results that have led to this assumption are discussed, before the actual analysis.

Indications that the use of governance instruments and locational characteristics are independent variables

Most policy makers indicate that policies related to the governance and development of urban agriculture are not aimed at specific locations or types of locations. Rachna Deenstra (Interview 2014) for example indicates that the municipality does not 'steer' or 'guide' the development of urban agriculture but supports and facilitates developments when they are seen as being in line with the policy goals of the city government. The same sentiment is expressed by other policy makers such as Van Huffelen (2014), in Rotterdam, and confirmed by the perceptions of civil society actors (Jan-Willem Van der Schans, Interview, 2014; Van Ardenne, Interview, 2014). Both Gout (Interview, 2014) and De Jel (Interview, 2014) describe the role of the municipality in Utrecht as facilitative rather than pro-active or steering and Rijpkema (Interview, 2014) states that:

"We look at the situation per project at the moment that the plans are becoming more complete and specific. And we chose to approach things like that because, if you would want to conduct research on soil quality and all those kinds of things even before there are specific plans for a site, that would be very expensive while 90% of the locations will not be used to develop urban agriculture. That is just a waste of time and money, really."

Even in The Hague, where the De Schilde project was initiated by the municipality, De Jager (Interview, 2014) and Koene (Interview, 2014) clearly indicate that they see urban agriculture as being a bottom up movement which they are eager to support, but for which they do feel that the role of the municipality lies in creating a favorable environment for its development rather than taking a leading role in its development. De Jager does not feel that there are certain 'target locations' for municipal policies in this regard. Van der Meij (Interview, 2014) confirms this, and both civil society actors interviewed in the city (Janssen-Van Raay, Interview, 2014; Van Roosmalen, Interview, 2014) also indicate that the municipalities' role is mainly a reactive one. In Amsterdam Sandra Konijn (Interview, 2014) also explicitly states that there is, at the moment, is no policy in place which subscribes the stimulation or discouragement of UA at specific locations, with the exception of Tuinen Van West.

When reading the food strategies of the cities a similar picture arises initially. In her personal foreword of the Rotterdam Food Strategy (Gemeente Rotterdam, 2012, p.5) Van Huffelen writes that:

"Fortunately there are many concrete projects which attribute to our ambitions. The municipality can sometimes be a partner in these developments, but is not always the one to take the initiative. A wide variety of initiatives have been started by civilians and entrepreneurs. I wholeheartedly support such efforts and hope that in the coming years many more of the projects will be developed."

In the food strategies of Amsterdam and The Hague similar approach can be discerned. The role of the municipalities is described as one of 'stimulating and facilitating', and here too bottom up initiatives are seen as the main driver of the development of urban agriculture. The city government primarily stipulates a role for itself in creating the conditions in which UA initiatives can be developed with success (Gemeente Amsterdam, 2014a; Gemeente Den Haag, 2014).

Indications for a dependency of the use of governance instruments on locational characteristics

Although the general rhetoric in food strategies, and the responses of policy makers and implementers during the clearly shows that municipalities appreciate urban agriculture as a bottom up movement, there are also indications, both in the food strategies of the different cities and in the answers provided by policy makers during interviews, that government instruments are not independent from locational characteristics. Furthermore several civil society actors also indicate that locational characteristics have an effect on the way they are involved in the governance of urban agriculture.

When taking a closer look at the food related policy documents of the different cities, there are a few sections in which specific locations are mentioned as a focus for governance by the city governments. In the food strategy of the municipality of Rotterdam, for example, the ten most stony neighborhood and mentioned as the focal point for the ambition to increase the number of community gardens (Gemeente Rotterdam 2012 p. 18 p. 22), and it is also indicated that the municipality will look at the possibilities to actively use the land she owns for the development of urban agriculture (Gemeente Rotterdam, p. 19). Lastly the development of urban agriculture on rooftops is explicitly tied to the already existing green roof program of the municipality (Gemeente Rotterdam, 2012, p.24).

Rooftops are also explicitly mentioned as a suitable location for the development of urban agriculture in the food strategy of The Hague (Voedselstrategie Den-Haag, 2013, p. 10). Here too a special subsidy is available for those who want to develop green roofs, either through food production or other vegetation. Unlike Rotterdam, The Hague also explicitly includes empty office spaces (among them De Schilde) as a possible location for urban agriculture (Voedselstrategie Den-Haag, p.15). Presently empty plots that are in need of redevelopment are tied to urban agriculture (p. 15) , as well as existing school gardens and city farms used for educational purposes at the moment of writing (p.17). Lastly the municipality of The Hague explicitly refers to the Stadsdelen (city districts) Schilderswijk, Transvaal and Centrum as being in need of more public green.

In the food vision of the municipality of Amsterdam, two types of locations are explicitly mentioned as being potentially suitable for the development of UA: empty office spaces and a variety of unused terrains which will not be developed in the near future (Gemeente Amsterdam, 2014a p.22). In both cases the municipality already plays a role: Sandra Konijn (Interview, 2014) researches the feasibility of UA in office spaces and plays a brokering role for interested entrepreneurs and real estate owners, interactive maps of both empty office spaces (Gemeente Amsterdam, 2014c) temporarily available spaces can be found online (Gemeente Amsterdam, 2014d). The developments in the Tuinen van West area and the role of the government (giving the land it owns in leasehold to UA entrepreneurs) are also mentioned in the document (Gemeente Amsterdam, 2014a, p.24).

Aside from the contents of these policy instruments, the statements from several policy makers and implementers also indicate that, although the general approach of the municipality is a reactive facilitating one, certain locations such as temporarily unused land (Deenstra, Interview, 2014; De Jager, Interview, 2014) or office spaces (Konijn, Interview, 2014) are seen as potentially interesting locations for the development of UA. This is an indication that certain locational characteristics could

affect the use of governance instruments by municipalities. Furthermore, a few civil society actors also indicate that the characteristics of the location of a project may influence the use of governance instruments (e.g. Janssen-Van Raay, Interview, 2014; Van Ardenne, Interview, 2014). Some examples of both situations will be discussed in more detail after the analysis of the interrelationships between the two types of variables. For now it suffices to say that both the review of policy documents and the responses during interviews show that such an interrelationship exists.

Analyzing the interrelationships between the use of governance instruments and locational characteristics

To elucidate the way in which the use of governance instruments in influenced by locational characteristics, the qualitative data gathered during the interviews with policy makers and implementers and civil society actors has been analyzed. Where respondents indicated an instance where the use of governance instruments was influenced by locational characteristics, the references were coded at special relationship nodes. The results indicating a dependence of the dependence of the use and availability of governance instruments on locational characteristics are discussed first, followed by those indicating a reverse relationship.

Empirical results indicating that the use and availability of governance instruments depends on locational characteristics

The relationship between locational characteristics and the use of governance instruments was first analyzed for civil society actors. The results are presented in figure 4.10 below.

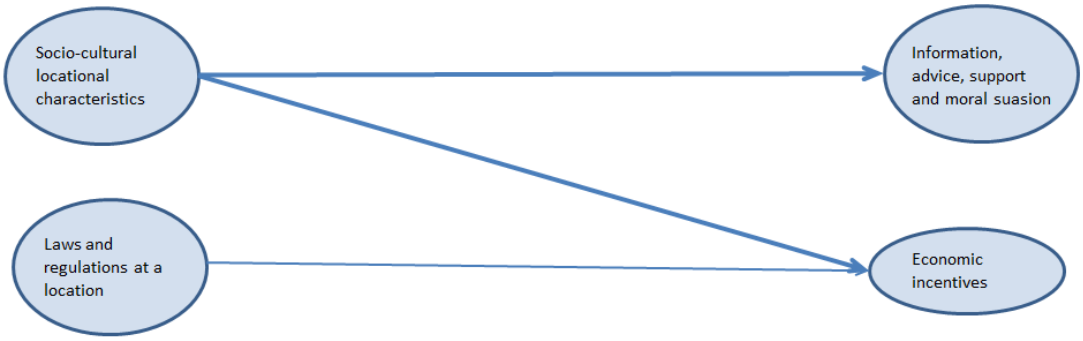


Figure 4.10: The relationship between locational characteristics and the use of governance instruments by civil society actors.

As can be seen from the figure, only a few instances, in which locational characteristics had an influence on the use and availability of governance instruments by civil society actors, have been encountered during the research. This is to be expected: most of the governance instruments used by civil society actors (see table 4.15) make use of the general governance mechanism “Information, advice, support and moral suasion”. The specific governance instruments within this category are usually not place, or even project specific (e.g. the creation of informal networks, generating exposure for urban agriculture and raise the awareness of the general public). Still the empirical data shows that the socio-cultural locational characteristics can influence both the use and availability of governance instruments related to two governance mechanisms: “Information, advice, support and moral suasion” and economic incentives. Two sources have provided examples of each of these relationships. A quote from Jan-Willem Van der Schans (Interview, 2014), who indicates that the time for which a location is available and the likely development future of the location are characteristics which cause him to try to persuade the municipality to make this a policy priority, may elucidate the first type of relationship:

"Here in Rotterdam I advocate that.. Well you could even say as a municipality that, from your development strategies for the city: on which locations do we want to allow the development of urban agriculture as a means for placemaking? And on which locations should it become part of a permanent urban agriculture infrastructure? In some places the city might wish that the development of housing is speeded up: than you can make those locations 'hot' through placemaking. And in other places you might say: well, we bought this land at the time but for now the developments that we planned will not work out anyway, so we will develop a food forest on this location for now. Because those locations will not be interesting for development for the coming 10 years anyway." (Jan-Willem Van der Schans, 2014).

An example of the way in which socio-cultural locational characteristics influence the use of economic incentives is provided by Janssen-Van Raay (Interview, 2014). She indicates that the demographic and socioeconomic characteristics of the area in which a location is embedded can make such locations a priority for the funding and educational support programs of Fonds1818, but that these areas are at the same time the places from which the fewest applications for funding are received. Another socio-cultural characteristic which influences the extent to which governance instruments such as donations are used by Fonds1818 is the accessibility of a location. Projects which are granted a donation should in principle be located in public spaces. (Van Janssen-Raay, Interview, 2014).

When we analyze the relationship between locational characteristics and the use of governance for policy makers and implementers, the picture changes:

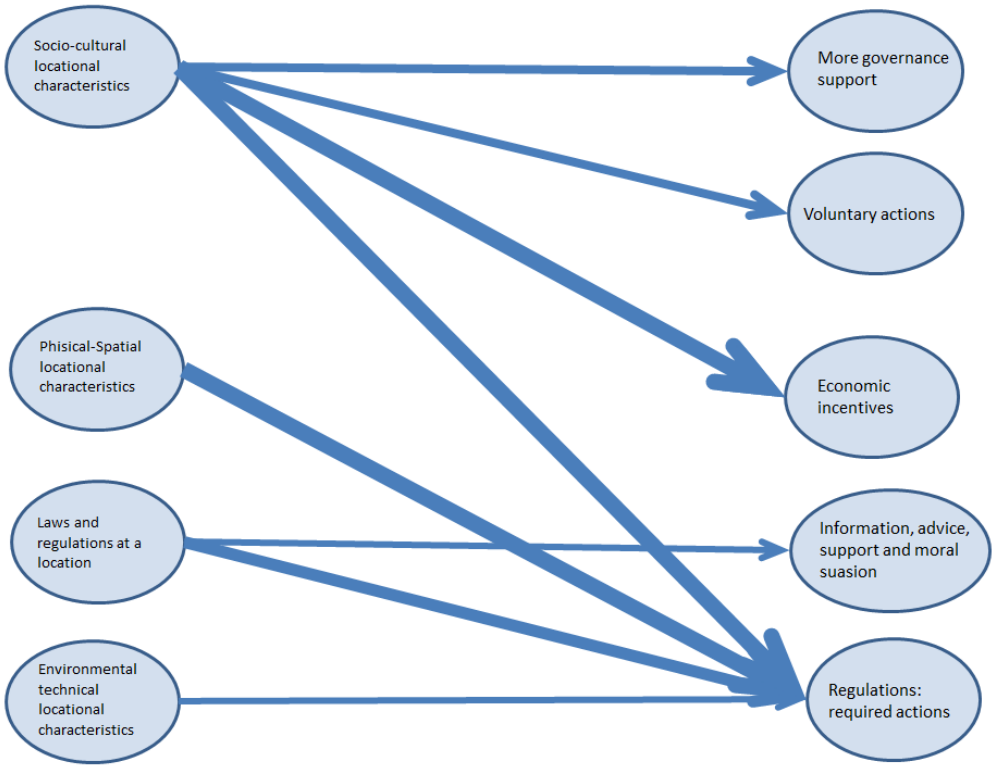


Figure 4.11: The influence of locational characteristics on the use of governance instruments by policy makers or implementers.

Socio-cultural locational characteristics influenced the use of governance instruments by policy makers or implementers for each of the four mechanisms distinguished in table 2.4, especially the use of economic incentives (7 sources) Information, advice and moral suasion (6) and regulations (7) and aside from that were mentioned as generally increasing the use and availability of governance instruments by 4 sources. Physical and spatial locational characteristics were seen as an influence on the use of regulations by 7 independent actors, but were not perceived to have influenced the use of any other governance instruments. Location specific laws and regulations mainly influence the use of regulations as a governance instrument (5 sources). Environmental-technical characteristics have been mentioned to influence the use of regulations as a governance instrument by 3 sources.

An example of the influence of socio-cultural locational characteristics on the use and availability of economic incentives by policy makers and implementers is the fact that subsidies such as the urban agriculture subsidy in Utrecht, or livability subsidies in The Hague are only used for projects which are accessible to the general public (e.g. Gout, Interview, 2014; Rijpkema, Interview, 2014; De Jager, Interview, 2014). At the same time this public accessibility also leads to the enforcement of regulations. In the case of Food for Good for example (which is a fenced project) it is not allowed to prevent public access by locking the fence when the park manager is at the site, so that the general public retains access. Another example of the influence of socio-cultural locational characteristics on regulations is the fact that the use of temporarily unused spaces are made available to people on the precondition that no permanent structures such as toolsheds can be build there (Rijpkema, Interview, 2014) to ensure that when the land is developed or the temporary initiative stopped, the land can easily be transformed again.

Physical-spatial characteristics of a location mainly influence the use of regulations because they trigger authorities to either prevent UA developments or add certain preconditions to their development. This is done to prevent the growing of food crops directly in polluted soil (e.g. Koene, Interview, 2014; Gerritse, Interview, 2014), but also because the development of projects close to other land uses can potentially lead to a transgression of environmental regulations (Gerritse, 2014).

Location specific laws and regulations can influence the use of regulations because they lead to an exception to the rules (in which case a spatial permit is used to facilitate the development of UA) or because In one example mentioned by Jan-Willem Van der Schans (Interview, 2014) the use of case specific permits was required to facilitate the development of a mint garden on a dike (in this case changes in the project characteristics and physical locational characteristics were also required).

Empirical evidence indicating that locational characteristics dependent upon governance instruments

Although it might seem like a counterintuitive statement at first it is true that locational characteristics can be changed by the use of governance instruments. The use of governance instruments from the "Regulations" category can directly change the "Juridical status of the locations and spatial legislation applicable" as well as the "Ownership and tenure modality of a space at a certain location". More simply put: municipalities can change rules, zoning and permissions tied to a certain location by for example changing the zoning status of a location and they could change the ownership of a location through the acquisition and redistribution of land or buildings. The number of sources mentioning the occurrence of either one of these situations (7) is visualized in figure 4.12. Because civil society actors did not make use of these instruments, they are absent from the discussion of this type of relationship.

Figure 4.12: The influence of the use of governance instruments on locational characteristics

All of the responses indicating this kind of relationship are related to either one of three cases included into the research: De Tuinbutler, Uit Je Eigen Stad or De Schilde. In the case of Uit Je Eigen Stad, both the ownership of the location and its zoning status has been changed, to enable the projects development. The changes in terms of both the ownership and zoning status of the land in the Tuinen van West area, which includes the location for the Tuinbutler project, provide the clearest example of the kinds of relationships. Here, the municipality of Amsterdam has changed the zoning status to include urban agriculture as a land use, not as a reaction to the development of a particular project but pro-actively because the vision it had for the redevelopment of the area was included the development of UA (Vermeulen, Interview, 2014; Van Asperen, Interview, 2014). Moreover, the municipality has actively sought to stimulate the development of UA by offering long term leasehold ("erfpacht" in Dutch) to entrepreneurs who fitted this redevelopment vision (Vermeulen, Interview, 2014)

The development rights of the land were granted to the housing corporation Havensteder, on the precondition that the corporation would facilitate temporary uses on the land which would stimulate the local economy and contribute to a process of 'place making' on the location (Jan Van der Schans, Interview, 2014). Uit je Eigen stad was one of these placemaking activities although it did not initially fit the land-uses included in the zoning status of the plot. To facilitate the developments despite these regulatory barriers, the government has granted a temporary spatial permit for the project for the moment, and plans to include urban agriculture as a land use when the zoning status itself is changes in 2016 (de Leede, Interview, 2014).

In the case of De Schilde the zoning status of the De Schilde building has not been changed, nor will it be changed in the future: instead the UA project developed there by urban farmers is treated as a commercial land-use, which fits the current zoning status of the building. I nevertheless included it as a case in which the location specific laws and regulations are changed through governments instruments, because the municipality of The Hague (although officially not the only owner of the building) directly and autonomously decided to grant the rent of the sixth floor to the De Schilde project, as a result of the Stadslandbouw initiative (Gemeente Den Haag, 2014; Durno, Interview, 2014), and has ensured that urban agriculture will be allowed as a land-use within the current zoning plan before the Stadslandbouw initiative started. Therefore, even though the ownership and zoning status are not officially changes, this too is an example of a location at which the municipality pro-actively changes the location specific laws and regulations to stimulate the development of UA. This is a big difference with more reactive cases in which authorities facilitate the development of UA through exceptions on the existing location specific laws and regulations.

Concluding remarks

Based on the analysis of qualitative data collected during semi-structured interviews, an interdependent relationship between locational characteristics and the availability and use of governance instruments has been discovered, which was not expected on the basis of the scientific literature and therefore not expressed in the conceptual framework (figure 2.5).

A more detailed analysis of the interview data has shown that the use of governance instruments by civil society actors was influenced by socio-cultural location characteristics as well as location specific laws and regulations, while all four types of locational characteristics have an influence on the use and availability of governance instruments by policy makers. The use of economic incentives and voluntary actions is influenced only by socio-cultural characteristics, which are, together with physical spatial characteristics, also an important influence on the use of regulations. Regulations such as spatial permits and exceptions to the zoning status of a location, or a somewhat less strict enforcement of zoning stipulations, are used in situations where the existing location specific laws and regulations hamper the development of UA at locations where policy makers do wish to allow such developments. The only instances in which a reverse location between the variables is observed are those in which the laws and regulations applications applicable to a location or its ownership are changed by policy makers pro-actively, rather than as a reaction to bottom-up initiatives and developments.

As with the analysis of the interrelationship between locational characteristics and project characteristics, the direct link between locational characteristics and the use of governance instruments does not stand for a direct causal mechanism. A detailed look at some of the references presented as quotes in the previous text, shows that locational characteristics influence the use and availability of governance instruments because they are important with respect to the policy goals of different actors. For example: socio-cultural locational characteristics such as the accessibility of a location influence the use of economic incentives by policy makers and implementers because city governments feel that these instruments should be used to improve the livability in public spaces; the use of economic incentives is triggered through the combination of that policy goal and socio-cultural locational characteristics. However, because these policy goals are often not explicitly mentioned by respondents it is impossible to add them to the analysis for every individual relationship encountered during the empirical research.

4.4. The conceptual framework adapted in accordance with empirical results:

The results of the three analyses discussed in the previous sections (4.3.1 to 4.3.3) on the way in which on the level of governance mechanisms, types of project characteristics and the 4 locational layers mentioned in the theoretical framework influence each other, have confirmed the relationships assumed in the conceptual model as originally presented in the theoretical framework, but they have also shown that it was incomplete.

The results of the research confirm that both the use of governance instruments and the characteristics of different locations within a city influence the development of urban agriculture projects through influencing particular project characteristics. However the analysis of the relationship between these variables has also shown that project characteristics have an influence on both (1) the use and availability of governance instruments belonging to each of the four governance mechanisms and (2) the locational characteristics of the site at which a project is developed. The analysis of the relationship between the use and availability of governance and locational characteristics instruments has shown that these variables influence each other as well.

With this analysis it is now possible to make more explicit assumptions on the way in which the key elements presented in the original conceptual framework interact and provide an explanation with regard to how locational characteristics and governance instruments may influence the development of urban agriculture. In fact, the general conceptual framework can, now that is has been revised on the basis of empirical research, be seen as constituting a rough *theory* (see Ostrom, 2007 p.27) on the influence of locational characteristic and the use of governance instruments on the development of urban agriculture. This theory explaining the way in which the way in which the aforementioned variables can influence each other is presented in figure 4.13 below:

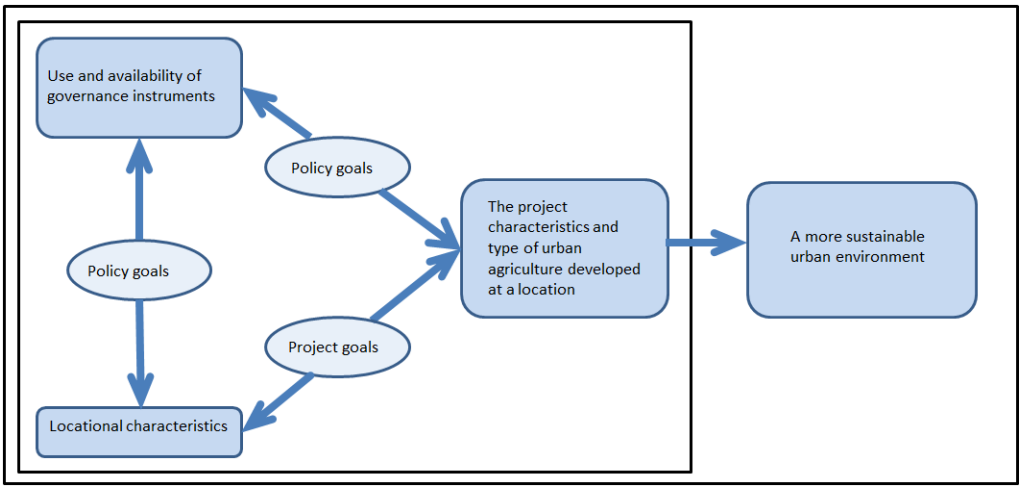


Figure 4.13: A theoretical framework explaining the way in which locational characteristics and governance instruments influence the development of urban agriculture

The theory presented in figure 4.13 is based on the following assumptions, (which are based on the analysis of the empirical data collected during the research):

(1) The project characteristics and therefore the development of urban agriculture are influenced by locational characteristics because project leaders and urban farmers adapt these characteristics to avoid or mitigate the effect of disadvantageous characteristics, and make optimal use of the opportunities presented by advantageous ones. Projects will not be developed at a location if too many characteristics are disadvantageous or if locational prerequisites for the development of key characteristics of the project are not met. To a somewhat more limited extent the locational characteristics can be influenced by the development of urban agriculture. In this case project leaders and urban farmers change the locational characteristics to fit the locational requirements for their project as best as possible.

(2) The use of governance instruments influences the project characteristics and therefore the development of urban farmers because urban farmers and project leaders adapt their projects characteristics because project leaders and urban farmers adapt these characteristics to avoid or mitigate the effect of sanctions, limitations or prohibitions which can be enforced through the use of governance instruments, and make optimal use of the opportunities presented by advantageous ones. The use of governance instruments in relation to the development of urban agriculture is usually reactive rather than pro-active, and is caused by the fact the use of governance instruments by actors is a result of the perceptions of the actors. Actors adapt their use of governance instruments to the extent to which project characteristics correlate or conflicts with the policy goals that are the motivation for the use of such instruments. The influence of governance instruments on project characteristics, and thus the development of urban agriculture, is more limited than the other way around, because of this reactive use of governance instruments.

(3) Locational characteristics can influence the use of governance instruments because actors perceive that the characteristics of the location at which urban agriculture is developed influence the extent to which the development of such urban agriculture projects correlates or conflicts with the policy goals that are the motivation for the use of such governance instruments. The influence of governance instruments on the locational characteristics of the sites at which urban agriculture is developed , is more limited than the other way around, because of the reactive rather than proactive use of governance instruments,

Figure 4.13 and the statements below also reflect the indirect influence two kinds of intermediate variables: the project goals which motivate a farmer to undertake actions which change locational characteristics, and the policy goals which lead policy makers and implementers to change the laws and regulations applicable to a location. These intermediate variables were not included in the analysis explicitly, because they are not always explicitly mentioned by the respondents during the semi-structured interviews. In some cases they could have been derived from the interview data through logical reasoning or implicit remarks of the interviewees, but that would make the nature of the results highly subjective and decrease the reliability of the results. Therefore, they are included in the extent to which particular but only to show that policy and project goals in general are an intermediate variable in the relationships between the 3 variables that were the subject of the analysis. The indirect influence of policy goals and project goals can be seen in most of the quotes used to explain the results of the analyses in the sections 4.3.1 to 4.3.2. With the theory resulting from the revision of the conceptual framework, the central question guiding the thesis research can be answered.

5. Conclusions of the research

Through this study an attempt has been made to contribute to the closing of two knowledge gaps identified within the scientific literature: (1) a lack of knowledge regarding the influence of the characteristics of specific locations in a city on the development of specific types of UA at those locations and (2) a lack of knowledge regarding the influence of different governance instruments on the development of specific types of urban agriculture. This research aim led to the following central research question:

What role do governance instruments and locational characteristics play in the development of different types of urban agriculture?

To answer this research question, four tools for analysis have been developed: (1) a typology of different types of UA, (2) a general framework on the different locational characteristics influencing the development of UA, (3) a general framework on the governance mechanisms and governance instruments available to actors involved in the development of or governance of UA and (4) a theoretical framework indicating the way in which locational characteristics and the use of governance instruments influence the development of UA. Now that all of these analytical tools have been evaluated and adapted on the bases of the results of the empirical research, the five sub-questions related to the central research question, and the central research question itself, can be answered.

What are the main types of UA that can potentially be developed in a city?

The research shows that 12 types of UA included in the original typology presented in table 2 has been developed in the Netherlands, or will be developed in the near future. These types were: (1) Backyard urban farming (2) Institutional gardens, (3) Guerilla gardening, edible landscape movement (4) community gardens, (5) open space outdoor commercial farming, (6) Open space outdoor recreational farming (7) non-commercial rooftop farming, (8) commercial rooftop farming (9) commercial farming in an outdoor controlled environment (10) non-Commercial farming in an indoor controlled environment and (11) Commercial farming in an indoor controlled environment and (12) Volkstuinen.

Two of these types of UA were not mentioned in the original typology as based on the scientific literature alone: open space outdoor recreational farming and Volkstuinen. These types of UA were added to complete the typology on the basis of the empirical evidence. The usefulness of the general typology of different types of UA as a tool for analysis has been tested by evaluating the project characteristics associated with 7 of the 12 types of UA mentioned in the general framework on the basis of the empirical research.

How do different locational characteristics influence the development of these different types of UA?

The results of the research show that all but two of the locational characteristics mentioned in the original framework is seen as a as either a prerequisite or a (dis)advantage for the development of Urban Agriculture by the actors engaged in its development or governance. Furthermore, ten locational characteristics which were not listed in the original framework have been added on the basis of the empirical research. An analysis of the extent to which locational characteristics were experienced by project leaders and urban farmers as either a prerequisite or as (dis)advantageous for the development of their projects shows that the influence of locational characteristics on the development of UA does indeed vary between different types of UA, but that even the locational characteristics labeled as prerequisites must not be seen as fully determining whether the development of UA at a location is possible. Rather they can be seen as strongly influencing the suitability of a location for the development of a specific type of UA.

The more in-depth analysis of the interrelationship between different types of locational characteristics and the specific project characteristics of the UA projects included in the research shows that the characteristics of a project are influenced by the characteristics of the location and vice versa. The influence of socio-cultural locational characteristics and physical-spatial locational characteristics on both the physical and production characteristics of UA projects was most often mentioned as an example of the first direction. When project characteristics trigger urban farmers and project leaders to actively change the characteristics of a location this is usually because the physical characteristics of the project necessitate farmers to change the physical-spatial properties of the location at which the project is developed.

What are the different governance instruments available to different actors when developing and establishing different types of urban agriculture within a city?

The research has shown that at least four kinds of actors are involved in the development or governance of UA. Two of these types of actors have been included in the research directly, namely (1) policy makers or implementers and (2) civil society actors. The two other actor types which were not included in the research directly were (1) academics and knowledge institutes and (2) actors from the private sector. All of the governance instruments used by these actors can be classified as one of four types of general governance mechanisms: (1) regulations and required actions, (2) economic incentives (3) voluntary actions for the enhanced support and security of UA (4) information support and moral suasion (5) institutional measures. The empirical research has provided empirical evidence for the use of each of these governance mechanisms. No other governance mechanisms were encountered during the research but a total of 18 new governance instruments were added to the framework as a result of this evaluation, most of which were classified as belonging to the governance mechanism “Information, advice, support and moral suasion” .

The research suggest that the role of these kinds of instruments as well as institutional measures is larger than was initially expected, and that most actors, including city governments, make use of supportive, facilitative and reactive governance instruments; attempts to proactively stimulation the development of UA or steer the places at which particular kinds of UA are developed, was not encountered in any of the cases included in the research, even though for policy makers and implementers the governance instruments needed to be able to exert this kind of top-down governance were available.

For ten governance instruments mentioned in the framework, there are no empirical results confirming their use or availability. These ten instruments were spread over each of the four general governance mechanisms used to structure the framework,

How do these governance instruments influence the development of UA?

The results of the research indicate that the use of governance instruments does influence the development of UA, but the number of actors that explicitly mentioned such an influence is limited. Economic incentives of both civil society actors and policy makers and implementers can have an indirect influence on the social and actor characteristics of a project and policy makers have been shown to directly influence these characteristics by using regulations. Contrary to the expectations expressed in the scientific literature, the results of the research indicate that the project characteristics of different types of UA also influence the use of governance instruments. Moreover the influence of project characteristics on the use of governance has been reported more often than the other way around; the use of governance instruments is ‘triggered’ by project characteristics, because this in turn influence the impact attributed to the development of UA in relation to policy goals.

What role do governance instruments and locational characteristics play in the development of different types of urban agriculture?

Based on the empirical research it can be stated that governance instruments are mainly used in a supportive and facilitative manner and seem to have only a limited influence on the project characteristics of urban agriculture projects. Aside from the fact that the influence of governance instruments is only confirmed to a limited extent by the research, empirics show that there is a causal relation in the other direction: UA project characteristics 'trigger' the use and availability of governance instruments. The amount of empirical data supporting the dependence of the use of governance instruments from project characteristics shows that the way in which civil society actors and policy makers is often reactive rather than proactive.

The research has shown that locational characteristics play a stronger more determining role in the development of different types of urban agriculture. For all of the cases included in the research the characteristics of the location at which they were developed influenced the physical, social and actor and production characteristics of the project. Although the amount of empirical data referring to such adaptations is smaller than that indicating an adaptation of the project characteristics, the research has shown that project leaders and urban farmers included in the research also succeeded in influencing those locational characteristics which were experienced as disadvantageous for the development of their project.

The results of the research have shown that, contrary to what could be expected on the basis of the literature that has been reviewed, there is an interrelationship between locational characteristics and the use and availability of governance instruments by different actors. The empirical evidence shows that the use of governance instruments by civil society actors was influenced by socio-cultural location characteristics as well as location specific laws and regulations, while all four types of locational characteristics had an influence on the use and availability of governance instruments by policy makers. A reverse relationship between the variables is also possible, when policy makers pro-actively change the laws and regulations applications applicable to a location or its ownership by using the governance instruments grouped under the governance mechanism "regulations". Because the possibility of this relationship was not mentioned in the scientific literature, this interrelationship was not included as an object of research in the original research design. It has been included in the theoretical framework, because this model would be incomplete without the inclusion of the possible implications for the way in which governance instruments and locational characteristics influence the development of urban agriculture.

6. Discussion

The research has confirmed the expectations based on the scientific literature that locational characteristics and governance instruments influence the development of UA, because both variables influence the project characteristics of UA project in a variety of ways. Nevertheless the results of the empirical research clearly show that the image of urban agriculture as a purely adaptive land use would be an incomplete one. Empirics show that project characteristics of different types of UA are not just a dependent variable influenced by the use of governance instruments and locational characteristics, but that these project characteristics in turn also influence the use of governance instruments and can indirectly lead to changes in the characteristics of the location at which a project is developed. These results have been used to build a more complete theoretical framework of the development of UA. Before the implications of this framework with regard to the explanation of the geography of UA within a city as well as the quest for finding more, or the most suitable locations for the development of UA are discussed, the limitations of the research need to be made explicit.

Limitations of the research

Because the body of scientific literature dealing with the interrelationships between the characteristics of different locations and types of urban agriculture as well as the governance of UA was limited, it was necessary to generate hypotheses and build a theory explaining these interrelationships, rather than testing one. For these purposes a qualitative case study design was a suitable research design, but this approach does come with a number of limitations.

The external validity of the research is limited because the sample of cases studied is representative only for the governance of UA in the Netherlands: zoning legislation, the use of permits and exemptions to spatial regulations and in general the kind of governance instruments used by different actors are all important components of the three frameworks presented in section 4.2 and all of these phenomenon are very context and place specific. It might even be argued that for a large part of the results the external validity of the research does not reach beyond the four cities which were a part of the research. It is likely that the presence of different types of actors the governance instruments which they are able to use when engaging in the development or governance of UA, in part depend on the size of the population of a city and the way in which its government is organized. Insofar as the lack of external validity applies to the three general theoretical frameworks which have been created on the basis of the research, it is less problematic. A possible lack of external validity is not an impediment for the use of these frameworks as an analytical tool even in a context other than that of the Netherlands: they are arguably more comprehensive that the frameworks which were available to serve as a starting point for the research of this thesis, because they have combined the most useful and important elements of the existing scientific literature and have been validated on the basis of empirical research. Furthermore these are general frameworks and not theories or models for predicting the behavior of actors and should be used as such. Although it is true that the frameworks will prove more incomplete and perhaps conflicting with reality when they are used in a context very different than the one upon which they have now been based, they do provide a useful structure for analysis for research in any context.

The results flowing from the second part of the research are likely to have a somewhat larger external validity. The analysis took place on the more abstract level of urban layers and governance mechanisms and therefore the conclusions drawn from this analysis are somewhat more generalizable. It is likely that the governance mechanisms, different types of locational characteristics and different types of project characteristics will be present in some form in most cities in the developed world. Although, it is also quite likely that some of the specific governance instruments as well as the locational characteristics mentioned in the general frameworks will vary from city to city, it is unlikely that the broad categories of these variables will not be present in a context different from that of the Netherlands. Therefore it should be possible to test the specific assumptions made in the theory even when the context of research differs from the one upon this research was based.

In research contexts where there are reasons to believe that even the broad categories upon which the theoretical framework is based are likely to induce a bias in the research, the general frameworks can be used as an analytical tool to see whether this is indeed the case. The results stemming from such research could then be used to adapt the theoretical framework where this is necessary. Thus, where the current research does not lead to generalizable predictions with regard to the influence of the use of governance instruments and locational characteristics on the development of different types of urban agriculture, it has provided a sensible starting point for empirical research in any context: the only difficulty with using these tools in a widely different context is that more adaptations are likely to be required.

Furthermore, it should be explicitly mentioned that both the general and the theoretical framework are likely to be incomplete even in a context similar to that of the current research. One example of this is the fact that the empirical data on the governance instruments used by private sector actors has been gathered indirectly through the interviews with civil society actors as well as policy makers and implementers. Additional research on the role of the private sector in the development of urban agriculture would therefore be a useful addition to the work presented in this thesis.

Theoretical implications of the research

Despite these limitations the research has provided a number of interesting results. The research has shown that the influence of the use of governance instruments and locational characteristics on the development of urban agriculture, are different for different types of urban agriculture and in general may be more limited then is sometimes implicitly assumed in the scientific literature. It has also shown that locational characteristics and the use of governance instruments can in fact be influenced by urban farmers when project characteristics and project goals necessitate such behavior. Both of these interrelationships have interesting implications for scientific research on the governance and development of urban agriculture.

Much of the research related to the design and conductance of land inventories by urban planners and geographers assumes that the bottleneck for the development of UA is the lack of suitable spaces available for its development, or the lack of information of the location of these spaces. This has led to the promotion of land inventories as a tool for the development of UA, as well as a call towards policymakers to create more space for urban agriculture and integrate its development explicitly in spatial zoning plans and other directive policy tools. Both of these issues remain very important because if anything, the current research has further established the relevance of locational characteristics for the development of UA and the influence of policy makers and implementers on the availability of such locations for its development.

However, knowing that locational characteristics are not an all determining set of characteristics with regard to the development of urban agriculture, and that locational characteristics are often influenced by both urban farmers and the use of governance instruments by policy makers, the criteria used in such searches for suitable land may be relaxed somewhat with regard to characteristics such as the pollution of soils of the availability of unsealed land: several cases included in this research have shown that these characteristics need not be seen as irreversible barriers for the development of UA. The extent to which specific locational characteristics can be changed by urban farmers to create suitable spaces for the development of UA might be an interesting topic for research, because it could elucidate which locational characteristics should truly be viewed as strong suitability criteria or even prerequisites for the development of urban agriculture, and for which criteria other solutions may be available. If, as the results of this thesis indicate, locational 'prerequisites' are not be as all determining for the successful development of UA as is sometimes implicitly assumed, than perhaps the biggest bottleneck for the development of urban agriculture development is not a lack of space but the fact that those aiming to stimulating its development are looking for these spaces at the hand of locational criteria which are too rigid.

The research has also shown that criteria for locational suitability clearly vary between different types of urban agriculture; the theoretical notion of adaptive urban farmers expressed in the revised Von Thünen model has been confirmed. The research has clearly shown that the fourth assumption made by De Graaf et al (ibid) regarding the influence of location characteristics is true: the different properties of the urban environment and specific locations within it, do indeed cause a variation in locational barriers and opportunities, and therefore, at least in part, *cause* the spatial pattern of different types of Urban Agriculture within a city. The influence for each of the urban layers suggested by De Graaf et al (ibid) has been confirmed. Moreover, the research has shown that a fourth non tangible layer can be added to this framework: that of locations specific laws and regulations. This means that it is not only true that scientific research aimed at establishing the potential space for urban agriculture within a city should change the way in which locational characteristics guide such research, but that such searches should also be aimed at specific types of urban agriculture rather than UA in general. Estimations of space for the development of UA based on a general rather than type specific list of criteria will always provide an inaccurate result with regard to the scale at which urban agriculture can actually develop in a city. In some land inventories (e.g. Ackerman, 2012) this is already done to some extent. This research has provided a more elaborate list of the locational criteria which matter for various types of UA and should thus enable the conductance of land inventories on the basis of locational criteria which are more accurate for each of the types of UA included in the research.

The research has shown that the influence of the use of governance instruments by policy makers and implementers is not one-sided, as it is sometimes implicitly assumed to be in the scientific literature, and that the kind of UA which is developed and the locations at which these developments take place actually influence the use of governance instruments. This is a reason to nuance the call for the integration of urban agriculture in the scientific discipline and practice of urban planning, as the dominant direction of research when it comes to the governance of urban agriculture and urban food systems.

The research results do not say anything about the barriers which a lack of integration which a lack of integration of urban agriculture in urban planning practices may cause. And as mentioned in the theoretical framework, there is a large body of scientific literature, based on empirical research, which shows that this lack of integration in spatial planning practice and policy making by city governments does indeed form a barrier for the development of urban agriculture in a variety of cities across the globe. Therefore the call for making urban agriculture and food systems in general an integral part of urban planning practice and the strategies and policies of local authorities voiced by Thrift (2011), Morgan (2009) and others, is not disproven; this should remain an important focus of the research on urban planning and urban food systems.

However, on the basis of the work presented in this thesis, it is clear that a focus on this more pro-active and top-down kind of governance, should not lead to the neglect of the more reactive governance of UA which is, although perhaps not the theoretical ideal, the practical reality in the Netherlands and perhaps in many other cities elsewhere. Where the more pro-active inclusion of urban agriculture in the urban planning system proposed by the aforementioned authors is not feasible, the way in which much of the use of governance instruments by policy makers and implementers as well as civil society actors in this research was reactive may be an interesting avenue for future research. One promising direction of research of this kind would be related to the knowledge gap regarding the exact relationship between policy goals or project goals and the actions of actors which lead to a change in locational or project characteristics, or the use of governance instruments. During the research it became apparent that the characteristics of particular locations and UA project 'triggered' the use of governance instruments by policy makers and implementers. Although there are many implicit indications that the policy goals of civil society actors and policy makers or implementers may be the underlying cause of this reactive type of governance, the exact way in which this causal mechanism operates could not be derived from the interview data because policy goals were mentioned implicitly rather than explicitly by most of the interviewees. To establish

which policy goals might trigger the use of specific governance instruments, and if the causal mechanism behind this influence of locational and project characteristics on the use of governance instruments is indeed completely related to project goals and policy goals would be an interesting topic for follow up research.

Policy recommendations

The research has shown three phenomena which are of particular importance to those that are engaged in the governance and development of urban agriculture:

(1) That, as suggested by Van Veenhuizen (2006) the potential sustainability impact attributed to urban agriculture by all of the actors involved in the research, varies with the type of urban agriculture in question and is in general much broader than is suggested by the scientific literature.
(2) That in all four of the cities included in the research, the use of governance instruments is mostly of a reactive rather than a pro-active nature, and depends on locational characteristics and the type of urban agriculture which is being developed. This dependence is caused by the fact that locational and project characteristics are perceived to have an influence upon the sustainability impact associated with the development of urban agriculture, which conflicts or correlates with certain policy goals that motivate the use of governance instruments by actors.
(3) Urban farmers have the capacity to adapt to some extend to locational characteristics by adapting the characteristics of their urban agriculture project. This dependence is caused by the fact that locational and project characteristics are perceived to have an influence which conflicts or correlates which certain project goals.

These three statements show that there is an intermediate position which can be assumed by civil society actors and policy makers involved in the governance of urban agriculture, namely one in which the nature of this governance remains reactive to some extent, but in which it is centrally coordinated. In this way the use of governance instruments may be channeled in such a way that it leads to the development of those project characteristics or type of UA project which provide the biggest contribution to the policy goals associated with the development of urban agriculture. The food strategies and food visions which have been adopted recently by Amsterdam, Rotterdam and The Hague as well as the research on the current state of the development of urban agriculture in Utrecht provide a promising point of departure for this kind of governance; as do the formation of more central information points to provide those that wish to develop an urban agriculture project with information and possibly assistance from the city government. But the adaptation of policy documents and the provision of information alone would mean a missed chance for both city governments and civil society actors and project leaders and urban farmers.

Although municipalities and other policy makers and implementers do not need to plan or conduct the development of urban agriculture themselves, the research shows that there is a potential to at least influence the locational selection process and the type of urban agriculture that is developed by others. This could be achieved by the creation of even clearer policy goals, or possibly policy targets, ideally in cooperation with both civil society actors and urban farmers. In this way municipalities would avoid a situation in which they have to spend too much more financial resources, but they would ensure that the resources that are already spend via the use of governance instruments is more coordinated. Furthermore, if the 'triggers' for the use of governance instruments and the policy goals which cause these triggers are established together with civil society actors and urban farmers than the capacities of both of these types of actors can also be used as effectively as possible. Civil society actors with financial means such as Fonds1818 can create preconditions for the use of their own economic incentives which complement those of city governments. Furthermore, if the policy goals of city governments and civil society actors are communicated clearly to project leaders and

urban farmers, these actors can in turn use their capacity to adapt the characteristics of their projects in such a way that they make optimal use of the governance support which can become available when the characteristics of the site at which a project is developed and characteristics of the urban agriculture project itself correspond with the policy goals of both city governments and civil society actors.

7. References

Ackerman, K. (2012). *The potential for UA in New York City: Growing capacity, food security, and green infrastructure.* New York: Columbia University Urban Design Lab.

Agudelo-Vera, C.M., A. Mels, K. Keesman and H. Rijnaarts (2012). The Urban Harvest Approach as an Aid for Sustainable Urban Resource Planning. *Journal of Industrial Ecology*, 16(6), 839-850.

American Planning Association (2007). *Policy Guide on Community and Regional Food Planning.* Chicago: American Planning Association

Ardennen, A. van. Personal interview. 07-07-2014

Armstrong, D. (2000). A survey of community gardens in upstate New York: implications for health promotion and community development. *Health & Place*, 6(4), 319-327.

Asperen, R. van Personal interview. 10-10-2014

Aubrey, C., J. Ramamonjisoa, M.H. Dabatc, J. Rakotoarisoad, J. Rakotondraibee and L. Rabeharisoa. (2012). UA and land use in cities: An approach with the multi-functionality and sustainability concepts in the case of Antananarivo (Madagascar). *Land Use Policy,* 29(1), 429– 439.

Bai, X. (2007). Industrial Ecology and the Global Impacts of Cities. *Journal of Industrial Ecology,* 11(2), 1-6.

Bakkum, F. Personal explorative interview. 06-02-2014

Balmer, K., J. Gill, H. Kaplinger, J. Miller, M. Paterson and A. Rhoads (2005). *The Diggable City: Making UA a planning priority.* Portland: Portland State University School of Urban Studies & planning.

Bauman, W. E-mail correspondence. 15-10-2014

Bauman, W. Personal interview. 25-04-2014

Bink, A. Personal interview. 28-03-2014

Björklund, A., C. Bjuggren, M. Dalemo, and U. Sonesson (1999). Planning biodegradable waste management in Stockholm. *Journal of Industrial Ecology,* 3(4), 43–58.

Blom, M. Personal interview. 14-10-2014

Bohemen, H, van. (2012). Chapter 2: (Eco)System thinking: Ecological Principles for Buildings, Roads and Industrial and Urban Areas. In: Bueren, E. M. van, H. Van Bohemen, L. Itard, Visscher, H. (Eds.), *Sustainable Urban Environments: an ecosystem approach* (pp. 15-70.). Dordrecht: Springer.

Bond van Volkstuinders (2014). *Bond van Volkstuinenders: Volkstuinen.* Accessed on 28-10-2014 via: http://www.bondvanvolkstuinders.nl/index.php?menu=2&stijl=1

Bourque, M. (2000). Thematic paper 5: Policy options for Urban Agriculture. In: N. Bakker, M. Dubbeling, S. Guendel, U. Sabel Koschella, H. de Zeeuw (eds.), *Growing Cities, Growing Food, UA on the Policy Agenda* (pp. 99-107). Feldafing: DSE

Brooklyn Grange (2014). *Brooklyn Grange. Home*. Accessed on 23-05-2014 via http://brooklyngrangefarm.com/.

Broto, V.C., A. Allen and E. Rapoport (2012). Interdisciplinary Perspectives on Urban Metabolism. *Journal of Industrial Ecology*, 16(6), 851-861.

Brown, C. and Miller, S. (2008). The Impacts of Local Markets: A Review of Research on Farmers Markets and Community Supported Agriculture (CSA). *American Journal of Agricultural Economics, 90(5),* 1296-1302

Brunner, P. H. (2007). Reshaping urban metabolism. *Journal of Industrial Ecology*, 11(2), 11–13.

Bueren, EW, van. (2012). Chapter 1: Introduction, pp. 1-15. In: Bueren, E. M. van, H. Van Bohemen, L. Itard, Visscher, H. (Eds.), *Sustainable Urban Environments: an ecosystem approach* (pp. 1-15). Dordrecht: Springer.

Centraal Bureau voor de Statestiek (2014). *Statline: Bevolking; ontwikkeling in gemeenten met 100 .000 of meer inwoners.* Accessed on 14-03-2014 via http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=70748ned&LA=NL

Cordell, D, A. Rosemarin, J.J. Schroder, A.L. Smit (2010). Towards global phosphorus security: A systems framework for phosphorus recovery and reuse options. *Chemosphere,* 84(6), 747-758.

Cordell, D., J. Drangert, S. White (2009). The story of phosphorus: Global food security and food for thought. *Global Environmental Change,* 19(2), 292-305.

Cox, S. Personal interview. 24-04-2014

Creative City Lab (2014). *Onderwerpen: Stadslandbouw.* Accessed on 10-02-2014 via: http://www.creativecitylab.nl/onderwerp/stadslandbouw

Deelstra, T. and Girardet, H. (2000). Thematic Paper 2: UA and Sustainable Cities. In: N. Bakker, M. Dubbeling, S. Guendel, U. Sabel Koschella, H. de Zeeuw (eds.), *Growing Cities, Growing Food, UA on the Policy Agenda* (pp. 99-107). Feldafing: DSE

Deelstra, T., D. Boyd and M. van den Biggelaar (2001). *Multifunctional Land Use: An Opportunity for Promoting UA in Europe*. Leusden: RUAF Foundation.

Deenstra, R. Personal interview. 27-05-2014

Doherty, A. Personal explorative interview. 13-02-2014

Dreschel, p. and Dongus, s. (2010), 'Dynamics and sustainability of UA: examples from sub-Saharan Africa', *Sustainable Science*, 5(1), 69–78.

Dunn, B. C. and Steinemann, A. (1998). Industrial ecology for sustainable communities. *Journal of Environmental Planning and Management,* 41(6), 661–672.

Field Code Changed

Durno, M. E-mail correspondence. 13-10-2014 & 26-10-2014

Durno, M. Personal interview. 03-09-2014

Evenson, R. E. and D. Gollin. (2003). Assessing the Impact of the Green Revolution, 1960 to 2000, *Science,* 300*(*5620), 758-762.

Farming the City (2014). *Farming the city.* Accessed on 26-05-2014 via http://farmingthecity.net/?page_id=4137

Feenstra, G. (2001). Creating space for sustainable food systems: Lessons from the field. *Agriculture and Human Values*, 19, 99–106.

Feenstra, G. (2002). Creating space for sustainable food systems: Lessons from the field. *Agriculture and Human Values* 19(2) 99–106.

Francis, C. A. and P. Porter. (2010). Ecology in Sustainable Agriculture Practices and Systems. *Critical Reviews in Plant Sciences*, 30(1), 64-73.

Friedmann, H. (2007). Scaling up: Bringing public institutions and food service corporations into the project for a local, sustainable food system in Ontario. *Agriculture and Human Values*, 24, 389–398.

Gemeente Amsterdam (2014a). Voedsel en Amsterdam: Een voedselvisie en agenda voor de stad. Amsterdam: Gemeente Amsterdam.

Gemeente Amsterdam (2014b). *Gemeente Amsterdam: Gebiedsontwikkeling, Buiksloterham: Inleiding.* Accessed on 28-10-2014 viahttp://www.amsterdam.nl/gemeente/organisatie-diensten/ontwikkelingsbedrijf/gebiedsontwikkeling/buiksloterham/buiksloterham/inleiding/

Gemeente Amsterdam (2014d). *Maps Amsterdam: Kaart Braakliggende Terreinen.* Accessed on 23-10-2014 via http://maps.amsterdam.nl/braakliggende_terreinen/?LANG=nl

Gemeente Amsterdam (2014c). *Maps Amsterdam: Kaart Leegstaande Kantoren, een selectie van de kantorenloods.* Accessed on 23-10-2014 via http://maps.amsterdam.nl/leegstaande_kantoren/?LANG=nl

Gemeente Den Haag (2013). Voedselstrategie. Den Haag: Gemeente Den Haag, Dienst Stadsbeheer, Afdeling Duurzaamheid & Leefomgeving.

Gemeente Den-Haag (2014) *Stadslandbouw Den-Haag Startpagina.* Accessed on 26-06-2014 via http://stadslandbouwdenhaag.nl/

Gemeente Rotterdam (2012). Food & the City: Stimuleren van stadslandbouw in en om Rotterdam. Rotterdam: Gemeente Rotterdam.

Gerring, J. (2004). What is a case study and what is it good for? *The American Political Science Review*, 98(2), 341-354

Gerring, J. (2007). *Case study research: Principles and Practices*. Cambridge University Press.

Field Code Changed

Field Code Changed

Gerritse, H. Personal interview. 09-07-2014

Gerritsen, H. E-mail correspondence. 13-10-2014

Gladek, E., M. Witkamp, P. de Sterke and T. Bosschaert (2011). Voedsel voor de Stad. Utrecht: Except – Integrated Sustainability.

Gout , A. Personal interview. 12-06-2014

Gout, A. E-mail correspondence. 20-10-2014

Grewal, S. S. and Grewal, P. S. (2012) Can cities become self-reliant in food? *Cities*, 29(1), 1–10.

Growndowntown Amsterdam *(2014). Growndowntown, Projecten: Growndowntown Amsterdam* Accessed on 23-09-2014 via: http://www.growndowntown.coop/index.php?option=com_content&view=article&id=16:grown-down-town&catid=9&Itemid=122&lang=nl

Hantz Farms Detroit (2014). *Hatz Farms Detroid: Home.* Accessed on 23-05-2014 via http://www.hantzfarmsdetroit.com/.

Field Code Changed

Hartmen, J. Personal interview. 19-06-2014

Hassink, W. Personal interview. 27-05-2014

Heijplaat Tuindorp (2014). *Heijplaat Tuindorp: Home.* Accessed on 12-06-2014 via http://www.heijplaat.com/tuindorp.html.

Field Code Changed

Heiteman, M. E-mail correspondence. 22-10-2014

Heiteman, M. Personal interview. 08-04-2014

Holland, L. (2004). Diversity and Connections in Community Gardens: a contribution to local sustainability. *Local Environment*, 9(3), 285–305.

Horrigan, L., R. S. Lawrence and P. Walker (2002). How Sustainable Agriculture Can Address the Environmental and Human Health Harms of Industrial Agriculture, *Environmental Health Perspectives,* 100(5) 445-456.

Horst, M. (2008). *Growing green: An inventory of public lands suitable for gardening in Seattle*. Washington. Seattle: University of Washington College of Architecture and Urban Planning.
Howard, E. (1898). Garden Cities of To-Morrow. In: LeGates, R.T, and Stout, F. (Red.), *The City Reader (Fourth Edition)* (pp. 314-321). Abbingdon: Routledge.

Huffelen, A. van. Personal interview. 14-05-2014

Jager, E. de. Personal interview. 23-05-2014

Janssen - Raay, C. Van. Personal interview. 06-05-2014

Jarosz, L. (2008). The city in the country: Growing alternative food networks in Metropolitan areas. *Journal of Rural Studies,* 24(1), 231–244.

Jel, L. de. Personal interview. 05-06-2014

Kaethler, T. M. (2006). *Growing space: The potential of UA in the City of Vancouver.* Vancouver: University of British Columbia School of Community and Regional Planning.

Kalmykova, Y., R. Harder, H. Borgestedt and I. Svanäng (2012). Pathways and Management of phosphorus in Urban Areas. *Journal of Industrial Ecology*, 16(6), 928-939.

Kennedy, C. and Hoornweg, D. (2012). Mainstreaming Urban Metabolism. *Journal of Industrial Ecology*, 16(6), 780-782.

Kennedy, C., J. Cuddihy and J. Engel-Yan (2007). The Changing Metabolism of Cities. *Journal of Industrial Ecology,* 11(2), 43-59.

Khan, A. G., C. Kuek, T. M. Chaudrey, C. S. Khoo, W. J. Hayes. (2000) Role of plants, mycorrhizae and phytochelators in heavy metal contaminated land remediation. *Chemosphere,* 41(1-2), 197-207.

Koene, A. Personal interview. 23-05-2014

Konijn, S. Personal interview. 28-04-2014

Koudenburg , K. Personal interview. 09-07-2014

Leede, H. de. Personal interview. 04-08-2014

MacRae, R., Gallant, E., Patel, S., Michalak, M., Bunch, M., & Schaffner, S. (2010). Could Toronto provide 10% of its fresh vegetable requirements from within its own boundaries? Matching consumption requirements with growing spaces. *Journal of Agriculture, Food Systems, and Community Development*, 1(2), 105–127.

Marcotullio, P. J. and Boyle, G. (2003). *Defining an ecosystem approach to urban management and policy development.* Tokyo: United Nations University Institute of Advanced Studies.

Markgraf, C. and Kay, C. (2010). *Creating a land inventory and urban food landscape on Vancouver island.* Vancouver: Vancouver Island Local Food Project.

McClintock, M., J, Cooper and S. Kandeshi. (2013). Assessing the potential contribution of vacant land to urban vegetable production and consumption in Oakland, California. *Landscape and Planning,* 101(1), 46– 58.

McClintock, N. (2010). Why farm the city? Theorizing urban agriculture through a lens of metabolic rift. *International Planning Studies,* 14(4), 417–424.

Meadows, D. (1999). Leverage Points: Places to Intervene in a System. Hartland: The Sustainability Institute.

Meij, L. van der. Personal interview. 04-06-2014

Meijer, A. E-mail correspondence. 25-10-2014

Meijer, A. Personal interview. 04-07-2014

Mendes, W., K. Balmer, T. Kaethler and A. Rhoads (2008). Using land inventories to plan for UA. *Journal of the American Planning Association*, 74(4), 435-449.

Mensink , E. Personal interview. 10-07-2014

Metson, G., R. Aggarwal and D,L. Childers (2012). Efficiency Through Proximity: Changes in Phosphorus Cycling at the Urban–Agricultural Interface of a Rapidly Urbanizing Desert Region. J*ournal of Industrial Ecology*, 16(6), 914-927.

Minx, J., F. Creutzig, V. Medinger, T. Ziegler, A. Owen, and G. Baiocchi (2011). *Developing a pragmatic approach to assess urban metabolism in Europe: A report to the European Environment Agency.* Stockholm/Berlin: Stockholm Environment Institute & Technische Universität at Berlin.

Morgan, K. (2009) Feeding the City: The Challenge of Urban Food Planning. *International Planning Studies*, 14(4), 341–348.

Morgan, K. and R. Sonnino (2010). The urban foodscape: world cities and the new food equation, *Cambridge Journal of Regions, Economy and Society,* (2010)3, 209–224.

Mougeot, L. J. A. (2000). Thematic paper 1: UA: Definition, Presence, Potentials and Risk. In: N. Bakker, M. Dubbeling, S. Guendel, U. Sabel Koschella, H. de Zeeuw (eds.), *Growing Cities, Growing Food, UA on the Policy Agenda* (pp. 99-107). Feldafing: DSE

Muynck, A. de (2011). Stadslandbouw en duurzame gebiedsontwikkeling. Rotterdam/Delft: Erasmus Universiteit Rotterdam, Stadsontwikkeling Rotterdam, Technische Universiteit Delft.

Nationale Federatie Stadsgerichte Landbouw (2013). Stadsboeren in Nederland Professionalisering van de stadsgerichte landbouw. Rotterdam: Ministerie van Economische zaken & Infrastructuur & Milieu.

Ostrom, E. (2007). Institutional Rational Choice An assessment of the Individual Analysis and Development Framework. In: Sabatier, P.A. (Eds.*), Theories of the policy process* (pp.21-64). Boulder: Westview Press.

Paül , V. and McKenzie, F. H. (2013). Peri-urban farmland conservation and development of alternative food networks: Insights from a case-study area in metropolitan Barcelona (Catalonia, Spain). *Land Use Policy,* 30(1), 94– 105.

Pearson, L. J., L. Pearson, C. J. Pearson. (2010). Sustainable UA: stocktake and opportunities. *International Journal of Agricultural Sustainability*, 8(1-2), 7-19.

Pothukuchi, K and Kaufman, J.L. (2000). The Food System: A stranger to the planning field. *Journal of the American Planning Association*, 66(2), 113-124.

Pothukuchi, K. (2009). Community and Regional Food Planning: Building Institutional Support in the United States. *International Planning Studies,* 14(4), 349–367.

Pothukuchi, K. and Kaufman, J.L. (1999) Placing the food system on the urban agenda: The role of municipal institutions in food systems planning. *Agriculture and Human Values*, 16(2), 213-224.

Rijpkema, B. Personal interview. 20-05-2014

Roosmalen, A. van. Personal interview. 06-06-2014

Schans, J.W. van der. Personal interview. 11-07-2014

Schans, W. van der. Personal interview. 16-09-2014

Schmidt, S. (2012). Getting the policy right: UA in Dar es Salaam, Tanzania. *International Development Planning Review*, 34(2), 129-145.

Sinclair, R. (1967). Von Thunen and Urban Sprawl. *Annals of the Association of American geographers*, 57(1): 72-87.

Smit, J. and Nasr, J. (1992). UA for sustainable cities: using wastes and idle land and water bodies as resources. *Environment and Urbanization,* 4(2), 141-152.

Spit, T. and Zoete, P. *Ruimtelijke ordening in nederland: Een wetenschappelijke introductie in het vakgebied.* Den Haag: SDU uitgevers.

Stroom Den Haag (2014). *Foodprint programma.* Accessed on 03-11-2014 via: http://www.stroom.nl/activiteiten/manifestatie.php?m_id=3456445

Taylor, J. R., and Lovell, S. T. (2012). Mapping public and private spaces of UA in Chicago through the analysis of high-resolution aerial images in Google Earth. *Landscape and Urban Planning*, 108(1), 57–70.

Thrift, J. (2011). Making Local Planning Work for Urban Agriculture in the North American Context: A View from the Ground. *Journal of Planning Education and Research, 32(3), 349-357.*

Tilman, D. (1999). Global environmental impacts of agricultural expansion: The need for sustainable and efficient practices. *Proceedings of the National Academy of Sciences*, 96, 5995–6000.

Tjallingii, S. (2012). Chapter 4: Water flows and Urban Planning, pp. 91-111. In: Bueren, E. M. van, H. Van Bohemen, L. Itard, Visscher, H. (Eds.), *Sustainable Urban Environments: an ecosystem approach* (pp. 91-111.). Dordrecht: Springer.

Traa, P. van. Personal interview. 23-05-2014

United Nations, Department of Economic and Social Affairs, Population Division (2014). *World Urbanization Prospects: The 2014 Revision, Highlights. (ST/ESA/SER.A/352).* New York: United Nations.

United Nations, Department of Economic and Social Affairs, Population Division (2013). *World Population Prospects: The 2012 Revision, Highlights and Advance Tables.* Working Paper No. ESA/P/WP.228.

Urban Farmers (2014). *Urban farmers: projects: The Hague: UF De Schilde, the "Times square of urban farming".* Accessed on 15-07-2014 via http://urbanfarmers.com/projects/the-hague/.

Van Bohemen, H. (2012). Chapter 2: (Eco)System thinking: Ecological Principles for Buildings, Roads and Industrial and Urban Areas. In Bueren, E. M. van, H. Van Bohemen, L. Itard, Visscher, H. (Eds.), *Sustainable Urban Environments: an ecosystem approach* (pp. 15-70). Dordrecht: Springer.

Van Bueren, EW. (2012). Chapter 1: Introduction. In Bueren, E. M. van, H. Van Bohemen, L. Itard, Visscher, H. (Eds.), *Sustainable Urban Environments: an ecosystem approach* (pp. 1-15.). Dordrecht: Springer.

Van der Schans, J. (2010). Urban agriculture in the Netherlands. *Urban Agriculture Magazine* 24(1), 40-42.

Veenhuizen, R. van (2006). Introduction: Cities farming for the future. In R. van Veenhuizen (Eds.), *Cities Farming for the Future, UA for Green and Productive Cities* (pp 1-18). Leusden: RUAF Foundation, IDRC and IIRR.

Vermeulen, A. Personal interview. 04-03-2014

Verschuren, P. and Doorewaard, H. (2010). *Designing a Research Project (Second Edition).* The Hague: Eleven International.

Vrieze, A. de. Personal interview. 16-06-2014

Waltman, J. (2010). *UA in Copenhagen and Madrid Practical applications and the effect of entrepreneurialism. Master thesis at the University of Vienna: Supervised by Prof. Dr. Fernando Molini, Department of Urban Studies.* Vienna: University of Vienna.

Wekerle, G. R. (2001). *Planning for UA in Suburban Development in Canada.* Leusden: RUAF foundation.

Wolman, A. (1965). The metabolism of cities. *Scientific American*, 213: 179–190.

Zimbler, R.L. (2001) Community gardens on the urban land use planning agenda. Experiences from the United States, Germany and the Netherlands. *Master project University of North Carolina at chapel Hill*. Approved by dr. Phil Berke.

Zwart, T.A. (2012). *Building Sustainable Food Systems: Urban Food Strategies in Amsterdam and Utrecht.* Wageningen: Wageningen University Rural Sociology Group..

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Appendix

List of questions used during the semi-structured interviews

Policy makers:

Focus on the following sub-questions (2, 7, 8, 9: staan hier onder ook in die volgorde):

- Which actors are involved in the development of these systems? In what way are these actors involved? **(Theory and empirical)**
- What are the different governance instruments available to different actors when developing and establishing UA a city? **(Theory, spatial planning and env. governance)**
- How do these governance instruments influence the availability and suitability of locations for urban agriculture? **(Theory and empirical)**
- How does the geographical location influence the availability and suitability of governance instruments? (**Empirical)**

Persoonlijke informatie: Kunt u me iets over uzelf vertellen?

- Wat houd uw huidige functie precies in? En hoe is deze gerelateerd aan stadslandbouw?
- Wat zijn uw dagelijkse bezigheden en de belangrijkste projecten waar u momenteel aan werkt?
- Vind u het wat dat betreft terecht als ik u typeer al seen beleidsmaker of ziet u uzelf niet zo? Waarom wel of niet?
- Ik zal in het interview de nadruk leggen op 'governance instrumenten' ruimtelijke ordening en het gemeentelijk beleid. Maare zijn er wat u betreft nog andere thema's die belangrijk zijn voor de stadslandbouw en de locaties waarop deze plaatsvind? Andere actoren dan de gemeente die 'beleid' maken? U kunt me dit ook altijd tijdens het interview laten weten.

Stadslandbouw systemen (meer ook als introductie naar het onderwerp toe, ook sq 1, 3):

1. Wat zijn de meest voorkomende stadslandbouw systemen in uw stad volgens u? Of in uw wijk/stadsdeel? Heeft u hier een verklaring voor?
2. Is de typologie die ik hierover heb gemaakt volgens u redelijk compleet? Zijn er systemen of soorten stadslandbouw die er voor uw gevoel echt nog bij in moeten of die er uit kunnen?
3. Zijn er bepaalde types stadslandbouw die in het beleid in uw stad benadrukt worden? Doelgroepen van beleid? En waarom is dat wel/niet het geval? (8)
4. Zijn er wat u betreft bepaalde succesverhalen, sleutelprojecten, kenmerkende projecten voor uw stad?

Locatiefactoren en beleidsinstrumenten in het algemeen:

5. Is de typologie die ik hierover heb gemaakt volgens u redelijk compleet? Zijn er locatie kenmerken die er voor uw gevoel echt nog bij in moeten of die er uit kunnen omdat ze grote invloed hebben op de geschiktheid van een locatie voor stadslandbouw? (8)
6. Zijn er bepaalde locaties die specifiek het doel zijn van beleid voor het ontwikkelen van stadslandbouw? Beplaalde factoren die een locatie tot 'target' maken? En waarom is dit wel / niet het geval? (9)
7. Word er bijvoorbeeld expliciet een link gelegt tussen locatie eigenschappen en of stadslandbouw wel of niet toegestaan word binnen het bestemmingsplan? Wat zijn de belangrijkste locatie eigenschappen die bepalen of stadslandbouw al dan niet een optie is? (9)
8. Word er uberhaupt onderscheid gemaakt in beleid voor verschillende locaties voor stadslandbouw? Of wordt beleid geformuleerd op de schaal van de stad als geheel en niet per locatie aangepast? Wat is hiervoor denkt u de reden? (9)

9. Wat zijn volgens u in het algemeen de meest gebruikte beleidsinstrumenten als het gaat over het ontwikkeln en stimuleren van stadslandbouw? En waarom is dit denkt u het geval? (7)
10. Hoe beinvloeden deze instrumenten de ontwikkeling van stadslandbouw? Kunt u hier concrete voorbeelden van geven? (7, 8)
11. Wat zijn volgens u de belangrijkste partijen om te betrekken bij de ontwikkelen van stadslandbouw en het vormen van beleid hierover? Worden die er in de praktijk ook echt bij betrokken? (2)
12. Kunt u een voorbeeld geven van het soort organisaties en mensen waarmee u bij het formuleren en uitvoeren van beleid in aanraking komt? (2)
13. Zijn er behalve uzelf andere partijen die veel invloed hebben op de ontwikkeling van (beleid voor) stadslandbouw? Welke zijn dit? Hoe ziet die invloed er uit? En wat zijn de machtsverschillen tussen de partijen? (2, 7)

De relatie tussen locaties en 'soorten' stadslandbouw aan de ene en beleid aan de andere kant:

14. Wat zijn voor de belangrijkste beleidsinstrumenten waarvan u gebruik heeft gemaakt in relatie tot dit project?
15. Wat waren de belangrijkste doelstelling van het beleid met relatie tot dit stadslandbouw project? Denkt u dat deze met deze beleidsinstrumenten zijn gehaald?
16. Speelt het beleid hier een pro actieve of vooral faciliterende rol? Is het toestaan en verbieden van stadslandbouw of actief stimuleren van de ontwikkeling ervan? Wat is hiervoor de reden?
17. Hoe past uw beleid binnen bredere beleidskaders als de voedselstrategie. Is er sprake van wederzijdse beinvloeding en zo ja, hoe ziet deze er uit?

Project Leaders:

Focus on the following sub-questions (4, 6, 7, 8, 9):

- What are the locational requirements for the development of these systems, according to the available literature and those that develop them? **(Theory and empirical)**
- How does the broader urban environment in which a location is embedded influence the suitability of a location for Urban Agriculture? **(Theory, mostly empirical)**
- What are the different governance instruments available to different actors when developing and establishing UA a city? **(Theory, spatial planning and env. governance)**
- How do these governance instruments influence the availability and suitability of locations for urban agriculture? **(Theory and empirical)**
- How does the geographical location influence the availability and suitability of governance instruments? (**Empirical)**

Persoonlijke informatie:

- Wat houd uw huidige functie precies in binnen het project?
- Zijn uw functie en werkzaamheden veranderd in de loop van de tijd? Of verwacht u dat dit zal gebeuren? Kunt u dit uitleggen?
- Wat zijn uw dagelijkse bezigheden en de belangrijkste zaken waar u momenteel aan werkt?
- Vind u het terecht als ik u typeer als een leider van dit project? Als een van de mensen die het project runnen? Waarom wel of niet?
- Ik zal in het interview de nadruk leggen op de invloed die de locatie van dit project/bedrijf heeft op haar succes en me afvragen in hoeverre de vorm die het project uiteindelijk gekregen heeft samenhangt met de locatie. Of de locatie een pragmatische of een bewuste keuze was. En of beleid vanuit de gemeente of andere partijen per locatie verschilt. Zijn er wat u betreft nog andere thema's die belangrijk zijn om een volledig beeld te krijgen van uw project/bedrijf? U kunt me dit ook altijd tijdens het interview laten weten.

Project kenmerken (vraag 1, 2):

1. Wat is het voornaamste doel van uw bedrijf / project?
2. Wat produceren jullie? Hoeveel produceren jullie? Hoe vaak word er geoogst?
3. Hoe produceren jullie? Wat zijn de landbouwmethodes waarvan jullie gebruikmaken?
4. Is uw systeem capitaal intensief of juist niet?
5. Hoeveel mensen zijn er bij jullie bedrijf betrokken als vrijwilliger of werknemer? En wat voor verschillende functies vervullen zij zoal?
6. Zijn jullie in economische zin op dit moment break-even aan het draaien of winst aan het maken?
7. Wat is de belangrijkste waarde die uw project / bedrijf voortbrengt?
8. Er zijn volgens mij verschillende 'soorten' stadslandbouw. Is de typologie die ik hierover heb gemaakt volgens u redelijk compleet? Zijn er systemen of soorten stadslandbouw die er voor uw gevoel echt nog bij in moeten of die er uit kunnen?
9. Onder welke 'soort' stadslandbouw zou u uzelf scharen? Of bent u een type dat niet in de lijst voor komt?
10. Wanneer commercieel: hoe ziet uw business case eruit?

Over de locatie van het project / bedrijf:

1. Kunt u iets meer vertellen over de locatie van uw project? De grootte, belangrijkste kenmerken in uw ogen? (4)
2. Hoe bent u bij deze locatie gekomen? Was dit een bewuste keuze? (4)
3. Waren er bepaalde voorwaarden waaraan de locatie moest voldoen om uw stadslandbouwproject mogelijk te maken? (4)

4. Wat heeft uiteindelijk de doorslag gegeven om juist hier stadslandbouw te gaan bedrijven? (4)
5. Zijn er bepaalde kenmerken van de locatie die hem bij uitstek geschikt maken voor uw stadslandbouw project? En is ze daardoor geschikt voor stadslandbouw in het algemeen of juist voor bepaalde soorten stadslandbouw? (4)
6. Op dezelfde manier bekeken: heeft de locatie bepaalde kenmerken die haar minder geschikt maken voor stadslandbouw of uw type stadslandbouw? (4)
7. Heeft de locatie ook kenmerken die niet fysiek te zien of te voelen zijn maar wel van belang zijn: eigenaarschap van de grond, bestemmingsplannen, enzovoort?
8. Als u de perfecte locatie zou moeten beschrijven: hoe zou deze er dan uit zien? (4)
9. Breder genomen: heeft de context waarin de locatie zich bevind (wijk, stadsdeel) ook bepaalde voor en nadelen? Kunt u deze benoemen? Dit hoeft niet alleen de fyieke ruimte te zijn (infrastructuur, OV) maar het kan ook gaan om bijvoorbeeld: sociaal-economische kenmerk van de bewoners van de buurt, de sfeer in de buurt, haar reputatie en noem maar op (6).

Beleid en governance instrumenten:

11. Wat zijn de belangrijkste partijen waar u mee te maken heeft als het gaat om beleid gericht op stadslandbouw? Denk breed: niet alleen de gemeente? (7)
12. Heeft u te maken (gehad) met ruimtelijke wetgeving en beleid van de gemeente? Op welke manier was dit? (7, 8)
13. Kent u de voedselvisie uw gemeente? En voor interviews met met betrekking tot Amsterdam: het Voedsel Informatie Punt (VIP) dat er gaat komen?(7)
14. Ziet u dergelijk beleid (maar ook breder NGO's en civil society misschien) als iets positiefs of is het meestal een belemmering voor uw project? Kunt u een aantal specifieke voorbeelden noemen? (8)
15. Zijn er bepaalde beleidsinstrumenten die nu worden ingezet die volgens u niet zouden moeten worden ingezet, omdat ze voor uw locatie slecht uitpakken? (8, 9)
16. Zijn er bepaalde beleidsinstrumenten die nu niet worden ingezet die u juist wel graag zou willen zien, omdat u er baat bij zou hebben? (8, 9)
17. Wat zou er in het ruimtelijk of wetgevend beleid, moeten veranderen om de ontwikkeling van stadslandbouw in het algemeen verder te stimuleren en te verbeteren? (7. 8)
18. En wat zou er specifiek voor uzelf van belang zijn? Of van belang zijn geweest in het opstarten van uw project? (8, 9)
19. Kunt u dezelfde vragen beantwoorden maar nu denken aan vormen van materiele en financiele ondersteuning, of ondersteuning in de vorm van kennis overdracht? (8, 9)

Civil society actors:

Persoonlijke informatie:

1. Kunt u iets vertellen over uw functie en hoe u daarbij met stadslandbouw te maken hebt?
2. Kunt u iets meer vertellen over de kenmerken van de organisatie waar u werkt en mensen die er werken? Doelstellingen? De grootte van de orgsanisatie?
3. Wat is voor uzelf de belangrijkste reden om u bezig te houden met stadslandbouw?
4. Ik heb u in mijn onderzoek getypeerd als een Civil society actor (ipv een beleidsmaker of een stadsboer), kunt u zich daarin vinden?

Stadslandbouw in Amsterdam, Utrecht, Den Haag of Rotterdam:

18. Wat zijn de meest voorkomende stadslandbouw systemen in uw stad volgens u? Heeft u hier een verklaring voor?
19. Is de typologie die ik hierover heb gemaakt volgens u redelijk compleet? Zijn er systemen of soorten stadslandbouw die er voor u gevoel echt nog bij in moeten of die er uit kunnen?
20. Zijn er bepaalde types stadslandbouw die volgens u extra van belang zijn of extra interessant zijn? Doelgroepen? En waarom is dat wel/niet het geval? (8)
21. Zijn er wat u betreft bepaalde succesverhalen, sleutelprojecten, kenmerkende projecten binnen uw stad?
5. Hoe heeft stadslandbouw zich in uw stad de afgelopen jaren ontwikkeld? En wat is daarin de rol geweest van uw organisatie en andere civil society actoren?

Over het beleid van de gemeente tov stadslandbouw:

1. Kunt u me vertellen wat u weet van het beleid van de lokale gemeente en hoe u daar mee te maken heeft gehad eventueel?
2. Kent u de voedselstrategie? Wat vind u van dergelijke initiatieven?
3. In het algemeen over het beleid van de gemeente:
   - Ervaart u dit als pro-actief of faciliterend.
   - Op welke schaal word er door de gemeente beleid gevoerd volgens u? Die van de stad als geheel of voor bepaalde locaties daarbinnen?
   - Welke beleidsinstrumenten spelen daarbij doorgaans een rol? Het kan dan gaan over financiele of materiele ondersteuning, maar ook informatievoorziening, educatie, communicatie en bewustmaking. Of vergunningen en wetgeving op het gebied van ruimtelijke ordening.
4. Denkt u dat dergelijk beleid effect heeft op de ontwikkeling van stadslandbouw? En waarom wel/niet? Zijn er concrete voorbeelden te noemen?
5. Is er iets wat door de gemeente nu wel gedaan word maar wat juist niet zou moeten worden gedaan volgens u?
6. En als we die vraag omdraaien?
7. Hoe zou volgens u in het ideale geval de rol van de gemeente eruitzien met betrekking tot stadslandbouw? Wat zijn de belangrijkste issues die men op dient te lossen?

De rol van Civil society actoren bij de ontwikkeling van stadslandbouw:

1. Wat zijn volgens u de belangrijkste partijen om te betrekken bij de ontwikkelen van stadslandbouw? Worden die er in de praktijk ook echt bij betrokken? (2)

2. Kunt u een voorbeeld geven van het soort organisaties en mensen waarmee u in aanraking komt? (2)
3. Zijn er behalve uzelf andere partijen die veel invloed hebben op de ontwikkeling van (beleid voor) stadslandbouw? Welke zijn dit? Hoe ziet die invloed er uit? En wat zijn de machtsverschillen tussen de partijen? (2, 7)
4. Wat is op dit moment de rolverdeling tussen al deze verschillende partijen? Waarom is dit zo? E is dit goed of zou het anders moeten zijn?
5. Wat voor instrumenten en middelen zet u zelf als met uw organisatie in als het gaat om stadslandbouw en de verdere ontwikkeling ervan?
6. Is er hierbij een verandering opgestreden in de afgelopen tijd?
7. Wat doet u nu niet dat u wel zou willen doen?
8. Waar hebben jullie in dat opzicht anderen bij nodig? Wat kunt u niet alleen? En hoe ziet dan de rolverdeling eruit?