

Urbanization and food security in China

The potential for urban agriculture to contribute to sustainable development

Abstract: China's current development is under pressure from a sustainability perspective. Depleting resources and stagnating growth have inspired the Chinese government to formulate a new plan regarding urbanization, as that is deemed a pivotal point to ensure sustainable development. The plan is macroscopic, which leaves room for additional ideas. This research excavates the idea of urban agriculture as a potential contribution to sustainable development in urbanization and food security in China. The social and ecological aspects of sustainable development are embedded in urban agriculture, and it can enhance the fruitfulness of current policies.

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Table of contents

1. Introduction	3
2. Methodology	6
2.1 <i>Theory selection</i>	7
2.2 <i>Empirical data</i>	9
3. Theoretical Framework	11
3.1 <i>Sustainable development</i>	11
3.2 <i>Urbanization</i>	13
3.2.1 <i>Sustainable Urbanization</i>	15
3.3 <i>Food security</i>	17
3.3.1 <i>Food security and cities: urban agriculture</i>	19
4. China's urbanization and agricultural policies	24
4.1 <i>Sustainable development in China.</i>	24
4.2 <i>Past urbanization policies in China.</i>	26
4.3 <i>Food security in China.</i>	27
5. Contemporary urbanization and food security policies	31
5.1 <i>National New-Type Urbanization Plan</i>	32
6. Urban agricultural in China's cities	37
6.1 <i>General introduction</i>	37
6.2 <i>Shanghai</i>	38
6.3 <i>Beijing</i>	39
6.4 <i>Urban agriculture's contributing value to sustainable development</i>	41
7. Analysis	42
7.1 <i>Economic development vis-à-vis sustainable development in China</i>	42
7.2 <i>Discussing the future of food security in China</i>	45
8. Conclusion	46
9. Bibliography	48

1. Introduction

In the coming decade-and-a-half, China aims to move 300 million people into cities, effectively bringing the urban population percentage up to 70% (Indrawati, 2014). This urbanization policy is prompted by an economic incentive, as cities are the engines of economic growth in China. The proposal comes with a large price tag of \$6.8 trillion (Roberts, 2014), and should result in bringing China's urbanization ratio comparable with that of developed countries. This endeavor of such an enormous scale will have major consequences for the social, economic, environmental, and political playing field in both domestic and international affairs in China.

As for the domestic side of the story, China has a relatively small share of the world's arable land, around 7 percent, while it still needs to feed around a fifth of the world's population. By expanding the urban areas, agricultural land diminishes, effectively putting China's self-sufficiency policy under greater stress. Agricultural experts expect that under current trends, China's natural resources and land availability will no longer suffice to supply the growing food demand from China's middle-class. This group not only has a larger share of their income available for consumption, but their dietary changes will prompt more meat consumption, which effectively means that more fodder needs to be grown domestically.

This leads to the international aspect, as the self-sufficiency policy has been criticized for some time (Fang, Yifu, & Yong, 2009). The option to import fodder has become a more mainstream topic in the academic debate among Chinese scholars, but the government has not shown any shifting into that direction.

This means that under these ongoing conditions, the sustainable development of China is under pressure. The Chinese government has released a new urbanization policy in 2014, and sustainable development is one of the key elements (World Bank, 2014). This policy addresses the issues of the depletion of land and natural resources and the controlling of the migration movements. If this turns out to be sufficient to balance the economic growth without compromising the environment remains to be seen, as coordinating such an enormous movement in all aspects is extremely complex. Critically

assessing all elements is important to construct the right policy implementations if China wants an uncompromised sustainable development.

The focus on urbanization in relation to sustainable development has gained more widespread attention during the last decades from academics, professionals and politicians (Morgan, 2009). Especially the developing world has seen increasing urban ratios, while enormous development challenges remain. The economies of scale that urban centers provide are beneficial, as the cities are enhancing political engagement, sites of innovation, and overall drivers of social change. At the same time, they are marked by social differentiation, poverty, conflict and environmental degradation (Beall, Guha-Khasnobis, & Kanbur, 2010). China is in the unique position to actively avoid these mistakes that have been made in western urban development, while at the same time having the momentum of economic change and development to rapidly build modern cities.

The focus of this research will be the relation between food security and urbanization in China. The precarious balance between these two that China has so effectively managed over the course of the last decades is faced again with large challenges. Urban expansion, increasing food demand, and environmental change ask for innovative solutions. One such a solution might be found in urban agriculture. This sector has gained more attention from sustainable urban developers, as it promises great improvements for environmental, social, and agricultural development.

The interrelationship between urbanization, food security and urban agriculture in China that has gained attention from the academic and political world, but with the new urbanization policy a new domain for exploration has opened. This research tries to add new insights in that domain by researching the question how urban agriculture can contribute to China's current urbanization policy to achieve sustainable development in urbanization and food security.

In order to find the answer to this question, a number of sub questions will be answered first. These sub questions constitute the main body of this research and will be answered in the different empirical sections. In the first empirical section, the sub

question that will be answered is: why has the concept sustainable development emerged in the Chinese policies regarding urbanization and food security? This is followed by a related sub question: how are social and ecological sustainable development embedded in China's current urbanization policy? The third and final sub question is aimed at a specific part of sustainable development: how is urban agriculture contributing to social and ecological sustainable development in major cities in China? In the following section, the methodological approaches to answer these questions will be further described.

2. Methodology

The objective of this research is to explore the potential for urban agriculture to contribute to sustainable development in urbanization and food security in China. The presented material will carefully examine the relation between urbanization and food security, by both presenting a historical overview, as well as the latest materials to identify the current opportunities and constraints. The topic of urban agriculture will emerge at the presentation of these latest materials. This methodology section will describe how the sub questions will be approached.

The first section of the methodology – ‘theory selection’ – will outline the theoretical approach. The section will deal with the sources of the material, as well as their relation to research questions. This is directly related to the third chapter ‘Theoretical Framework’. This methodological part will serve to mark the boundaries of the scope of this research, by aiming to identify the most important aspects of sustainable development that are deemed necessary to answer the sub question, as certain aspects have played more important roles than others in the emergence of sustainable development on the research agenda. The operationalization of the concept will be presented in the third chapter, after which in Chapter 4 the tools will be put to use to answer the first question. This means that the general theory helps to identify trends in the Chinese sustainable development agenda.

The second section of the methodology will deal with the approach to the empirical part of this research, and is related to the second and third sub questions. The presented data will come from academic sources, governmental policy documents, and news articles, and will describe the situation in China in regards to urbanization and food security issues. It will describe the reasons for choosing these specific sources, as well as dealing with possible limitations following this selection. The second part will also explain the implementation of cases in this research. As the cases are not the main focus of this research, but still act as bridging the gap between theory and practice, some clarification of their usage is needed.

2.1 Theory selection

In this research, the focus on urbanization and food security will be limited to that of ecological and social sustainable development. This demarcation is the direct result of the Chinese governments' aim to create a sustainable planning policy (World Bank, 2014). Although this policy encapsulates many sustainability aspects, ranging from financial to governmental sustainability, the major focus of the Chinese government in its National New-Type Urbanization Plan¹ is on both social and ecological sustainability. The presented theoretical material will describe the current research paradigm in sustainable development, as well as urban agriculture. The latter is a current trend on the research agenda, and will be described from the sustainable development perspective. The social and ecological aspects of sustainable development will be the main focus throughout this research, as will be explained next.

The current agricultural situation in China is dealing with severe pollution, degrading farmland, diminishing water reservoirs and many other environmental problems. Creating a more ecological sustainable growth is therefore a matter of necessity, as the current situation is unsustainable. At the same time, the mass rural-urban migration that is projected for the coming decade and a half is also going to have severe social implications. In order to ensure a smooth transformation, policy planners should address the social sustainable development of urbanization. It should be kept in mind, as the following chapters will show, that some of the elements of both social and ecological sustainability will have overlap with the before mentioned other types of sustainability, and they will be addressed accordingly.

Next to the Chinese governments' intentions, the research agenda of urbanization theorists has been increasingly dominated by the sustainability concept. Chapter 3 will discuss this concept, as it is a term that is used extensively, and a proper clarification of what it means for urbanization and food security is therefore necessary. A distinction between social and ecological sustainability will be made, and will be present in all chapters.

¹ The new urbanization policy document that was released in 2014 has another English translation, "National Plan on New Urbanization". This research will use the translation that is used by the majority of the sources.

To ensure a proper critical and academic analysis of the current urban situation in China, it is necessary to present a theoretical discussion about the relation between urbanization and food security in general. The presented materials will be used to illustrate what the current trends in both urbanization and food security are. These materials are the direct result of past research and developments, and hence an oversight of past trends is necessary to understand the current focus. The urbanization trends will be demarcated within mainly the social sustainability concept, although the ecological impact of urban expansion will gain sufficient coverage as well.

The specific focus of the food security issue will be on urban agriculture, as this is one of the major trends in ecological – and social – sustainability. The section will address the complexity of food security, as it is not only a domestic issue but influenced by the international food system as well. The international dimension of the global food market will be of great importance for China's future food security, *vice versa* affecting the global food market.

Following the general part about food security, a section will address what can be understood as urban agriculture and what it can mean for food security, as well as for social inclusion and ecological benefits. This will in turn help understanding the importance of exploring the possibilities urban agriculture can have for China, as these issues are all present in the problem area that this research is dealing with.

Together, the sections in Chapter 3 will not only result in a more holistic understanding of the current opportunities and constraints China is facing domestically, but will also provide a link to the international dimension of the global food markets, as China's huge food demand will have profound effects on those markets.

By presenting both Chinese and Western sources this research will avoid the pitfall of adopting a western-centric view. As the field is constantly developing, this research aims to present the most recent trends that are on the academic agenda. This will on the one hand benefit the research by making it contemporary and useful in the current research paradigm, but due to this novelty, it will lack a binding theory that overarches these new

materials. By introducing the concepts of ecological and social sustainable development, this absence of an overarching theory will be overcome.

2.2 Empirical data

The empirical data will be presented in Chapter 4, 5, and 6, in a four-staged manner, where each part draws upon the previous one. This method is crucial for understanding the potential impact of urban agriculture in China, as each section on its own is not sufficient. The academic articles, the governmental policy documents, and the cases all tap from different sources, and strengthen the other parts by filling gaps that cannot be filled within the separate section. As both governmental policy and cases are very recent, academic articles have not sufficiently covered the topics. *Vice versa*, the context in which the policy and cases exist is not properly understood from their description alone, and the necessary background information is provided by academic journals. All the chapters will lead up to the overall analysis, which will assess the intertwining of the four stages.

The first part of Chapter 4 will deal with the Chinese characteristics of urbanization and food security and will enhance the reader's understanding of the uniqueness of the case; one that needs to be understood from a Chinese perspective as well. By presenting materials that address the aforementioned sections about urbanization and food security in China, the opportunities and constraints from the Chinese situation become apparent, which enhances the understanding of the current urbanization policies in China.

Consequently, in order to research the relation between food security and urbanization in China, it is necessary to describe the past urbanization policies of the People's Republic of China. This will be done in the second part of Chapter 4. Not only will this provide a picture of the situation that contributes to understanding the difficulties that arise when balancing urbanization and agricultural production; more importantly, the current policies of the PRC are directly related to those past policies. The description of these past urbanization policies will be presented chronologically, with a focus on food security. There is a large pool of information available on the subject of urbanization in China and presenting all of it is beyond the scope of this project, and not necessary for

the purpose of this study. This description will paint the picture of the difficulties China has faced in the past and how those affect the challenges that are being faced today. This will provide the reader with a better understanding of why the sustainable development concept gained more ground over the last decades in China, effectively answering the first sub question.

Following this description of the past, naturally the current policies will be presented. These policies are derived from major documents on the topic drafted by China's State Council and other governmental bodies. By presenting the objectives and means stated in the policies together with background information regarding the issue, an insight into the decision making process will be provided. This will serve as a crucial understanding of the viability of urban agriculture in China, as the policies will be analyzed whether they are compatible with the concepts of social and ecological sustainable development. At the end of the chapter, the second sub question will be answered.

Subsequently, cases regarding urban agriculture in China will be presented. These will function as illustrative examples as their major purpose, exemplifying the social and ecological benefits that they hold. At the same time, they provide the reader with a thought-provoking set of examples that show the potentials of movement that can grow into a powerful addition to China's urbanization and food security policies. It should be noted that due to the innovative nature of this movement, the presented cases stem from news sites and affiliated organizations. This should not limit the quality of the analysis however, as the cases serve as illustrative examples of what social and ecological sustainable development through urban agriculture can look like. The related third sub question will be answered here, although it should be noted that the cases can only provide a small answer to the question – other, more general material on the state of urban agriculture in China will be presented as well.

3. Theoretical Framework

The theoretical framework of this research is divided into three major parts. First, a literature overview of the concept of sustainable development in relation to urbanization and food security will be presented. The concept is subject to many interpretations, and a selection will be made to enable a comprehensive overview to be used. Following this section, material on urbanization and food security will be presented, both from the sustainable development approach, although some of the presented materials will deal with other – but related – aspects as well, for the purpose of holistic understanding. Finally, the characteristics of China’s urbanization and food security will be presented, which will naturally lead into the next chapter of the current policies in China.

3.1 Sustainable development

As pointed out by Lehmann (2010), the term sustainability is being so overly used that its value seems to be diminishing, and is being increasingly interchangeably used with sustainable development. As he points out, the term sustainability is an end, and sustainable development is the means to achieve that end (Lehmann, 2010). Defining that end and those means is a matter of debate. The consequences of climate change have spurred a large amount of material that focuses on reducing the amount of resources we use. Mumtaz (2011) states that sustainability is “restricting the depletion of resources and the degradation of the environment to a level that would allow sustained economic growth for the next generation” (Mumtaz, 2011, pp. 330-331). Brundtland, whose definition of sustainable development is very similar, supports this view: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Lehmann, 2010, p. 75).

These definitions are too broad for the purpose of this research however, and breaking down the elements of sustainability will provide the tools to analyze trends and cases in a more detailed way. This breaking down leads to the identification of two aspects of sustainable development: ecological and social sustainable development. The former is closely related to the abovementioned definitions, but stands out because of its applicability for both large-scale processes as well as for smaller parts of the system

(White & Tuttle, 2013). Considering the anti-urban appearance that environmentalism is often associated with (Marcotullio & Solecki, 2013), it is of vital importance to assess the beneficial nature of ecological sustainability in a way that is pro-urban. This means that the focus of urbanization and city planning should not be the mistaken one of resource consumers and bio-degraders, but rather one that identifies the potential environmental benefits that come from dense settlements, such as lowering energy consumption and providing opportunities for the poor (Marcotullio & Solecki, 2013, p. 12). This will be the focus of this research as well, without failing to address the conceivable negative ecological consequences of both urban development and of seemingly positive policies that have a negative effect.

As for the second aspect of sustainable development, social sustainability has a slightly different conceptual meaning than the mentioned definitions. Where the ecological concept has evolved from environmental grounds, the social concept has long been an aspect of the ecological dimension, and defining it on its own has been a little more troublesome due to both its broad range of issues and its “blurred separation between theoretical approaches and normative considerations.” (Pareja-Eastaway, 2012, p. 502). Still, certain elements can be identified as constituting the social concept: equality, inclusiveness, interconnectedness, and quality of life are among them. Following this, Pareja-Eastaway defines social sustainability as occurring “when the formal and informal processes, systems, structures and relationships actively support the capacity of current and future generations to create healthy and liveable communities” (Pareja-Eastaway, 2012, p. 502). This leads to two main perspectives in research, although they are not mutually exclusive; on the one hand there is a focus on social equity and social justice, and on the other the emphasis is on community engagement. Vallance et al. add another perspective to this, and one that also shows potential friction between social and ecological sustainability: “preserving preferred ways of living or protecting particular socio-cultural traditions” (Vallance, Perkins, & Dixon, 2011, p. 342). This is not only the case for traditional communities that are deemed underdeveloped, but more interestingly for the focus of this research, also affects the preferred living conditions in cities, for instance low-density suburbs that are proven to be ecologically unsustainable (Vallance, Perkins, & Dixon, 2011).

What these definitions all encapsulate is their rejection of the current development, which in one way or another will compromise the future possibilities. In this research, this attitude towards changing the current economic growth paradigm and its related aspects will be continuously present, as the following presented materials will all discuss potential new ways of development.

3.2 Urbanization

Urbanization and urban theories have a long and rich history, and discussing it exhaustively is unnecessary for the scope of this research, as this study deals with the contemporary issues related to sustainable urbanization. However, some of the current issues with urbanization are resultant of past policies, so a general outline of major themes within this field is supporting the understanding of the current focus found in modern theories. This will also lead naturally into the debate about food security and its relation to urbanization.

Under the influence of urban growth, the main focus of 19th and early 20th century Western urban theorists had been engineering solutions, to deal with the resulting problems of growing cities (Lehmann, 2010). A common theme among these engineers, architects and city planners was their problem-solving orientation: as a result of the Industrial Revolution, cities were developing into unhealthy and unlivable areas that were in need of functional solutions such as sewage systems and waste disposal. As a result of this “anti-urban” approach, European cities started to sprawl uncontrollably through suburbanization and zoning, which was encroaching upon the agricultural hinterlands (Lehmann, 2010).

This changed throughout the 20th century, as the international development paradigm started to encompass a growing body of literature related to sustainable development. The limited resources the planet has, the environmental degradation, and the irreversible effects of climate change all became increasingly present in scientific literature, policies, and popular movements that were dealing with sustainability. It was not until the late 20th century that the sustainability paradigm entered the domain of urban development theories however. By then, megacities had developed in different parts of the world, and questions regarding ecology, urban sustainability, and

globalization become more prominent in the urban development discourse (Lehmann, 2010). Urban sprawl, if fragmented and uncontrolled, will lead to so-called 'urban diseases': congestion of traffic, concentrated industrial zones, high pressures on ecological capacities and environment, and unregulated land development, including the property market (Kraus, Aggarwal, Coy, & Mertins, 2014). As the world's population has become more urban than rural during the last decade, the relation between development and urbanization becomes clearer. The current urban growth is mainly driven by parts of the world where there are still large development challenges, such as Africa and Asia (Beall, Guha-Khasnobis, & Kanbur, 2010). In these parts of the world, cities are a blessing and a burden, as they provide both enormous economic opportunities through agglomeration, innovation and entrepreneurship, but they also have to deal with social differentiation, poverty and environmental degradation (ibid.).

In general, modern cities are distinguishable from the open country by their proximity, density, diversity and dynamics. These four features encompass both what makes cities attractive agents for economic development, as well as what makes them complex when it comes to sustainable development. Due to density and diversity, the close access to other markets and labour enables firms to improve their performance, which in turn leads to agglomeration effects. In addition to the combination of density and diversity, which provide the economic growth incentives, the dynamics of the urban context characterizes the social setting that revolutionizes the playing field through the rapid agglomeration of new skills, perspectives, and a demand for institutional innovation (Beall, Guha-Khasnobis, & Kanbur, 2010). In a way, cities are embodiments of progress and development: it is in the urban context that people master the complex realities of the modern world, moving them away from the primitive society they once came from. It is in cities that democratic values can be modernized through the formation of urban identities, as the proximity to the political decision making process is not only physical but psychological as well (Beall, Guha-Khasnobis, & Kanbur, 2010).

These qualities of diversity, density and dynamics also have negative side effects, as they can lead to residential segregation and integration problems, due to their complex interrelations. In particular, governance and urban politics have a large influence on urban development, and resulting from this, standard political science models that do

not acknowledge the local level as influential are unable to deal with the complexity of entangled urban institutions. Consequently, cities can grow into fragmented and differentiated entities, in which social violence, poverty and inequality spur (Beall, Guha-Khasnobis, & Kanbur, 2010). On top of this, cities are an increasing burden on the ecology and environment. They absorb the largest part of natural resources, resulting in devastating effects on not only their hinterlands but way beyond these boundaries as well (ibid). As pointed out by Mumtaz (2011), the current economic growth model of development inherently instigates these depleting and degrading practices, and moving away from them involves a rethinking of the goals development. The current goals inspire a increasing accumulation of wealth, through expanding production and consumption that are created for the adjusting demands, but far exceed our needs (Mumtaz, 2011).

3.2.1 Sustainable Urbanization

The interrelationship between urbanization and development is no longer one of functionality, but has entered all fields of the development research agenda. The concentration of both problems and opportunities that cities have to offer has led to an immense amount of research in all types of fields. In the following section, it will be addressed how the sustainable urban development paradigm formed, both for holistic understanding purposes, as well as for the build up of the focus of this research: food security. The issues of sustainable urbanization described here will tie back to the food security question, and that in turn will introduce the matter of urban agriculture.

The Western experience of urbanization is in general one of progress and economic growth. The rapid industrialization accompanied the urban growth ratio, and the resulting increase in welfare in these countries has led to a standard model of development in which the agricultural development only served as a precondition for industrialization (Awokuse, 2008). Poverty was seen as a rural issue, which would be addressed through urban development – effectively meaning that all agricultural related business was moved out of the cities. Concurrently, investing in rural areas was deemed a more viable approach in alleviating overall poverty, as it would limit rural-urban migration. Through this modernization stigma, the developing world would soon catch-up with the developed world (Beall, Guha-Khasnobis, & Kanbur, 2010). During the 1960s,

this positivism came to a slowdown, as the negative consequences for the environment and ecology as a result of urbanization became more apparent (Li & Ma, 2014). In addition to the concerns over the environmental sustainability of the urban development, the field was expanded into areas as health, education and socialization. The question about the sustainability of cities was gaining more validity through the notion that the economic development of cities was resulting in inequality. As Beall et al. (2010) point out, the economic growth was only growth on paper, as the gap between rich and poor in cities was growing. This was visible not only in terms of income, but poor urban dwellers were also deprived of social services, housing and water. Urban slums and informal settlements house an estimated 1 billion people worldwide, in which living conditions threaten people's health. On the other side of this gap, the middle-class has started to retreat in gated communities, disconnected from the urban space and consequently not participating in creating a more sustainable and equal city. This has left the subject of urban governance up for grabs by those who claim that the political passivity of both poor and rich has resulted in clientelism (Beall, Guha-Khasnobis, & Kanbur, 2010).

In the recent two decades, a new approach to urbanization started to gain attention, and has been around ever since. Resulting from the notion that cities do not necessarily all follow the same development path and that the impact of cities on ecology, environment, and climate change can hardly be overstated, urban development has attracted all kinds of research fields, varying from economists to health specialists and from architects to political scientists. A common theme among them is a renewed positive approach to urban development, one that is no longer assuming a linear development path but is still aiming at cities that are healthy, sustainable and economically viable. Terms as *eco-cities*, *green urbanism*, and *low-to-no-energy cities* have become mainstream among urban theorists, policy planners and economists (Lehmann, 2010). A few common areas that gained attention from all these parties involved were energy, water, air and shelter (Morgan, 2009). Another change in the field has been the split of urbanization and economic development as an inseparable concept. Whereas before the development policy makers adopted the idea that industrialization – and consequently economic growth – was part of the linear modernization process, it has been pointed out that urbanization without economic growth is fairly common (Morgan, 2009). The urban bias

still has a profound effect on development policy makers, who neglect and ignore the existence of urban poverty. In turn, this has led to policies of planned agglomeration and interventions of the market, that were supposed to counter spatial inequalities by creating growth poles away from the main urban centers (Beall, Guha-Khasnobis, & Kanbur, 2010). What is often hindering these areas to develop is the limited infrastructural base that supports them, combined with a non-market approach. In order to create viable growth poles, they should develop 'naturally', that is, through economic successes and potential. The resulting effect of this is a renewed urban sprawl, advancing urban development into city regions that are economically more viable, given that there is a sound provision of infrastructure (Beall, Guha-Khasnobis, & Kanbur, 2010).

3.3 Food security

For the focus of this research, food security will be addressed from an urbanization perspective. Although food security is both an international and national political issue, this research aims to contribute to the question about national food security. It will by no means claim to solve the entire question related to the 2 billion people who are food insecure, but will offer solutions on scale that deals with policy making (Morgan & Sonnino, 2010). For instance, whereas the western world has seen a rise of urban agriculture in recent years, it can be argued that this process is mainly a social movement, and not a necessity for food security (Atkinson, 2013). For China, the historical developments have put its urban agriculture in a unique position, and throughout this research that position will be examined to discover its potential.

One specific issue did not enter the urban policy planning circles until the turn of the millennium: food security. Food security refers to three dimensions: availability, access, and utilization (Tweeten, 1999). The Food and Agricultural Organization of the United Nations adds a fourth dimension: stability (FAO, 2006). The availability of food deals with the supply side, referring to production, imports and stock. As there might be enough food in the world, the major constraint for most people to be food secure is consequently the accessibility of the food (Tweeten, 1999). Utilization deals with the actual metabolism of food by the body, as not all food is always adequate, due to insufficient education, preparation or hygiene (ibid.). The final dimension of stability addresses the long-term situation, in which food security is not prone to sudden shocks

or cyclical events (FAO, 2006). These four dimensions are each equally important on the whole issue of food security, but for the relation to urbanization certain aspects might turn out to be of less potential when it comes to planning policies.

While the basic essentials of air, water and shelter had traditionally been addressed, food security in relation to policy planning had been left out (Morgan, 2009). This was partly due to the widespread conviction that the food system was a rural issue, which resulted in a planning paradigm that rid the city of farmers and street vendors based on their negative influences on public health and modernity (Morgan, 2009). Over time the attention for the close relation between sustainable development and urban planning started to grow, including aspects such as public health, social justice, energy, land, water, transport and economic development. The link between these aspects and food systems is what has become known as the *new food equation* (Morgan, 2009). Where food security was thought of as being taken care of by most policy makers in the global north, five complex developments have brought food systems back into the top of academic, professional and political agendas (Morgan & Sonnino, 2010). The first was the food price surge of 2007-2008, which resulted in a doubling of the wheat prices and a tripling of the rice prices. Although these prices have settled down a bit, their predicted price-levels are still far above their past ones. This consequently led to the second point of the new food equation, that of national security. The rising food prices sparked political protests in over 60 countries, causing the G8 leaders to for the first time ever convene a summit devoted to food in 2009. A third issue deals with international security, as due to the rising food prices, food-stressed countries are investing in fertile land overseas, a practice that has generated accusations of food colonialism. The fourth issue is climate change, which effects on water, heat, ecosystems and sea levels all affect the agricultural production systems around the globe. Fifth and most important for the scope of this research, the rapid urbanization that is taking place emphasizes the important role of cities: "Indeed, today it is at the municipal level that the socio-economic and environmental problems associated with food insecurity become most evident" (Morgan & Sonnino, 2010, p. 222).

3.3.1 Food security and cities: urban agriculture

The revival of food security from a sustainable development perspective during the last decade calls for a rethinking of the role of cities in terms of planning. This rethinking should focus on the ecological and social opportunities that could come from bridging the rural-urban gap that has long been upheld by modernization theorists who deemed the rural elements still present in cities as holding back progress. As it is the city where innovation, social change and entrepreneurship take place, it is up to the municipal governments to become food chain innovators, to design new types of food systems and to rethink the connection between their local governance and their global connections (Morgan & Sonnino, 2010). Urban agriculture is a key concept in this matter, defined as the “food and fuel grown within a city or peri-urban area, produced directly for the market and/or household use,” and is concerned with “human-environment interactions and rural-urban relations in seeking a sustainable way for development” (Yang, Cai, & Sliuzas, 2010, p. 374).

Where food policy making was once a producer-orientated landscape, over time the multifunctional character of the whole system is becoming more apparent. No longer is the field limited to those professionals working to get their ideas into the mainstream policy. A more inclusive definition comprising the whole food planning community now encompasses all those who are aiming to make food policy-making more open and democratic (Morgan, 2009). This in turn means that the municipal governments have to extend their view to incorporate not just the traditional actors coming from the supply side of food, but every actor in food-related professions and NGOs that focus on social justice and ecological causes (*ibid.*).

Nugent (2000) distinguishes between four types of ways in which cities incorporate food supply to their municipality. Each type derives from a specific set of topographical features, climate, and traditions, and although these conditions are necessary, they are not sufficient, as they require household-level decisions and governance as well (Nugent, *The Impact of Urban Agriculture On The Household and Local Economies*, 2000).

The first and second types are each other counterparts, as they exist in similar conditions but differ in their governance. While both Latin American and African

developing countries are witnessing transforming urban areas, the former often witnesses land speculation and commercialization in the center of cities, while in the peri-urban areas mechanization and concentration of agricultural activity takes places. In African developing countries, the lower population densities resulted into more hospitable circumstances for food production within the city central areas. The main difference between the two examples is the effect they have on food security. The Latin American version provides substantial employment, but it hardly affects the food security for the poor. In African countries, the result is the opposite, with little added jobs but significant effects on food security (Nugent, 2000).

A third type of urban food production comes from the developed world, although it is not exclusively found there. This type involves backyards and community gardens, and is aimed at recreational benefits and social interaction, and, if done by the middle-class, not for food security. These cities can have peri-urban areas that are devoted to commercial farming as well, often contributing greatly to the economic performance of cities (Nugent, 2000).

The fourth and final type of urban agriculturalists is found in Asian countries, whose rapid development combined with a still mostly large rural population makes up the landscape in which urban agriculture takes place. Either it are dense, crowded cities with a relatively industrialized population, or it are open spaces and greenbelts, where a strong agricultural tradition is present, characterized by much cultivation and small livestock rearing (Nugent, 2000).

Measuring the impacts of urban agriculture is only recently being developed. Although models exist to measure non-market values, this has not been developed for urban agriculture, although this has been getting more attention. One proposed way is through the setup of indicators that are signs of underlying features of concern (Nugent, 1999). This could develop into a framework that provides a cost-benefit analysis, which policy makers could refer to. As the focus of this research is on ecological and social sustainability, the following section will provide an insight into what types of indicators can be identified in those areas.

The ecological causes, as mentioned earlier, have been gaining more attention due to the global growing concerns regarding climate change. The realization that the international food system contributes heavily to global emission of greenhouse gases resulting from its inefficient transport system, has sparked a focus on shortening the supply chain, stimulating a certain level of density, and increasing compactness (Lehmann, 2010). Although such implementations might not all be viable on the short-term, redevelopment of city blocks can and need to incorporate these aspects. As for long-term opportunities, a number of aspects can be identified, ranging from local food production and regional supply to urban farming and eating locally. In that scenario, cities make provision for adequate land for food production in the city, an effort that would re-envision a valuation of land from a non-economic traditional growth model to a sustainable, natural, and healthy one (Lehmann, 2010). Zhang et al. (2013) add to this that the ratio of urban land *vis-à-vis* rural land determines whether a city can develop sustainably: “The urban sustainable development cannot retain without agriculture, while the urban modern agriculture can play a positive role in urban biodiversity and environment improvement” (Zhang et al., 2013, p. 68).

Other ways in which in which cities can decrease their ecological footprints are the energy forms they utilize. The current non-renewable – oil, coal, gas – or non-degradable – nuclear – forms of energy are inherently not sustainable, and alternative forms are available. Utilizing wind, solar, hydro, and geothermal power through smarter city planning will – besides creating a greater support from the public who will benefit economically – reduce the emission of greenhouses gases immensely (Lehmann, 2010). This is especially true for food producers, whose energy use is reaching an all time high record due to its globalized production chain, in which food travels an average of 3000 km between field and plate (Lehmann, 2010). Local food producers would not only reduce this number greatly, they would also consume less water, less fertilizers and pesticides (which are fossil-fuel based), and reduce the so-called urban heat island effect in which human activities cause an increase of the temperature in dense areas. These urban agricultural initiatives would also have an improving effect on waste management, as organic waste can be composted (Lehmann, 2010). It should however be noted that there is a misconception that is often used by environmentalists, namely that localization is a synonym for ecological sustainability. If the climate and environmental

conditions are not suitable for growing certain crops, their total lifecycle will lead to more greenhouse gas emissions, which comprises of more than just the miles they travel (Morgan & Sonnino, 2010). In the next section, this point will get more attention, as this is a counterpart of the social sustainability of cities.

Most literature dealing with urban agriculture has a profound opportunistic tone when describing its merits, and this is not any different for the social impacts of this local food production. Nugent (2000) points out the buffering effect that urban agriculture can have during economic downturns, as it is a sector that is easy to enter and provides the most essential commodity during economic downturn. This view is supported by Zhang et al. (2013), who see a similar buffering effect for those farmers who, as a consequence of rapid urbanization and industrialization, are faced with a competitive urban economy in which they can't compete. Having the opportunity to enter the urban agricultural sector, farmers flowing into cities can build a social labor pool (Zhang et al., 2013). On a more individual level, Nugent adds the psychological benefits (Nugent, 1999). Other authors add cultural identity and self-expression to the personal level, stating that it can have particularly important social benefits in those large cities that have high ratios of processed, mainstream food (Morgan & Sonnino, 2010). In such world cities, ethnic diversity with a multitude of cultural backgrounds puts strains on privileging local food production, as it might not cater all culinary needs. Here, city governments play the important role of balancing the localization of production and consumption of seasonal foods, while at the same time focus on globalization and promote the use of fair trade products when it comes to those items that can not be locally sustainably grown (Morgan & Sonnino, 2010).

Another issue that has gained more prominence due to the sharp increase of urban citizens over the last decades deals with the social disparities that become more apparent. As pointed out earlier, the segregation of middle- and lower class citizens within a city's boundaries poses a problem for democracy and economy. In relation to food security, Sonnino (2013) points out that local food production is a double-edged sword for socialization. On the one hand it is praised as a way to create a more socially embedded system, in which civic engagement, cooperation, and healthy social relations are fostered (Sonnino, 2013). However, on the other hand, without sufficient

governmental support, these initiatives are prone to the 'local trap': "Local social relationships, power relations, and environmental management practices are not always positive, and communities can pursue elitist or narrow 'defensive localization' strategies at the expenses of wider societal interests." (Sonnino, 2013, p. 4). One of the arguments for this critique about localization deals with the exacerbation of social injustice that could come out of it. The local-food producers' target audience are mainly middle-class consumers, who put a heavy burden on regular farmers and less wealthy citizens by making them chose between income and direct social ties. It is up to local governments to address this issue. The economic power of the state, combined with its educational capabilities of information spreading, make it the central authority to address the possible positive and negative social side effects of local food production. Through subsidization, school programs, and other incentivizing methods, the local governments can help make local food production an economically viable and therefor socially binding sector.

4. China's urbanization and agricultural policies

Before addressing the current urbanization policy plans in China, it is necessary to contrast the previous theoretical materials with the specific characteristics that the Chinese urban landscape has. These characteristics will enhance the understanding of both the constraints in China, but will as well illuminate the great potential China has in tackling problems before they occur, as they did occur in western countries. The following material will address the topics of sustainable development, urbanization, and food security in the Chinese context.

4.1 Sustainable development in China.

As mentioned above, the development agenda in China has mainly been concerned with economic growth as its pivotal element. The enormous economic growth in China, averaging 9.1 percent in the period 1978 until 2013 has been unprecedented, but has also created an increasing pressure on food production and the agricultural sector (Veeck, 2013). Although the past results of increasing the agricultural output have been widely acknowledged, many experts have put forward major concerns about the future challenges China faces. The main consensus among them is the current unsustainable process of both urbanization and agricultural production. Both ecological and social issues are deemed to worsen over time without proper changes in the current scheme. This chapter will describe the emergence of the sustainable development paradigm in China. By identifying historical pivotal points in terms of policy change, the chapter will provide the reader with a better understanding of the current focus on sustainable development in policy making.

As for ecological issues, questions related to increasing food demand, diminishing arable land, water shortage, climate change, and environmental damages are increasingly present in the public and academic debate in China. The Number One Central Document, the first policy paper of each year, emphasized sustainable development, by encouraging agricultural production to maintain a balance between quality and quantity, instead of high outputs that deplete the natural resources (Xinhua News Agency, 2015). At the same time, premier Li Keqiang, when addressing the declining growth in 2013, mainly focuses on inputs for economic incentives. Through technological and institutional innovation,

increasing trade, and the expansion of domestic demand, China should move away from high consumption and high investment towards a steady pattern that will sustain economic growth, improves people's wellbeing, and promotes social equity (Li, 2013). When concentrating on ecological sustainability, the premier's focus' lies on environmental protection and energy conservation, without further specifying detailed operations.

For social issues, the main concerns lie with the rural-urban integration problem, such as the household registration system (*hukou*), the unskilled migrant workers, and eroding family ties. As mentioned above, the focus of sustainable development aims for social equity. In relation to the rural population, Christiansen (2009) points out a number of issues that are of potential importance to consider when reforming the rural-urban discrepancies. He stresses the importance of household farming for both food production and social cohesion, which is the case now and will likely be so in the future (Christiansen, 2009). Without proper and careful planning by the Chinese authorities, the social networks created by and through the land resources will break down, causing detrimental effects.

In the following sections, these issues will be addressed in more detail. By carefully dissecting the issues, the following sections aim to identify the problem areas that are of pivotal importance to address within the National New-Type Urbanization Plan's reforms. The next section will show the historical circumstances that have set the current conditions.

4.2 Past urbanization policies in China.

In order to understand the relation between urbanization and food security in China, it is necessary to first describe how the current situation of urbanization in China came about. Chronologically describing the past achievements and struggles will provide more insight into the origin of the current policies. It will become clear that the balance between self-sufficiency in food production, industrialization and urbanization is – and always had been – precarious and incessant. This section will deal with the urbanization policies that China has had, and will show the intertwining of food security and urbanization in China.

During the period 1949-1978, the topic of urbanization in China has been subordinate to economic policy implementations. It often had been changing direction to provide an *ad hoc* solution to a then-current problem. As such, it is necessary to first wade through the murky waters of the People's Republic of China's past urbanization policies, to consequently identify the origins of the current approach to urbanization. To do this, a chronological overview of the past policies starting from the foundation of the PRC will be presented, partly following Fang et al. (2009) in their historical description of the Chinese economy in phases, supplemented with critical views where necessary.

During Maoist times in China urbanization policies were the result of economic development policies, which were mainly aimed at self-sufficiency in agricultural production and building heavy industry. This resulted in the overall stagnation of the urbanization ratio. Shortly after the foundation of the PRC the economy was at a low point, and it was suffering from high inflation and unemployment, and low production (Fang, Yifu, & Yong, 2009). During this period of a socialist planned economy two guiding principles were introduced for economic development. The first was the Marxist idea of public ownership, in which the state acts as a trustee. The second was derived from the Stalinist notion of the central planning of resource allocation, which included a focus on heavy industry development and the ban on trade with capitalist countries. This socialist industrialization incorporates creating a spatially equal country, which in essence meant an anti-urbanism planning strategy. The focus on heavy industry led naturally to a concentration of the factories in cities, invariably resulting in urbanization (Lu, 2012). In order to close the gap between urban and rural areas, the policy planners

implemented Marxist 'de-urbanism' to counter the trend of spatial inequality. This was overlapping with the government's commitment to food-self sufficiency, as the official slogan illustrates: "production first, living conditions second" (Lu, 2012, p. 34). In practice, this meant that the allocation of resources were mainly distributed to either the agricultural sector, or to so-called 'producer cities' in which the heavy industry was located – as opposed to 'consumer cities' in which the financial and service sectors were located (Lu, 2012). Through the expansion of rural industry to create employment, the Chinese government succeeded in controlling the growth of urbanization, which is uncommon in developing countries (Chan & Xu, 1985).

As a result of the government's commitment to food self-sufficiency, urbanization was distorted from its natural course, as it meant the limitation of rural-urban migration that was controlled through the household registration system (*hukou*) (Lang & Bo, 2013). Through the expansion of rural industry to create employment, the Chinese government succeeded in controlling the growth of urbanization, which is uncommon in developing countries (Chan & Xu, 1985). After Mao's death, economic liberalization policies that were adopted created an economic environment in which agricultural production soared. In turn, this favored investment in industry in urban zones, as agricultural employment reach saturation (Lang & Bo, 2013). The axis of this could be found in the coastal cities, which were allowed to attract foreign investment to support the industrialization process. The resulting fast expansion of these cities meant that rural districts nearby had to make way for factories, roads, shopping malls, and new housing developments (Lang & Bo, 2013). Land conversion was very profitable, so the local governments of these districts – who were evaluated based on the economic growth they reported – were very eager to sign lucrative deals in which rural land was converted into urban or industrial zones.

4.3 Food security in China.

It is widely acknowledged that after the economic opening up, China has done a tremendous job in increasing its agricultural output in the light of a enormous population growth combined with limited arable land, which is at a mere 40 percent of the world's average per capita. As a result of these reforms after 1978, the increases in agricultural production were extraordinary and beyond expectation, as the condition of

the agribusiness was poor. Technological advances were limited, as were process and transport infrastructure, seed and soil lacked quality, and the workforce was heavily affected by the commune era (Veeck, 2013). Due to the economic growth witnessed after the economic reforms, the demand for food started to grow as well, putting more stress on the government to keep the 95 percent self-sufficiency ratio. The success in essentially meeting this goal makes efforts of the Chinese government planners very notable, although some precautions need to be made. As China is still in many ways a developing country, the current agricultural production capabilities are deemed to have reached their limits, due to scale, resources, and land. To understand this, it is necessary to see how China has met its food security question over the past three decades.

In both the Maoist era as during the planned economy following the opening up of China, development in China has been determined within the narrow constraints of food security, agricultural productivity and social organization of production (Christiansen, 2009). A recurring theme has been strong role of the state in both periods. During the commune era, production targets were set up based on ability. Rural areas were supposed to be self-sufficient, and had to sell their surpluses against government-set prices to the urban areas. This local self-sufficiency was not an ideological inspired quest, but found its origins in military concerns, poor transport logistics, and a rapid demographic growth (Christiansen, 2009). In order to achieve enough output, efforts were made in, among others, intensification, soil improvement, and irrigation. All these undertakings needed enormous human efforts, and due to the limitations on rural-urban migration, a large pool of rural labor was available. As Christiansen points out, that although the agricultural production was expanding, the addition of new labor was no longer affecting the production numbers in viable ways (Christiansen, 2009). The wage gap between rural and urban labor, created by the government to restrict rural labor flowing into industries, had the reverse effect of repressing technological advances in agriculture. This hindered further growth of agricultural production, and called for solutions by the state. The state was unable to provide these, and a solution during the early 1970s came through the establishment of small rural industries, although the effects were limited (Christiansen, 2009).

It was not until the late 1970s when the economic reforms under Deng Xiaopeng started to come into effect, which would mark the enormous upsurge of agricultural production. The most important policy implementations were on the one hand the reduction of the wage cap between the rural and urban areas, and on the other the breaking open of the rural collective structures. The former allowed for a great labor input in urban industries, greatly enhancing their capacities and productivity. The latter process of de-collectivization did not however mean a complete handing over of agricultural production to market forces. A now praised policy – although at the time deemed *ad hoc* – was the implementation of the Household Responsibility System, in which there was more room for individual entrepreneurship and initiative (such as crop selection, labor diversification, and commercialization), while at the same time remaining a land use contract with the local government setting up quotas for production (Christiansen, 2009). While the incentives for increased production were strengthened on the individual scale, a number of negative side effects can be distinguished, mainly due to downsizing. The scale of collective farming during the commune era established a number of communal production structures, related to joint mechanized services. These operations collapsed in some places where there were no commercial enterprises taking over their operations, resulting in a declining social and economic cohesion (Christiansen, 2009).

Overall however, the emphasis on initiative spurred the farmers to not only intensify their agricultural production, but to diversify their sources of income as well. The combination of higher procurement prices with diversification of labor greatly enhanced agricultural output, leading to great improvements in food security. A large contributing factor has been the implementation of comprehensive agricultural development programs. These programs are locally based and led, and combine greater availability of subsidized high-quality inputs and farm technologies with labor-intensive improvements (Veeck, 2013). Through detailed reporting and analysis, local needs were identified, aiming at providing tailor-made solutions for individual farmers, as well as overcoming collective action problems regarding issues as waste and water management (*ibid.*). The agricultural programs have been successful in increasing the quality of fields, defined by their annual average yields, especially due to the systemic and government supported approach. The average agricultural output grew by 6.5 percent annually during the period 1979-1997, and as more agricultural programs were

introduced, the average jumped up to over 17 percent for the period 1997-2011 (Veeck, 2013). As a result, China is now near self-sufficient in grain production (ibid.), which is in line with the 95 percent self-sufficiency goal.

However, concerns are being raised over the future prospects of the food security situation in China. As the previous section shows, the dimensions of availability, access, and utilization are properly addressed, as the increase in volume and quality over the last three decades has shown. It is the fourth dimension of stability that worries experts and policy makers alike. As stated, the limits of intensification through the labor intensification are expected to reach their peaks soon, and issues as climate change, increasing demands, dietary changes, and shifting regional production are all putting pressure on the future food security. On the demand side, the current grain demand is around 500-520 million tons, and is expected to reach 700 million tons by 2050 (Veeck, 2013). On top of this, rising incomes result in a diet change, where the extra income is spent on more luxurious foodstuff as meat and seafood. The fodder needed for this meat production is currently estimated at 180 million tons, but will likely overtake the amount of consumed grain (ibid.). The expected increase of urban citizens in the coming years will greatly stimulate this trend, as urban dwellers' diets consist of less grain and more meat than that of rural people (Christiansen, 2009).

The future consumption gains might not pose a threat in the light of the past successes in productivity gains. However, it is exactly here where the bottleneck for China's future food security is located. Both water and land resources are scarce, and diminishing. Although the development of fertilizers and machinery will continue to extend the relative output per acre, the climatic variability and competition for land will outweigh these inputs (Veeck, 2013). Water resources will deplete, and the competition between agricultural and industrial interests will aggravate that issue. On top of this, arable land conversion in favor of industrial and urban expansion is burdening agricultural production even more. For years, land conversion was a profitable business for local governments, whose evaluation was mainly based on their economic development. Converting relatively unproductive land into industrial parks was, and remains, very lucrative. Although the central governmental has realized this – and implemented strict regulations and strict penalties – every year more of the best quality arable land,

especially in peri-urban areas, continues to be converted (Veeck, 2013). Prospects for future land loss due to both conversion for non-agricultural uses and conversion to non-grain crops are estimated at an annual loss of around 0.75 percent of the total arable land (Veeck, 2013). As China is already facing low numbers for per capita water resources and arable land (30 and 40 percent respectively), the stated goal of 95 percent self-sufficiency is inevitably going to face more constraints.

The Chinese government has not been ignoring the detrimental ecological and difficult social situation in China over the last decades, but the friction between economic growth and sustainable development (in these two aspects) is notable. Be it either speeches from the vice premier, or crisis-averting reforming policies, all show the hard balancing act policy makers have to perform. Nonetheless, over the decades, the sustainable development paradigm has entered into the policy-making realm. From the ecological perspective, the realization that the environmental damages are irreversible and therefor – and this is the pivotal point – damaging future economic growth has resulted into the maturation of China’s ecological sustainable development discourse. A similar pattern can be uncovered in the social sustainable development agenda, although it is a more pro-active movement. The city as an economic powerhouse is a well-perceived idea in policy-making, given that it is properly managed. The *hukou* system has aided this management in China, effectively avoiding the major urban poverty that characterizes other developing countries’ urban areas. Built upon this system, the Chinese government has put in place a framework that is highly manageable, and making it possible to identify and avoid potential conflicts before they occur. This asset is very powerful and should, in the light of the social element, be used very carefully in order not to obstruct the spontaneous social movements necessary to create liveable cities.

5. Contemporary urbanization and food security policies

With the current situation regarding urbanization, food security, and the future prospects in mind, the next section will address the governmental policies that deal with urbanization. The Chinese government released the National New-Type Urbanization Plan in 2014. This will touch upon the issues related with food security as well, although the plan does not address it directly. Presenting additional material that is written in concordance with the Chinese government will fill this gap. The focus in this Chapter is on the social and ecological sustainable development aspects in the policy, although the policy itself spans a broader range of topics. At the end of the chapter, this focus will be summarized in order to answer the second sub question, regarding the embedding of the sustainable development concept in the policy.

5.1 National New-Type Urbanization Plan

The National New-Type Urbanization Plan was released in 2014, after a 3-year drafting process under supervision of the Central Committee of the Communist Part of China (CPC). The focus of the plan can be summarized as *one main line, four tasks, and five reforms*. These three components are the reason for the addition of ‘New-Type’, and the following sections will show how the Chinese is government is moving away from old practices with this “macroscopic, strategic and fundamental plan” (Central Committee of the Communist Party of China, 2014).

The main line focuses on improving the quality of urbanization, and the means to do so come from a people-oriented approach. This is done by focusing on city clusters as the major form of urbanization, supported by comprehensive accommodating capacity and safeguarded by institutional innovation (Central Committee of the Communist Party of China, 2014). This approach is supported by the World Bank, which produced a report called “Urban China”, released shortly after the National New-Type Urbanization Plan. It was written in concurrence with China’s Development Research Center of the State Council, therefor being part of the current urbanization policy discourse in China. This report stresses the importance of properly addressing the next wave of urbanization to meet the evolving development objectives (World Bank, 2014). In relation to the people-oriented approach from the CPC, the World Bank’s report highlights – as one of their

three main points – inclusive urbanization, which aims to provide all people access to equal opportunity to benefit urbanization (World Bank, 2014). Currently this is not the case, as is illustrated by three developments. First is that although the urbanization accompanied high productivity growth, inequality between urban and rural citizens has grown. The GINI-coefficient of China stands at 0.47, which is a large increase compared to three decades ago and high compared to other East Asian and OECD countries (World Bank, 2014). The second issue is the current *hukou*-system that is being criticized from both urban and rural sides. The rural *hukou* holders are experiencing limited services when moving to cities, and when they transfer to cities, the funds that financed their services are not transferred to cities. This in turn spurs the discontent among urban *hukou* holders, who see the influx of rural people as overcrowding the social services, with declining quality as a result (World Bank, 2014). Third and final, the current financial compensation for farmers when they are expropriated from their land is a main cause of social unrest in China, as the farmers regard that the compensation is too low. It is estimated that during between 1990 and 2010, the financial compensation for expropriated farmers was RMB 2 trillion below market value (World Bank, 2014).

In order to address these issues, the CPC has formulated a number of strategies to decrease the inequality and social tensions. First, the *hukou* system is getting reformed, to a situation into which rural migrant can gradually obtain an urban *hukou*. Rural migrants whose life is becoming increasingly permanently urban through long-term jobs and family-life in the city will gain easier access than migrants with temporary jobs and whose family is in their hometown (Central Committee of the Communist Party of China, 2014). A second way of improving the rural-urban migration is through on the one hand provide the migrant workers with more opportunities, and on the other hand to actively transform their lives into similar ones like urban citizens. The opportunities that are being offered are the so-called guarantees, and range from providing them with training before they start their jobs and guarantee their payment for their jobs, to improving living conditions and ensure schooling for their children. These guarantees construct two fundamental transformations: upgrade the migrant workers to technical workers, and change their identities into those of urban dwellers. The main focus of these transformations is developing training for the migrant workers through a joint effort from state, enterprises and individuals. Through these trainings, both new migrants and

migrant who are already employed should be able to enter into new jobs that require more skills than they currently have. Other trainings are aimed at communities to provide charitable training, while preparatory training focuses on rural students and retired soldiers to ease their transition into city life (Central Committee of the Communist Party of China, 2014).

The four tasks that are envisioned by the National New-Type Urbanization Plan are as follows: “to gradually settle the former agricultural population who have migrated to the cities, optimize urbanization, and increase the sustainability of cities to eventually achieve unified urban and rural development.” (Central Committee of the Communist Party of China, 2014, p. 1). These have certain overlaps with the preceding section regarding the social issues of migration. The part about sustainability is for the purpose of this research more interesting, and will be described here in further detail.

The World Bank’s report mentions sustainable urbanization as one of the three determinants for China’s success in its development objectives, and defines it as urbanization that can be supported by the environment – i.e. land, air, water – and natural resources (World Bank, 2014). The current path of urbanization is unsustainable, as its resource use is inefficient: it causes pollution and indirect economic costs that are not reflected in market transactions (*ibid.*). As stated by the World Bank: “Some also fear that the increased demand from a growing urban population for water and land could undermine China’s food security and lead to unacceptably high imports of key products, which could in turn drive up global prices” (World Bank, 2014, p. 25). Although China has made large efforts to reduce the pollution and increase energy efficiency, these have been outperformed by the economic growth that continues to put pressure on the sustainability. The most prevalent issues are found in water and land resources, which are both under stress by agricultural production and urbanization. Livestock and poultry operations – which are growing due to said dietary changes – are polluting water sources, as do pesticides and fertilizers, whose usage is rising (World Bank, 2014). China is already far below average when it comes to water sources: it has only 7 percent of the world’s freshwater sources while sustaining 20 percent of population, which comes down to 30 percent of the world’s per capita average (World Bank, 2014; Veeck, 2013). On top of this, the availability of agricultural land is close to 120 million hectares,

which is deemed to be the minimum necessary to ensure food security, or the so-called 'red line'. A critical point here is the current trend in agricultural land conversion as a result of urbanization, which will convert an additional 3.4 million hectare into urban land over the next decade, dropping the available land below the 'red line' (World Bank, 2014). This brings in the topic of food security, as pointed out by the World Bank: "China's urbanization is likely to strongly affect two important aspects of food security: the aggregate availability of domestically produced food, and the access of vulnerable individuals and households to food" (World Bank, 2014, p. 28).

These problems are acknowledged within the National New-Type Urbanization Plan. If the four tasks outline the objectives, the five reforms are the means to achieve those objectives. Although they encompass certain other aspects as well – such as financing the plan, and migration movement control – the main focus in this section will be in relation to the above-mentioned sustainable issues defined by the World Bank. Two reforms are especially concerned with this issue: the control of land resources and protecting the environment. The building of urban housing is related to this as well, but this has mainly to do with the upgrading of the current housing conditions and not as much with the ecological aspect. Incorporated in the plan is a focus on ecological conservation. As opposed to former extensive expansion approach, the new plan should promote a more sustainable development agenda, containing topics as water and land conservation, green development, intense ecological restoration, and the development of green and smart cities that encourage green lifestyles (Central Committee of the Communist Party of China, 2014). This should reduce the negative effects on nature and environment.

When addressing the diminishing agricultural land, the National New-Type Urbanization Plan has a more elaborate vision for the reforms compared to the ecological conservation. Three aspects are identified as central achieving the proposed reforms. First, the protection of arable land is getting stimulated through regulation changes in the areas of economic and social development, urban planning, and land use (Central Committee of the Communist Party of China, 2014). The aim is to tie all the existing planning policies to the National New-Type Urbanization Plan, turning it into the foundation for future regulations, by marking all ecological resources, farmlands, and

city areas with red lines (Central Committee of the Communist Party of China, 2014). This would place the scale of new construction land under stricter control, although it should be noted that the expansion of cities is still present, be it under different conditions. New urban areas should encroach upon the conglomeration of satellite towns, forming a combined urban area. The plan does mention the upgrading of so-called shantytowns one of its priorities as well, in order to decrease the gap between wealthy parts and poor areas within cities. These upgrades could prove to decrease the need for the expansion of cities, through increasing density. Density in most of Chinese cities is still quite low, compared to its Asian counterparts. Through proper governmental planning, overcrowded areas can be transformed into dense but livable areas, which brings in the second aspect of controlling land resources. It is the governments' aim to innovate the land system by increasing the land supply, making most of the present stock of land, optimizing the land structure and raising the land use efficiency (Central Committee of the Communist Party of China, 2014). This comes down to improving both the quantity and quality of land, as the evaluation of land is balanced in favor of the protection of farmland. Low-efficiency arable land will be converted into urban or industrial areas, whereas the retrieval of farmland will be improved through a responsibility system (Central Committee of the Communist Party of China, 2014). As for this expansion, in order to create clear consensus about the possibilities for what areas are suitable for construction, a four-line planning scheme will be introduced. These four coloured lines will inform planning departments which areas are green belts, water supplies, cultural relics, or vital infrastructure, in order to prevent construction happening in those areas (Central Committee of the Communist Party of China, 2014). This protection of farmland ties into the third aspect, which the preservation of farmers' lawful rights. The main focus lies on reforming the collective ownership in rural parts, which should on the one hand be reinforced to protect farmland, while on the other hand the possibility for commercial usage to enter the land market should be enforced (Central Committee of the Communist Party of China, 2014).

From the content presented in this Chapter, a clearer image arises regarding the Chinese government's intentions to incorporate sustainable development aspects in its urbanization policies. Although this policy incorporates other types of sustainable development as well, the focus on social and ecological aspects is profound. The

prominent people-oriented approach and the recurring emphasis on the unsustainable usage of natural resources speak for this. Although critics might argue that both the social and ecological emphasis is instigated from an economic desire and necessity, but that argument falls victim to oversimplification, as it does not address the nature of the implemented policies. Perceived in that way, it shows that the policies for social sustainable development are elaborate, with specifications for a large number of groups as well as the intentions to incorporate many actors in achieving the stated goals. As for the ecological measures, there is a two-sided story. On the one hand, the controlling and restoration of land resources and agricultural land conversion is well described and implemented. On the other hand, the ecological sustainable development of urban areas remains somewhat opaque, as the policy is filled with terms that are very broad. A further explanation and elaboration of their concrete measures would greatly enhance the validity of the policies, as they would be able to be scrutinized.

6. Urban agricultural in China's cities

6.1 General introduction

In general, urban farming is common practice in China, resulting in a fairly self-sufficient food system in which most food is produced within 10 miles of the point of sale (WWF, 2012). As pointed out before, this does not mean that urban agriculturalists will keep being the sufficient suppliers, due to the increasing population and urban expansion. As stated by Yang et al. (2010, p. 275), “[as] it is almost inevitable that urban development will outbid agriculture for developable land, urban and rural planners should be concerned with the social and environmental costs of this development.”

While the previous sections provide the context in which the current state of urbanization and food security are embedded, it encapsulates still a conceptual notion of urban agriculture that does not go into detailed description. In the following section, two cases will be presented, to give a clearer example of what urban agriculture in China looks like in practice. These two cases will emphasize ecological and social sustainable development respectively, the first one to be found in Shanghai and the latter in Beijing. These two cities are proven examples of embedding urban agriculture in their urban development, as Shanghai has a track record of being nearly self-sufficient and Beijing is

deemed the leader in China's agricultural industry (Cai & Zhang, 2000) (Yang, Cai, & Sliuzas, 2010). Although the focus is on the ecological and social sustainable development that urban agriculture contributes to, the cases will touch upon other elements as well in order to give a clear picture of the scale of urban agriculture.

6.2 Shanghai

Although Shanghai might not be immediately associated with agriculture – the sector only contributes 2 percent of the city's GDP – the city's government has committed to capital-intensive agricultural development (Cai & Zhang, 2000). This has had positive results for the up scaling of the local food production, as Shanghai now produces half of its food demand within the city's green belt (RUAF, 2012). Up until the 1980s, the city was self-sufficient in its food production, but during the 1990s the urban expansion and demographic changes put this independency under pressure (WWF, 2012). The total arable area declined from 360.000 ha in 1978 to 290.00 in 1995, resulting in a decline of the self-sufficiency ratio (Cai & Zhang, 2000). At the turn of the millennium, a renewed effort to safeguard the self-reliance was made by taking control of the local production and distribution, and by regulating the land use to preserve farmland (WWF, 2012). The city's investment in agriculture increased fivefold since then, and a number of programs were adopted to ensure the economic development of agriculture, although the program incorporated a vast amount ecological and social aspects (WWF, 2012) (Cai & Zhang, 2000). The clearest examples of the ecological approach are two of the programs. The first is the introduction of circulatory and ecological agriculture, while the second is the integration of biodynamic farming into existing ecological policies, of which the aim is to increase the coverage of green spaces up to 35 percent by 2020 (WWF, 2012). These aims coincide with two other aims the city's government has identified for the use of urban agriculture when it comes to ecological and social issues: the reduction of air pollution by maintaining green open spaces and the opportunity for recreation (Cai & Zhang, 2000).

The results of this renewed focus are starting to show. The main aim of economic development comes down to the production of market-competitive products, which was under pressure due to limited land and technological resources. These have witnessed protection and investment, resulting in increasing yields on limited land, whilst making

the products more competitive, increasing the income of urban farmers (Cai & Zhang, 2000). This also implied that large-scale farms overtook the household farming, in turn resulting into the mechanization of many activities at the expense of labor requirements.

As for the ecological trends that are happening, the proximity of agricultural activities to the urban areas led to a more outspoken population regarding the negative environmental effects of agriculture, as well as the quality of products. The public was scrutinizing all the environmental costs, such as crop contamination and soil, water, and air pollution. As a result, the open-land production of crops was moved into greenhouses, which have shown to reduce the ecological footprint of the agricultural production (Cai & Zhang, 2000). This included the use of organic waste to make biogas, the composting of crop residues, and the use of night soil as natural fertilizer.

A final policy implementation has been the promotion of the agricultural areas and farms for leisure activities. The average green space per citizen is just a little over one square meter, which is low compared to China's average of four square meters and even less compared to the world's average of fifty square meters (Cai & Zhang, 2000). By adjusting the farms and fields to make them more attractive, these areas have become popular destinations for day activities or holiday resorts, as well as agricultural festivals that next to leisure provide promotion of and education about agriculture.

6.3 Beijing

As stated, Beijing has a known reputation for being the builder of the rudiment of China's modern agricultural industry, which started after the economic reforms in 1978 (Zhang et al., 2013). According to Yang et al. (2010), since then the relationship between modern agriculture and urbanization in Beijing can be divided into four stages, each characterized by the effect on the rural workforce and arable land.

After the economic reforms, the Household Responsibility System affected the agricultural output of China tremendously, and Beijing was no exception. During the first half of the 1980, the new economic opportunities in the agricultural sector attracted a lot of labor into the agricultural sector, which rose from 1.6 million to 1.9 million over the course of 6 years (Yang, Cai, & Sliuzas, 2010).

This initiated the second stage, as the enormous upsurge of agricultural output resulted in economic prosperity, which led to migration to the city and a higher demand for food. This period was labeled as 'feeding the city', and food scarcity became an issue of the past. Because of this food security, the economic activities started to diversify, and the industrial and service sectors became an economic competitor for the agricultural industry. Consequently, the land resources became more valuable, resulting in a diminishing of arable land at the expense of urban and industrial expansion.

The third stage was one of fast urbanization and meant that the agricultural sector had to adapt, which it did by specializing and forming collectives that opened the possibilities for large-scale agricultural development (Yang, Cai, & Sliuzas, 2010). At the same time, the communication between the government and farmers regarding the agricultural land use was lacking, which led to resistance from the farmers who felt that their rights were not protected (Zhang et al., 2013).

This resulted in a stronger competitive position in relation to the urban industries, which would lead to the fourth stage in which the rural and urban sectors integrated. The proximity of the sectors as a result of urban expansion meant that the opportunities for agro-service and transportation jobs soared (Yang, Cai, & Sliuzas, 2010). However, the collective agricultural enterprises clashed with the farmers, who accused the enterprise of unfair contracts, which in turn led to breaching of those contracts (Zhang et al., 2013).

This final stage is present today, and one of the most common rural-urban integration sectors is agro-tourism. Although similar activities had been around since the beginning of the 1990s, the sector experienced tremendous growth after the turn of the millennium, resulting in over a thousand agro-touristic parks in 2005, and that number is still growing (Yang, Cai, & Sliuzas, 2010). Many of the visitors are enjoying the local cuisine, experience the farming methods, or celebrate festivals. In terms of employment, the agro-touristic farms report that migrant workers make up the largest share of the total workforce (Yang, Cai, & Sliuzas, 2010). As they are located in peri-urban areas, this

has a side effect of relieving some of the stress that the large migrant labor pool brings to the city centers.

Critiques about these enterprises and their conducts have been raised as well. The large migrant labor force is still being underpaid, and their children are suffering from poor support in terms of education (Zhang et al., 2013). Another issue is the lack of cooperation between research institutes and the agricultural enterprises. This results in a lack of maturing of the sector, which is a disincentive for students to pursue a career in this field.

6.4 Urban agriculture's contributing value to sustainable development

From these two examples, a small but insightful analysis can be made. As a leftover from former policies, urban agriculture is still fairly present around Chinese cities. The agricultural land has been under pressure as a result from the economic growth and its related urban expansion, but the two examples show different ways how to alter or even reverse those effects. The case of Shanghai shows foremost the impact of the local government on the implementation of urban agriculture. The positive public involvement that this involvement generated is indicative for two things. First, the assumed backwardness of agriculture in order to modernize urban areas is proven to be invalid, as Shanghai is a highly developed city. Second, the local governments' policy *vis-à-vis* the central planning proposed in the National New-Type Urbanization Plan is a topic for debate. As the public in Shanghai now has a closer tie to the implementers and the implementation, this proximity might crumble if the central government dictates the rules. Good interaction between the local and central government seems to be of the utmost importance.

As for the Beijing experience, the case shows the fickle balance between food security and urban expansion, where the upsurge of food production caused a spur in urban expansion, which in turn decreased agricultural output. It does also provide the unmentioned social benefit for the labor pool in China. As the unskilled workers come to cities and invoke resentment among urban laborers, the urban agricultural sector provides a buffering effect. This option in combination with the proposed training of unskilled workers seems to be very valuable, and is worth further exploration.

7. Analysis

Urbanization, food security, and urban agriculture in China are all issues that affect or are affected by academics, politics, companies, environmental organizations, and individuals. This multifunctional character shows the importance to coordinate the combination of the three issues, but at the same time it indicates the difficulties in aligning all the preferences from the different actors. This analysis will try to identify common themes that all actors are dealing with, to show how an integrated approach could be formulated. The analysis will first address all the different sections of the empirical data separately, based on their ecological and social sustainable development perspectives as defined in the theoretical framework. After this a section follows in which a combined analysis will provide some suggestions and discussions for future research, which will also show some of the limitations of the scope of this research.

7.1 Economic development *vis-à-vis* sustainable development in China

The focus on economic development from the Chinese government has for an extensive period of time outweighed the sustainable development of both ecological and social objectives. This long history of economic preference is cemented in the policy-making rhetoric, as every described issue in this research has been in some way linked to its economic implications. It is however interesting to see that the government does seem to incorporate social and ecological issues more and more, as for instance premier Li Keqiang's speech on declining growth shows – but again, this puts economic development first.

It should not necessarily be an issue that economic growth precedes ecological and social sustainable development when making policy, but throughout this research issues have been raised about the incompatibility of economic growth under the current regime without overhauling the sustainability concept. The inevitable consequences of environmental degradation and social tension as a result of the clash between urbanization and agricultural production are of a multi-faceted nature, and it is up to the government to coordinate these issues, as it is the government who is an ever-present actor in all the relations. The National New-Type Urbanization Plan is a step in the right direction, as is shown by the well-vocalized objectives and measures the CPC has embedded in the plan. The recognition of both ecological and social problems that

would result under the old urbanization planning have been identified, and new policies have been implemented to address them. However, due to the economic preferences, the proposals have a nature of being fixes rather than visionary, and this might pose problems with irreversible effects.

First, the emphasis on urban dwellers to be more productive than their rural counterparts disregards the existence of urban poverty. The historical record China has regarding the containment of the so-called urban diseases might soon be under great pressure as a result of the proposed migration of 300 million people into the cities. Even with a gradual *hukou* reform, training for migrant workers, and accommodation upgrades, the movement of such a vast amount of people will put pressure on the cities services and infrastructure, employment possibilities and livability. The World Bank's recommendation to shift away from the focus on building and sector development towards a more inclusive and dense development is therefore of great importance, but is something that unfortunately is not mentioned with the National New-Type Urbanization Plan.

This brings up the second issue, as the social tensions that arise are for a great deal connected to the infrastructure of the cities. As shown with the peri-urban farms where migrant workers find work, the proper spreading of living, working, and recreational areas is of vital importance, and uniform zoning would be detrimental to the development of the city. Although the National New-Type Urbanization Plan acknowledges that the unbridled expansion of industrial parks or residential compounds should be restricted, there seems to be lacking a coherent mixed zoning approach. This research has tried to show the importance of having such mixed areas for ecological and social effects in specific, and these zones would not exclude economic development as it would prevent the so-called urban diseases that hinder economic prosperity. It is interesting to see that the two theoretical perspectives of focusing on social equity and community engagement coincide in the plan, as it encompasses both opportunities for individuals to enhance their capabilities, as well as aiming at a larger social cohesion through the spatial reforms.

The third point addresses one important aspect of those mixed zones, namely urban agriculture. If the Chinese government is determined to incorporate sustainable development from an ecological and social perspective into its overall development policy, the inclusion of urban agriculture is one that cannot be omitted. Although urban agriculture is already present in most cities, the trends of the last decades predict a slow disappearance for the arable land in and around cities. The ecological impact might not be one of replacing industrial or residential zones in favor of more green areas, but the focus should be on both keeping certain green belts around cities, as well as incorporating it into newly built cities. The social impact comes mainly from the buffer the agri-businesses provide in terms of employment for unskilled laborers, but this research also shows the social activities that are associated with agricultural land.

A last concern has to do with the added agricultural output urban agriculture can produce. As mentioned, the current landscape in China already has a vast amount of peri-urban agriculture; a leftover from the commune era in which local self-sufficiency was encouraged. Currently, these farms are small, so productivity can rise under the influence of scale and the affiliated mechanization. This has two problems however, one being in the initial phase and the other as a result of it. The innovation-triangle consisting of the cooperation between government, research institutes and agricultural enterprises is not working smoothly, resulting in both a lack of investment in the sector and a lack of students pursuing a career in the agricultural sector. This could have serious drawbacks on the potential increase in productivity. If the government establishes a better network in which these obstacles are overcome, there is another issue once the mechanization infiltrates the agricultural enterprises, as this would lead to declining employment possibilities – employment that was identified as essential for the buffering of the vast migration of the coming decade. The issues between farmers, enterprises and research institutes that are now hindering the productivity growth of the agricultural output need to be resolved, and it is the government who can play an active role in solving the issues by implementing better security for both farmers from unfair contracts and the enterprises from contract breaches.

7.2 Discussing the future of food security in China

As shown, the urban agriculture is not up-to-date to tremendously increase its output necessary for the increasing food demand. Although the arable land outside cities is still able to produce more through mechanization and other yield-increasing technologies, climate change already influences the spatial shifts of agricultural production. This process is unlikely to be reversed, and technological innovation will most likely not be able to counter the effects. This in turn means that China's self-sufficiency will be on the line, and this policy should therefore be open for discussion. The possibilities for increasing the amount of import, especially for animal fodder, should be explored. The notion of self-sufficiency is appealing from a security perspective, but should not be maintained *in extremis*, which would lead to detrimental food insecurity. Rather, food security could be achieved through a cooperative international regime, of which a framework in the form of ASEAN already exists. This would shift some national power to an international body, but the results in the long-term are invaluable compared to that shift, as is demonstrated within the European Union. Although the EU has a much more elaborate cooperative nature, it does provide the ASEAN with an example of pros and cons of such a partnership. Certain signs can be identified that a shift in mindset among Chinese influential individuals and governmental bodies has started. Former World Bank Chief Economist Lin Yifu has mentioned the possibilities and necessities to open the debate for food imports. He argues that currently China has no comparative advantage in agricultural production compared to those countries that have natural endowment, or biological or technological advanced agricultural sectors. Although this can be altered, the option for importing grain as a part of food security should not be thrown out of the window, he argues (Fang, Yifu, & Yong, 2009). This view is supported by the World Bank itself as well, which outlines the benefits China already experience from their soybean imports. The general view they support is that China should proactively position itself in the global food governance, if it wants to reap the benefits of such collaborations (World Bank, 2014).

8. Conclusion

This research started out with showing the interlinking of urbanization, food security, and urban agriculture in China. The first two have always been two sides of the same coin, as has been shown in both theory as in the case of Beijing. The implementation of urban agriculture to contribute to social and ecological sustainable development has been the specific focus, as these two aspects had been identified as most important for understanding the urbanization and food security topic in China. Throughout this research a landscape has been painted that still shows a strong prevalence for economic development, but positive signs for the introduction of sustainable development can be identified. Academics, politicians, and agri-businesses are all more occupied with the concept, and the new urbanization policy strongly addresses this topic.

As for urban agriculture, its contribution to urbanization and food security takes on different forms. For urbanization, its main new contribution can further explored in the social sphere. The recreational benefits should not be underestimated, as the green areas prove to be valuable for the livability of cities. The buffering effect it can have for the large pool of migrant workers that is coming to the cities are of vital socio-economic importance, to avoid a segregation between original urban dwellers and the new arrivals. The gradual integration in cities is both important for both groups, and this buffering option should be included in the proposed training efforts.

The ecological benefits are of a different nature. Urban agriculture is not, as in western cities, a phenomenon that is reintroduced, but rather a historical implemented part of China's agricultural sector. Therefore, the ecological benefits are mainly a matter of conservation, rather than a complete rethinking of city layout. There is still a lot to win from technological and biological innovation, but the Shanghai example shows that the local government has acknowledged these issues. It also shows the positive effects the policy has on agricultural output, shown by the increases in production while dealing with diminishing arable land.

Due to a lack of resources this research could not touch upon the new cities that China is building – it would be of great interest to see how the city planners have accounted for the sustainable development of these cities. The discourse on sustainable development in the National New-Type Urbanization Plan is drenched in interesting terms, but a concrete example of the implementation of them in city planning would make those terms more tangible.

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