

**Understanding the Role of Urban Agriculture in the Transformation of the
City in Contemporary Urban China:
Case Studies of Kunming, Yunnan Province**

Candidate:

Yuan Wei

Supervisor:

Associate Professor Paul Jones

Associate Supervisor:

Dr Adrienne Keane

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**Sydney School of Architecture, Design and Planning
University of Sydney**

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Statement of Originality

This is to certify that to the best of my knowledge, the content of this thesis is my own work under the supervision of Associate Professor Paul Jones and Dr Adrienne Keane. This thesis has not been submitted for any degree or other purposes. I certify that the intellectual content of this thesis is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged.

Yuan Wei

Sydney, March, 2019

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Abstract

The exponential growth of China's urban sprawl has resulted in the transformation of once arable land into cities, reducing food production levels nationwide and superseding former rural villages into developed urban areas. This thesis explores the emergence of urban agriculture (UA), and its changing role and nature in the urbanisation process, specifically in the context of better understanding 'informal' and 'formal' practices. This study focusses on the case study of Kunming, Yunnan Province, China, where significant numbers of Village in the City (VIC) and peri-urban residents are practicing UA. To explore UA in Kunming, this research applies a mixed methods approach, including questionnaires, semi-structured interviews, site observation, and mapping. Four key criteria are used in this thesis to analyse the expressions of various UA types and the motivations of the stakeholders, namely, functions, space types, physical forms, and rules and regulations.

Analysis of the results identifies that UA is a viable practice which supports the livelihoods and wellbeing of the residents in new, innovative and diverse forms of private and public space. In terms of stakeholders, four main groups were involved in UA in Kunming: individuals/households, community groups, commercial operators, and governments and related departments. The household participation rate of UA is higher in VICs than in non-village areas. The most popular reasons for undertaking UA practices are revealed to be 'previous agricultural background' in VICs, and 'personal interest' in non-village areas. The dominant function of UA preferred by the households is family consumption in both VICs and non-village areas. Across the city, the prevalent space chosen by the households for UA practices is in private space, followed by public domain areas. Citywide, the households prefer using recycled containers with rectangle/square geometric shape for planting. The results show the dominant species being grown is vegetables. The formal rules and regulations regarding resident-led UA practices in both VICs and non-village areas in Kunming are ineffective and often unenforced. The results also highlight the need for improvement in strategies for developing large-scale UA projects in Kunming due to the existing questionable negotiation practices between commercial operators and local authorities.

Through the analysis of function, space type, physical form and rules and regulations, we better understand the way in which residents produce form, and engage with and territorialise space. UA in Kunming presents itself in different ways and at different scales in the private and public domain. This research highlights how people adapt urban spaces for their needs and the perspectives from different governance levels to understand the complexity and co-evolution of UA in Kunming. In summary, no matter whether formal or informal, UA is a key element in many cities in re-using and re-adapting space. These UA practices respond to urban pressure and bring the innovative thinking of urban governance in terms of effectively integrating UA into local development whilst understanding the new and alternative ways of revitalising and managing cities.

Keywords: Urban agriculture, Village in the city, Sustainable development, Urban planning, Kunming, Yunnan Province, Contemporary urban China.

Acronyms

CGIAR	Consultative Group on International Agricultural Research
FAO	Food and Agriculture Organization of the United Nations
RUAF	International Network of Resource Centres on Urban Agriculture and Food Security
SGUA	Support Group for Urban Agriculture
UA	Urban Agriculture
UNDP	United Nations Development Programme
VIC	Village in the City
WHO	World Health Organization

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1 Introduction

1.1 Background

Urban agriculture (UA) plays a key role in the contemporary city by addressing issues arising from food security, food shortage, and land insufficiency in urban areas (Bakker, Dubbeling, Gundel, Koschella, & Zeeuw, 2000; Deelstra & Girardet, 2000; Veenhuizen & Danso, 2007). Also, urban development is increasingly superseding arable agricultural land. This thesis explores this dilemma through the lens of land use and community responses to UA in urban areas. The concentric zone model of urban development is now the main developmental approach adopted to spatially structure Chinese cities. Application of this model has meant cities have increased in size and density without the inclusion of 'green' buffer zones (L. Lu & McCarthy, 2008; Tian, Wu, & Yang, 2010). Peri-urban areas are considered to be a resource of 'land storage' for cities to eventually expand into, thus, rural land designated as future urban areas. During the urbanisation process, the Village in the City (VIC) phenomena arises as a result of the transformation of rural areas into a 'land bank' for future urban development. They are a transitional form of urban development.

According to the investigation of the Ministry of Land and Resources of the People's Republic of China (MLRPC), the amount of arable land was measured as 13,516 thousand hectares in 2013. This was a decrease of 221.2 thousand hectares since 2009 (135,385 thousand hectares), which was primarily caused by urban construction, natural disasters, increased allocation to industries, as well as other factors (MLRPC, 2015) (see Figure 1.1). The percentage of arable land in the country is decreasing while the population is continuing to increase. Urban land and food shortages have already become problems that cannot be ignored.



Figure 1.1. Amount of arable Land in China, annually for 2009-2013

(Retrieved from (MLRPRC, 2015))

Land is necessary for sustainable agricultural development and essential ecosystem functions. At a global level, more than 1.5 billion hectares – about 12% of the world's land area – are used for crop production (FAO, 2015). The decreasing trend of available arable land is closely related to the demand for food production and food quality. Based on the latest estimates, approximately 795 million people – just over one in every nine people in the world – still lack sufficient food to support an active and healthy life (MLRPRC, 2015).

In addition to food shortages, the global population is also being affected by climate change. Current global surface temperatures are now approximately 0.6°C higher than the average for the last century. This increase is consistent with the model predictions of the effects of rising atmospheric concentrations of CO₂, which are a result of human activities, such as traditional crop production practices and the long distance of transportation. China has the highest level of greenhouse gas emissions from agricultural activities in the world. From 2000 to 2012, there was more than 600-800 Mt CO₂eq released in China (FAO, 2015). To achieve global targets of sustainable development, improving agricultural production processes into more ecologically and environmentally friendly systems is a primary concern and has helped form the research questions explored in this research.

Homelessness and unemployment have already become serious issues due to the shortage of arable land in China (Webster, Wu, Zhang, & Sarkar, 2016; Zhu & Luo, 2010). As a large share of the low-income workforce is involved in agriculture, developments in this sector have a significant impact on livelihoods and welfare. From 2007 to 2012, employment in agriculture in China was at a range of 32%-65.6% share of total employment (FAO, 2015) (see Figure 1.2).

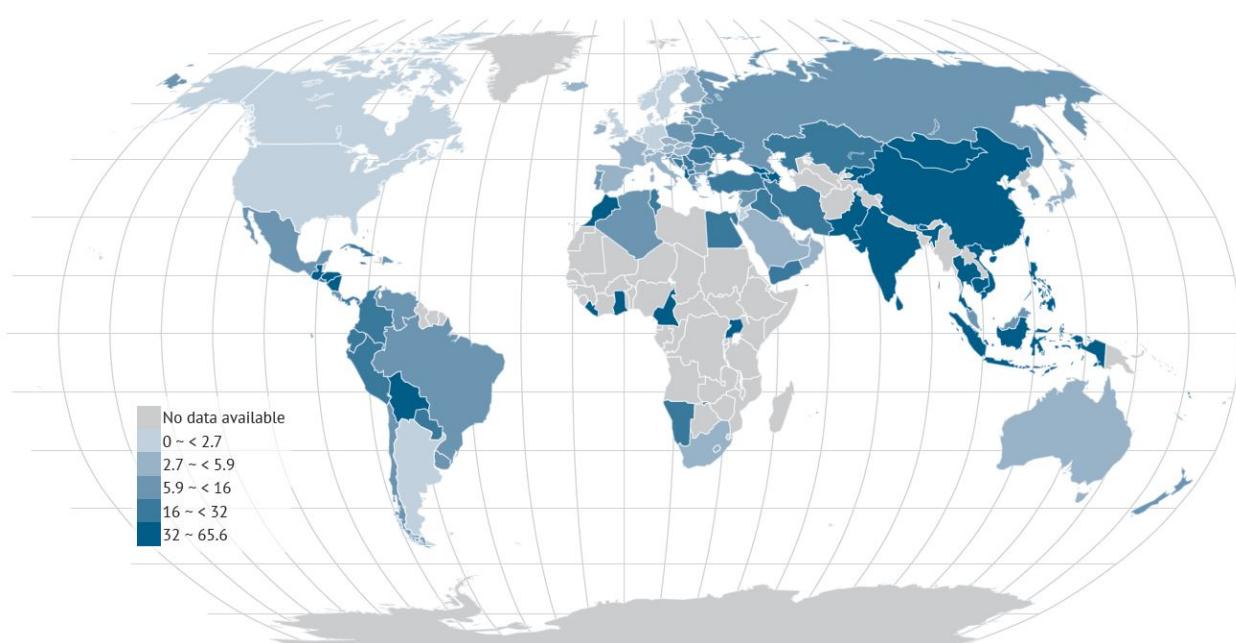


Figure 1.2. Employment in Agriculture, Share of Total Employment (percent, 2007 to 2012)

(Retrieved from (FAO, 2015))

The unprecedented pace of modernisation and urbanisation has seen cities grow and sprawl from urban areas into rural spaces. According to the statistics published by the National Bureau of Statistics of the People's Republic of China (NBSC, 2015), the urban built-up area increased by more than 17,000km² in the period between 2005 to 2014 (see Figure 1.4). Since 2000, the area of cities in China has expanded at an average rate of 10% annually. The number of urban residents in every square kilometre reached 2,419 persons in 2014, compared to only 870.2 in 2005 (see Figure 1.3). It is estimated that the urban population in China will increase by 292 million persons by 2050 (Globe, 2014).

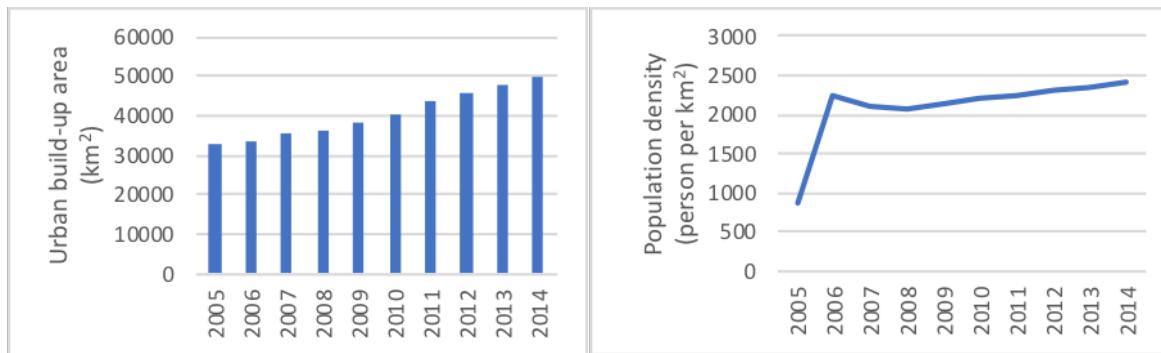


Figure 1.3. Urban Build-up Area (left) and Urban Population Density per km² (right) in China, 2005-2014

(Retrieved from (NBSC, 2015))

Urbanisation brings positive and negative impacts. On one hand, it exemplifies the promise and potential of cities as engines of growth that generates wealth and provide opportunities for the underprivileged to escape poverty. On the other hand, there is a more worrying scenario for cities whose growth has outpaced their capacity to be effectively governed, leading to failing infrastructure, a lack of essential services, dense slum areas and highly polluted landscapes. Some cities face immense environmental challenges, including the increasing upward trend of urban population, unlimited growth in urban areas, a serious lack of adequate food production and security, and public health and sanitation issues (Bhagat, 2018; Hsin Chang & Brada, 2006; Maneepong & Webster, 2008). As such, there is far more that needs to be done to harness the positive opportunities that urbanisation brings.

UA provides millions of people with a level of secure access to food whilst reducing their exposure to volatile changes in prices which maybe outside of their control. With a reasonable level of institutional support for the integration of UA into local development and international policy makers (such as FAO and the World Health Organisation), as well as national and municipal institutions becoming more proactive – UA is an activity that should be encouraged. UA offers the benefits of relieving food insecurity, reducing household waste and carbon emissions, and providing more green space.

Although research into UApractices began late in China's urbanisation process, there are already many examples of UA to be found in Chinese cities (K. Chen, Shi, & Xu, 2009; C. Liu, 2006). These practices are both formal, such as in urban farms, and informal, such as practices created spontaneously by residents without any specific policy governing them. It is argued in this thesis that the future of the cities should be one that recognises the role of UA at the local level through both formal and informal processes. Thus, engaging in agriculture in various forms and functions within urban areas, rather than removing small-scale agricultural practices from the city has positive benefits for both residents and city generally.

Within the context discussed above, this research aims to obtain a deeper understanding of the role and nature of UA in the urbanisation process by exploring the changing functions, types and forms of UA in the transformation of the city. This seeks to understand the nature of current UA practices whilst acknowledging the important role of UA in both built and unbuilt spaces in the city.

1.2 Urbanisation Trends in Contemporary Urban China

Urbanisation is “the process whereby a society changes from a rural to an urban way of life. It also refers to the gradual increase in the proportion of people living in urban areas” (MCBI, 1968). In demography, urbanisation can be explained as the process where the population migrates from rural areas to urban areas (X. Wang, 2009). American urban geographer Northam (1979) explored the characteristics of some developed countries and divided the process of urbanisation into three stages: Initial Stage (annual rate of urbanisation less than 25%), Acceleration Stage (total rate of urbanisation between 25% and 75%) and the Terminal Stage (annual rate of urbanisation greater than 75%).

When considering the developmental process of China, (Zheng & Huang, 2006)identified five key stages(see Figure 1.4):

- (1) Start Period (1949-1960) - after the establishment of the People's Republic of China, the government decided to develop industry and the military. In order to meet the demands of development, sections of rural land were reallocated to urban land.
- (2) Reverse Period (1960-1976) – due to the ‘Cultural Revolution’, there was a regression in the urbanisation process because of the implementation of several strategies such as transferring many young adults from urban to rural areas to support the rural development.
- (3) Restart Period (1976-1989) – after the ‘Reform and Open Up’, the government adjusted the structure of the economy. Villages increasingly transformed into parts of the city and the ‘VIC’ phenomena appeared at this period.
- 4) High-speed Development Period (1989-2001) – with the fast development of the consumer market, economy, and industry, the speed of urbanisation rapidly increased.
- (5) Stable Development Period (From 2001 to present) - due to the capacity of cities and full development of the economy, the process of urbanisation stably increased.

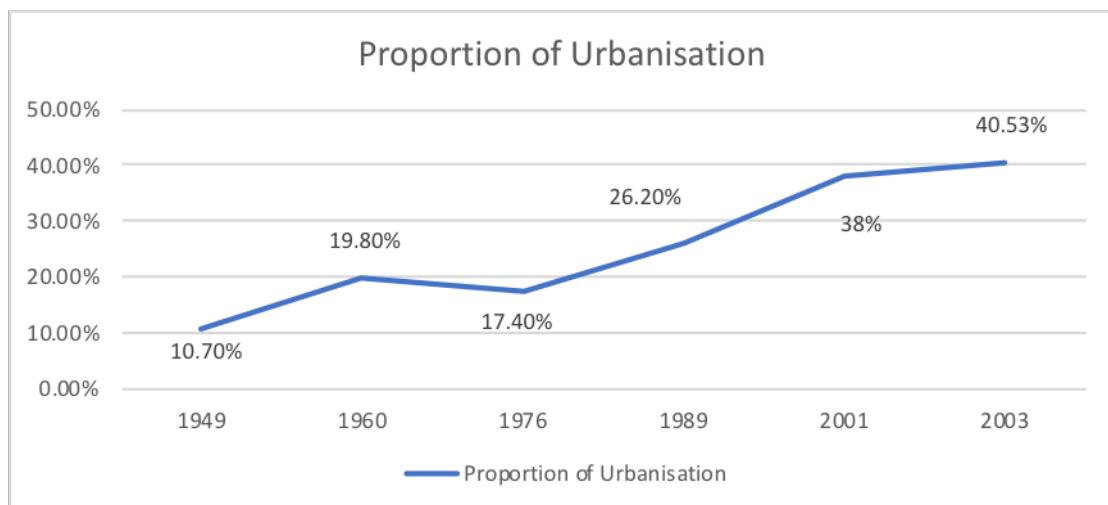


Figure 1.4. The Urbanisation Process in Contemporary China

(Statistics retrieved from Zheng & Huang, 2006)

In the early 1980s, the growth of urban population was slow. Through the implementation of policies and plans, the Chinese Central Government aimed to increase the proportion of the population living in urban areas (PRC, 1980). Progressing through to the 1990s, industrialisation launched by the Chinese Central Government became the foundation of urbanisation. However, during this time, the issue arose where the limited capacity of the cities to absorb the migrant workers gave rise to an imbalance in spatial density. The rapid transfer of population from rural to urban areas and the imbalance of urban development

became a mainstream concern, which persists to the present day. Issues concerning agriculture, villages, and the ‘peasantry’ continue to be prominent in China’s urban context.

Many researchers have defined the overall features of urbanisation in contemporary China from the 1980s until the present (Gu & Wu, 2008; Ning, 2012). These features include peri-urbanisation characterised by growing urban edges. The total urbanisation rate has increased from 19.39% in 1980 to 49.95% in 2010 (average annually increased more than 1%) and the urban population increased 369 million persons during this period. The second feature highlighted by Gu and Wu (2008) and Ning (2012) is the obvious discrepancy between urbanisation rates among different provinces and prefectures (see Figure 1.5). The coastal cities in the eastern region gain the highest level of urbanisation while the central region has the second highest. The cities in the western region have a lower degree of urbanisation. Another prominent aspect of Chinese urbanisation is the metropolitan areas have become the core of the national economy. During the urbanisation process, areas with a high density of cities combined into a metropolitan region, such as the Greater Pearl River Delta and Yangtze River Delta urban agglomerations. In 2009, the gross domestic product in these two areas reached 9.44% and 17.6% of the total gross domestic product of China respectively.

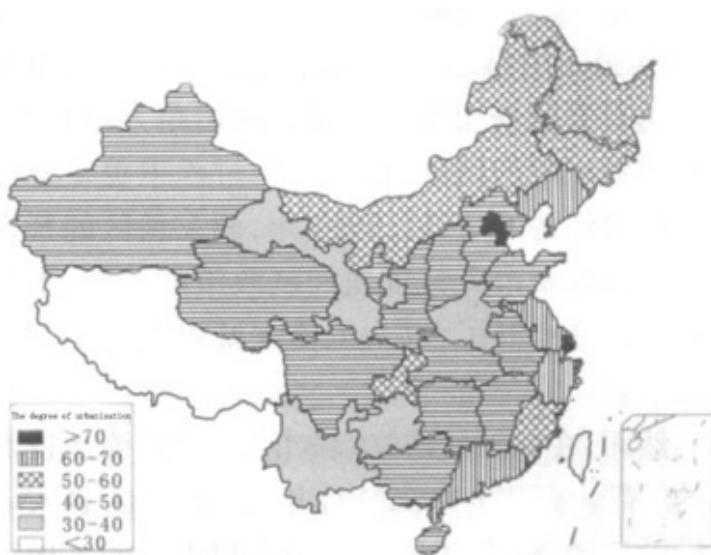


Figure 1.5. The Discrepancy of the Urbanisation Rate in China

(Retrieved from Ning, 2012)

Overall, the transformation of the structure of industry was the key dynamic mechanism which propelled the urbanisation process (Gu & Wu, 2008). Industrialisation, both urban and rural, contributed to the large-scale migration of labour being shifted from rural areas to urban areas. The rapid development of transportation and communication within urban areas also contributed to the influx of migrants.

The Chinese Central Government and local governments played a significant role throughout the urbanisation process of the nation (Gu & Wu, 2008). A series of population policies were issued by the Chinese Central Government with the following aims: (1) resettle the unemployed population and reallocate the labour; (2) support the new industries; (3) Support remote districts; (4) encourage the relocation of educational institutions; and (5) promote the construction of water conservation facilities and reservoirs.

1.3 Urban Informality and the Village in the City Phenomenon

1.3.1 Urban Informality in a Chinese Context

‘Informality’ is a term used to “describe the collection of firms, workers, and activities that operate outside the legal and regulatory systems” (Loayza, 2016, p. 2). Through the studies on informality in Africa, Hart (1973) argued that there is no simple definition of informality that grasps the great variety of practices found in different parts of the world and in different spheres of society. The neglect by, or deregulation of state control was seen as a framework condition for unfolding informality, without major concern about the reactions of the state towards it.

The understanding of informality as a mode of production rather than a sector has specified that there is no pre-defined boundary that separates the formal from the informal sphere of society(Roy, 2005). Starting from this point, recent literature on informality overcame the older distinctions between ‘legal’ and ‘illegal’ and between ‘regulated’ and ‘unregulated’ and has claimed that informality unfolds in a ‘deregulated’ system(Roy, 2012; Schoon & Altrock, 2014).A variety of research and literature focusses on urban informality

of the Global South, including Indonesia (P. Jones, 2016, 2017), Brazil (Muller, 2017), etc as well as the Global North (Jaffe & Koster, 2019; R. Liu, 2014; Webster et al., 2016).

In the context of China, the Chinese party-state follows a course of experimental governance characterised by conceded informality, which refers to the “flexible management of diverse informal practices depending on their relevance, usefulness and potential threat towards the authorities” (Schoon & Altrock, 2014, p. 216). The Chinese central government neither tries to completely formalise development as in the case of western developed states, nor gives itself up to informal practices as in the case of some of the least developed states in the global south. Instead, it uses its resources to deal with informality strategically. The strategies include: “(1) The party-state actively supports informality when institutional gaps are successfully closed; (2) The party-state promotes informality when it produces new strategic knowledge; (3) The party-state utilises informality when flexible guiding principles serve as a political strategy; (4) The party-state tolerates informality when it serves their development and objectives; and (5) The party-state overcomes informality when important economic (or other) interests are prevailing” (Schoon & Altrock, 2014, pp. 217-219).

1.3.2 The Definition of the Village in the City

Many of the significant urban transformations of the 21st century have taken place in the developing world. In particular, informality, once associated with poor squatter settlements, is now seen as a generalised mode of metropolitan urbanisation (Roy & Alsayyad, 2004). Metropolitan informal urbanisation is made possible through particular regulatory logics, which can impact the agricultural land that exists at the rural/urban interface of many Global South cities (Roy & Alsayyad, 2004). VICs possess the features of both urban and rural areas and follow a unique ownership and development structure (Y. Liu et al., 2010). Transformation of land use, either by the governments or by residents themselves, makes VICs differ from other traditional villages (see Figure 1.6).

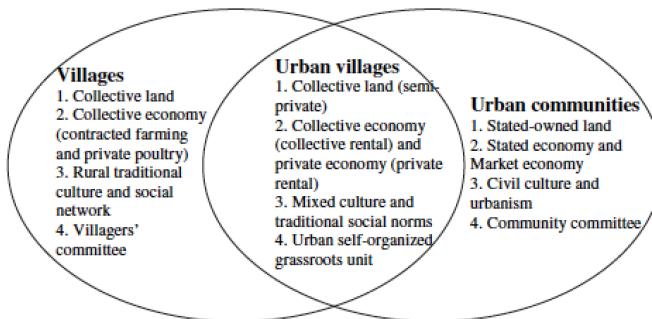


Figure 1.6. The Plural Characteristics of Urban Village (VIC)

(Retrieved from Y. Liu, He, Wu, & Webster, 2010)

As a consequence of China's political and economic transformation, VICs in China are entirely different from the village-style neighbourhoods or communities in western cities or the squatter areas in some Asia-Pacific developing countries (Aldous, 1992). Some of the VICs in China still retain a small amount of cultivated land while the majority of the land is reserved for residential land use. VICs are a unique phenomenon in contemporary China and these villages are present both on the edges and within the large Chinese cities. These areas cater for the living and cultivation needs of local villagers while awaiting formal development by the Chinese Central Government. Skyscrapers, transportation infrastructure, and other modern urban development also surround the VICs (Ding & Xing, 2007; Luo, 2001; Ma, 2007).

1.3.3 The Transformation of the Village in the City

The reason for the appearance of the VIC in the Chinese context comes from the dualistic structure of the urban and rural. This structure can be separated into two primary parts: the first aspect being the *hukou* system (Household Registration System) in China; the second being the land policy. F. Wang (2005, p. 23) explained the terminology of the *hukou* system as "a record in the system of household registration which is required by law in both the mainland communist People's Republic of China and the democratic industrialised island nation of the Republic of China (Taiwan)" (p. 23).

The system classifies people and their household into two categories: people who live in rural areas are known as an ‘agricultural resident’ and ‘non-agricultural resident’ represents those who live in an urban area. Non-agricultural residents have the right to enjoy the welfare benefits provided by the government, including medical insurance, pensions, and housing funds. Should an agricultural resident want to gain welfare benefits from the government, they must change the registration status of their household to be recognised as a non-agricultural resident. The transformation process is difficult as there are eligibility criteria¹ which must be met (PRC, 2017).

According to existing literature, the second primary driver that affects VICs is the Land Policy (Hao, Sliuzas, & Geertman, 2011; Y. Wang, Wang, & Wu, 2009). Prior to urbanisation, villages in China were self-sufficient organisations with agricultural activities and strong local governance; farming was the main occupation of the village population. The current law in China stipulates that “land in urban areas of cities shall be owned by the State. Land in rural and suburban areas shall be owned by village collectives, except for those portions which belong to the State as provided for by law. Land in rural and suburban areas shall be owned by village collectives” (PRC, 2004, p. 1). Thus, the lineation of urban and rural has clear legal boundaries. However, these boundaries become blurred when the city areas absorb the village sites.

¹The conditions of transfer from a rural *hukou* into an urban *hukou*: 1) Elderly population in the rural areas who have health issues and cannot live individually. There are no any relatives to take care of them and they have to move to the urban areas to rely on their children who live in the urban areas; 2) Children under the age of 15 who are unattended in the rural areas and need to move to the urban areas to rely on their parents who live in the urban areas; and 3) Husband and wife live in the rural and urban areas separately and have been married for more than 3 years. The spouse who lives in a rural area and is over the age of 35 can apply for an urban *hukou*.

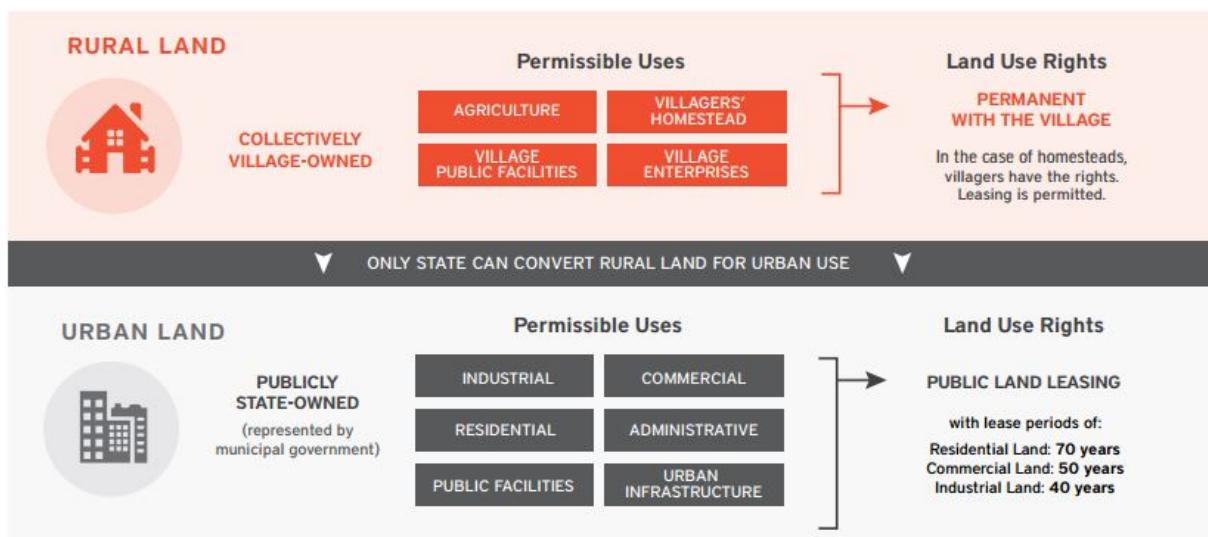


Figure 1.7. Land Ownership and Property Rights in China

(Retrieved from Li Sun & Liu, 2015)

In rural areas, land can be divided into two categories (see Figure 1.7): house site, which gives villagers the right to use and build their house to live, and cultivated land, which is where villagers undertake agricultural activities. With the spread and development of cities, the government acquired land from the village collectives for urban development and paid money to villagers as compensation. Cultivated Land is cheaper for the government to purchase compared to house sites due to the different calculation methods of compensation (see Figure 1.8). As a result, almost all of the cultivated land has been acquired by the government, but the majority of house sites still remain under the ownership of the village collectives. The increasing migration into cities for employment opportunities leads many residents to rent rooms in VICs as they are affordable and convenient. The housing shortage in the urban villages thus encourages villagers to increase the height of old houses, and the village collectives to construct new buildings to accommodate more residents. In the attempt to monopolise on available space, buildings are made to be tall and narrow, resulting in the disorganised spatial layout of VICs.



Calculation Methods of Compensation

House Site:  (3 Stories) * 100 m² * ¥ 100/m² = ¥ 30000

Cultivated Land: 100 m² * ¥ 100/m² = ¥ 10000

Figure 1.8. Transformation Process of VIC

(Summarised from Literature)

Based on the land tenure situation and the remaining amount of cultivated land, there are three stages for the evolution and morphology of VICs. The evolution of a VIC begins at the developing stage: for example, a village is located in the outer edges of the city and is at a lower degree of urbanisation, where parts of cultivated land remain and house sites are maintained by local villagers (see Figure 1.9). The second stage is the ‘partially-acquired’ VIC, which appears in the suburbs of the wider city and the land has not been completely acquired by the city (see Figure 1.10). The last stage is the typical VIC and can be seen in most main cities in China; it is known as a ‘fully-acquired’ VIC (see Figure 1.11). Fully-acquired is when all land that belonged to a village collective has been acquired by the state and major modern development plans are being implemented.



Figure 1.9. The Evolution Morphology of Developing VIC

(Map captured from Google Earth, 2017)



Figure 1.10. The Evolution Morphology of the Partially-acquired VIC

(Map captured from Google Earth, 2017)



Figure 1.11. The Evolution Morphology of the Fully-acquired VIC

(Map captured from Google Earth, 2017)

When considering the development and overall status of the city, the Chinese government established policies to facilitate the reconstruction of VICs (Luo, 2001). These policies included the provision of compensation when reclaiming land from villagers and a master plan for the reconstruction of VICs. Matters of compensation were undertaken at a local government level, whereupon entire blocks of land were bought from the village collectives and villagers received financial payment. The Municipal Government then removed all existing buildings and invited developers to construct new residential areas while former

villagers were temporarily moved to another location in the city. After reconstruction was completed, the former villagers could return to live in a part of the new resettlement housing areas. During the whole process of development, village areas experienced three primary stages of transformation: rural villages, VIC, and resettlement housing (Hao et al., 2011; Song & Zenou, 2012) (see Table 1.1).

Table 1.1. The Comparison amongst the Three Stages of Villages during the Development of City

(Retrieved from Hao et al., 2011; Song & Zenou, 2012)

Category	Rural Village (without development)	VIC (pre-development)	Resettlement Housing (post-development)
Land Ownership	Village collective	Village collective & State	State
Location	Rural area	Urban area, suburban area, and outer suburban area	Urban area
Causes	People gathered due to natural resources, family, clans, and/or religion	Urban sprawl, Chinese dualistic structure of rural and urban spaces	Reconstruction of VIC
Lifestyle	Traditional self-sufficient life	Unable to easily integrate into an urban lifestyle	Modern style of life with fewer traditional habits
Main Occupation of Local Residents	Farmer	Unemployed, low-status worker	Unemployed, jobs in various fields of society
Living Conditions	Natural and healthy living conditions	Poor living conditions	High-rise modern residential buildings
Issues	Inconvenient due to the distance from city	Narrow streets, tall buildings, deduction of green space, lack of tenant regulation and safety, etc.	Local residents adapt the public green space for agricultural production.
Role in the City	Provide land for developmental demands of the city	Enclosed by the city	Compatible with and integrated in to the city
Green Space	Pastoral scenery	Lack of public greenspace	Single and formal green space
Agriculture	No limitation to cultivate	Majority of farmland lost	Cultivation limited to the urban green space, public space, private plots; adaptive performance

1.4 Conceptual Framework

Figure 1.12 shows the four main criteria of this research: ‘Functions’, ‘Space Types’, ‘Physical Forms’, and ‘Rules and Regulations’ and the domains in which they operate. The visual metaphor for the nature of the UA as adapted for this research is derived from Canter (1977) and Montgomery (1998).

The ‘Functions’ of UA practices are defined by the contributions UA make to a city. In other words, what kinds of roles do these practices play in society, such as commercial or non-commercial practices. ‘Space Type’ reveals the location of UA practices, such as private or public domains, or built-up or unbuilt areas. ‘Physical Forms’ reveals the relationship between the practices and the city in terms of scale, configuration, and intensity of form throughout the city. The practices of how the stakeholders negotiate, contest, and derive the ‘Rules and Regulations’ is also a significant element of how UA evolves.

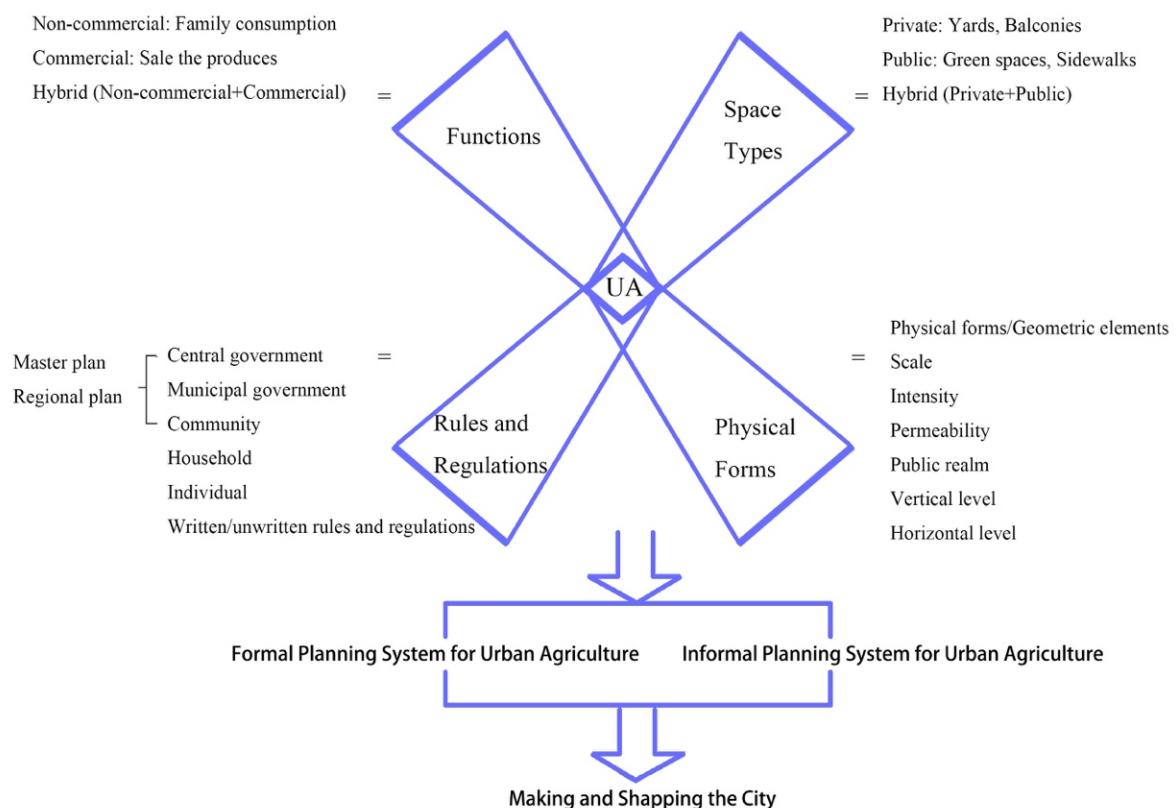


Figure 1.12. Understanding UA - Key Criteria and their Domains

(Derived from Canter, 1977; Montgomery, 1998)

There are ‘top down’ and ‘bottom up’ urbanisation systems that contribute to making and shaping the town and city (P. Jones, 2016). Within UA practices, the two systems coexist, overlap and work together (see Figure 1.13). In relation to China, the formal system has been adopted by municipal governments and related departments, beginning with a master plan and followed by specific practices. During the implementation process, the master plan ideas may be modified due to many practical reasons, but is still a top down process and output. Conversely, some stakeholders involved in UA practices prefer to employ ‘bottom up’ approaches so as to meet their immediate needs and requirements. These informal activities can raise issues if the practices are incompatible with existing government rules and regulations. This research will focus on determining how ‘top down’ and ‘bottom up’ processes work in the context of UA, with some working separately or some working together and coevolving.

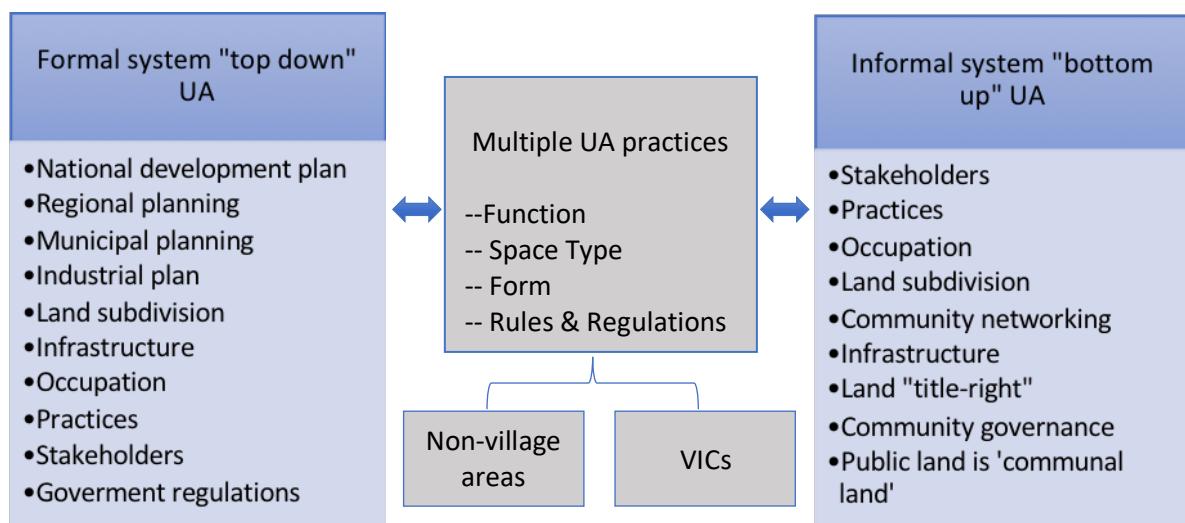


Figure 1.13. ‘Top down’ and ‘Bottom up’ Systems of UA

(Adapted from P. Jones, 2016)

1.5 Aims, Objectives, and Key Research Questions

Building on the above context and issues, this research aims to obtain a deeper understanding of the role and nature of UA in the urbanisation process by exploring the changing functions, types and forms of UA in the transformation of the city. There are three objectives of this research as below:

- Understand the role, function and form of different types of UA practices in the transformation of the VIC.
- Identify the motives of the various stakeholders in ‘shaping’ and undertaking the various types of UA practices, its importance to stakeholders and implications for spatial patterns.
- Situate the important role of UA practices in the urbanisation and governance of the city (social, economic, and environmental), including the negotiation and contestation of space.

There are three main research questions and their sub-questions in this research, which are summarised in Table 1.2.

Table 1.2. Preliminary Research Questions

Main Questions	Sub-questions
1. What are the functions, types, and forms of UA practices in the transformation of VICs and the wider city?	1) Who are the main stakeholders of UA practices? 2) What types of space do UA practices appear in VICs and the wider city? 3) What are the physical forms and scales of UA practices? 4) What are the functions of UA practices? 5) Which rules and regulations are related to UA practices?
2. What are the motives of the various stakeholders who undertake these UA practices and how do they create and shape the form and function of the cities?	1) Why do the stakeholders undertake UA practices? 2) Why do the stakeholders choose the specific space types to undertake UA practices? 3) Why do the stakeholders undertake UA practices for specific functions? 4) Why do the stakeholders undertake UA practices in specific physical forms? 5) How do stakeholders create, negotiate, and participate in the related rules, regulations, and governance arrangements?
3. How should the planning system respond to the range of UA practices emerging in the city?	

1.6 Motivation and Significance

Agriculture is a primary industry in China that provides basic necessities for many cities to survive. The primary income source of local villagers living in rural areas is derived from the production of agriculture. The interdependency of the city and local villagers to agricultural practices persists when the city consuming some or all of the arable land in rural villages whilst retaining the housing site in these villages. As such, the terminology also evolves to reflect these changes; ‘agriculture’ becomes ‘urban agriculture’, while the ‘village’ becomes the ‘village in the city’. These concepts help us to understand the workings of the city, including how it is being shaped and made (P. Jones, 2016).

During the transformation of VICs, the roles, forms, and functions of UA continue to evolve and change as a result of various urbanisation processes(R. Liu, 2014). By incorporating UA as a part of VICs and the wider city, the benefits to residents and the environment are obvious. In short, myriad UA reflects the newly emerging modern form of agriculture, which can compensate for the agricultural areas lost through urbanisation. The challenge is to understand the current practices of UA that occur during the process of urbanisation and establish the significance of their role and functions.

At present, there are many UA practices with different modes that can be found in various locations in Chinese cities(Cai, 2014; Deng, 2009; L. He, 2013). Some of these have been planned by the government and have the support and protection of related rules and regulations, such as the urban farms and the community gardens. The ecological, social, and environmental benefits of these planned practices have been documented (Erick, 2014; Nordregio, 2018). However, ‘informal’ practices also exist where local residents adapt public green spaces to agricultural uses (L. Chen, 2012; Huashang, 2015). At times, these informal practices attract criticism regarding pollution, ‘social sanitation’ and adverse public appearance, thus generating negative public views (L. Chen, 2012; B. He & Zhu, 2018). Nevertheless, these practices continue and are important in this research.

UA may also occur on private lands and can also occur at different scales, from commercial to residential; from a pot plant to acreage, such as in urban farms. The practice of UA in its various forms appears to have impacts on land at varying scales.

In this setting, the potential significance of this study includes:

- Identification of the importance of UA activities in the urbanisation process and its potential/contribution to sustainable development of Chinese cities;
- Provide a better understanding of the physical forms and expression of UA in different parts of the city (from formal to informal, and their overlapping) and how planning may best respond;
- Provide a better understanding of the negotiation, contestation, and transgression of urban space through the perspective of UA, and
- Collectively, improving the understanding of the shaping and making of the city through formal and informal practices of UA.

1.7 Thesis Structure

Figure 1.14 displays the main structure of this thesis. In Chapter 1, the background introduction of the urbanisation process in China, motivation, aims, objectives, and research questions are introduced. Chapters 2 contains the literature review of UA, as well as the relationship between UA and urbanisation. Chapter 3 outlines the research methods and the approach to data analysis. Chapter 4 provides the foundation of case study analysis by introducing the relevant background information of Kunming, including natural, cultural, economic, and social development, as well as the current situation of UA. In order to better understand the role and nature of UA in Kunming, Chapters 5 and 6 provide the typology research including functions, space types, physical forms, and the rules and regulations of UA in VICs and non-village areas respectively. In Chapter 7, the perspectives and attitudes of different groups of UA stakeholders and their motivations of UA activities are discussed, also including discussion of the information in both VICs and non-village areas. Finally,

Chapter 8 summarises the key findings of this research, as well as the overall implications for existing literature.

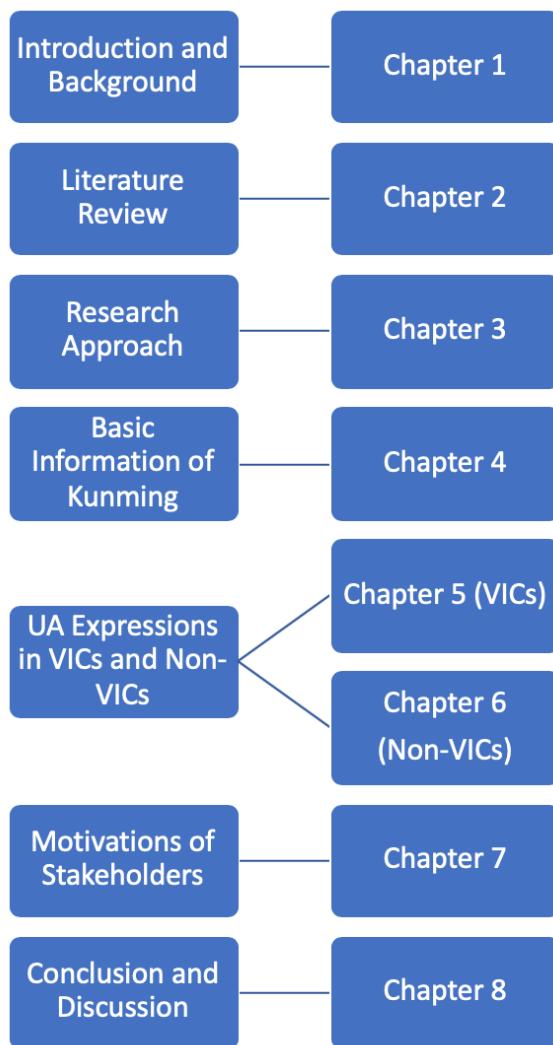


Figure 1.14. Thesis Structure

1.8 Summary

As discussed above, urbanisation accompanies the economic growth and development of city areas. However, in the context of rapid urbanisation, agricultural land and peri-urban environments are often at the frontline of urban expansion. The unprecedented speed of urbanisation across the globe has affected the ecological functions and processes of agriculture, threatening human sustainability (Fu, Hu, Chen, Honnay, & Gulinck, 2006;

Hewitt & Escobar, 2011). Every year, thousands of hectares of farmland are lost in the urbanisation process and undermine regional food systems(UNESCAP, 2015).

Furthermore, urbanisation in China continues to trigger the migration of residents from agriculture-dominated rural areas to industry-dominated urban areas (Henderson, 1988). As a result, VICs have become an inevitable consequence of the urbanisation process of many Chinese cities. VICs in contemporary China have a significant role in the urbanisation process. This phenomenon unveils the contradiction and inequality between urban and rural areas. There are numerous issues and challenges that are involved in VICs, such as scarcity of farmland, disorderly agricultural activities, lack of employment, unsatisfactory living conditions, narrowed public spaces, and reduced size of housing. Within the remaining cultivated land in some of the partially-acquired VICs and developing VICs, local villagers can still undertake traditional agricultural production. In summary, VICs provide the possibility of integrating agricultural practices into the city so as to improve the resilience of the community and wider city. In this research, the objectives will be to understand agricultural practices and their dynamics in both VIC and non-village areas in Kunming, Yunnan Province in southwest China.

2 Foundational Concepts and Key Themes in Urban Agriculture

2.1 Scope of Urban Agriculture

2.1.1 Definition of Urban Agriculture

In 1935, Aoshika (1935) initially put forward the concept of ‘urban agriculture’ (UA), which refers to the special forms of agricultural activities attached to and affected by the urban economy to produce fresh vegetables, fruits, diaries and poultries. These activities often distribute in urban industrial, commercial areas and residential areas. UA can be defined as agricultural practices that are located in the commercial, industrial, and residential areas, as well as those situated on the fringe of a city. It is the practice of cultivation, processing, and distributing food in or around a village, town, or city. The concept of UA also includes the notions of animal husbandry, aquaculture, agroforestry, urban gardening, beekeeping, and horticulture. The primary purpose of UA is to meet the demands of myriad consumers in the city (Bailkey & Nasr, 2000; Hampwaye, Nel, & Ingombe, 2009). Jac Smit, who is viewed as ‘the father of UA’, was a pioneer in advocating for the cause of UA, as outlined in his book *‘Urban Agriculture: Food, Jobs and Sustainable Cities’* (Smit, 1996a, p. 15):

“UA does not exist in isolation but occurs in the context of other urban activities and systems, particularly the local economic, land use, ecological, and urban management systems. It is also integrally related to the local, national, and global food systems”.
(Smit, 1996a, p. 15)

During the UA development process and a better understanding of the city, the definition of UA has evolved as influenced by divergent disciplines and practices. In this context, urban horticulture and urban gardening are two frequently mentioned concepts in the literature that have related definitions and scope that fall within the broader umbrella concept of UA (Nikolaïdou, Klöti, Tappert, & Drilling, 2016; Orsini, Kahane, Nono-Womdim, & Gianquinto, 2013). Urban horticulture, for example primarily focused on the range of plant species utilised by residents to meet their needs. Urban horticulture includes edible

vegetables and herbs as well as ornamental and medicinal species of plants (Nandwani, 2018; Orsini, Kahane, Nono-Womdim, et al., 2013). Urban gardening on the other hand, focuses more on small scale gardening activities in different spaces (internal and external), and may include species and plants that fall under the domain of urban horticulture. UA is expressed in both small- and large-scale agricultural production practices in the city, which may include urban horticulture and urban gardening (Nikolaïdou et al., 2016). Despite the subtle differences, the latter concepts are part of innovative UA food production activities in or around the city, thus enhancing civic engagement, collective empowerment, and community connectives as well as ecological and greening benefits (Glover, 2004; Rosol, 2010; Tan & Neo, 2009).

UA is expressed in the city landscape through different functions and forms, from a small-scale household's vegetable plots on the balconies and yards to large-scale production like community gardens and urban farms (see Figure 2.1) (Hopkins, 2016).

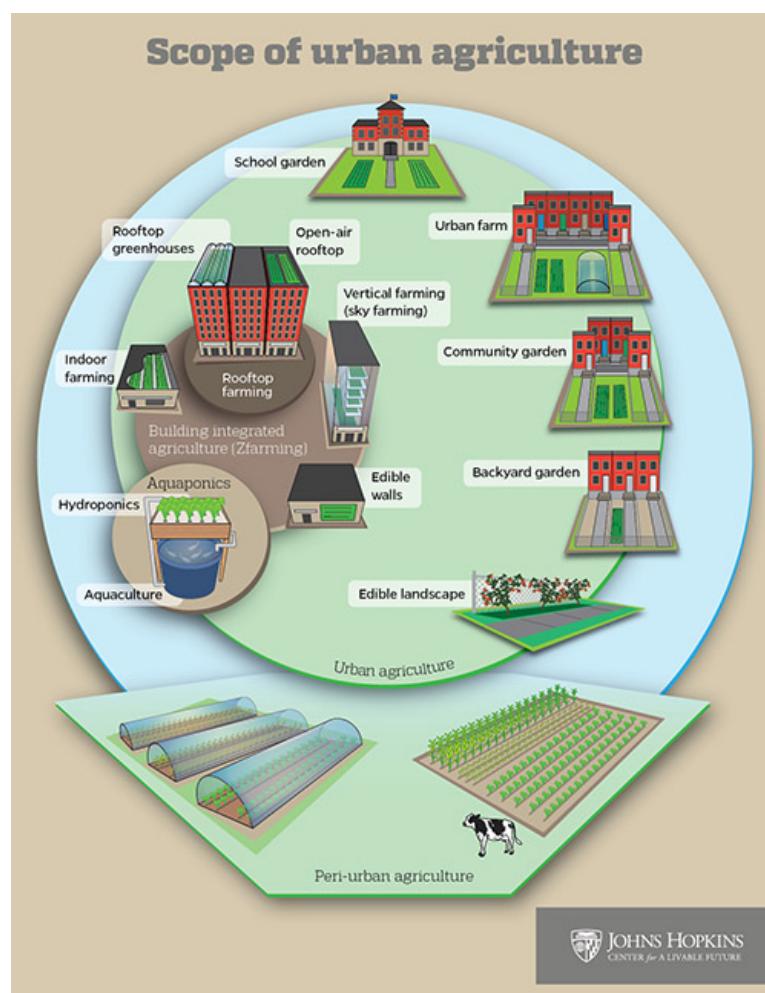


Figure 2.1. Scope of Urban Agriculture

(Retrieved from Hopkins, 2016)

2.1.2 Benefits of Urban Agriculture

At the global level, UA has always been a part of urban life, from the *chinampas* (floating gardens) in Tenochtitlan in 1959 (now Mexico City) (Four String Farm, 2014), to the American community gardening movement in the 1970s (Birky, 2009). Many countries and cities already recognise the important role of UA during the urbanisation process so as to make cities more liveable and sustainable (Aubry et al., 2012; Dossa, Abdulkadir, Amadou, Sangare, & Schlecht, 2011; Zasada, 2011).

UA provides benefits to many residents, including food security, nutrition and health, social equity, employment, income generation, enterprise development, and environmental enhancement (Smit, 1996b). Nowadays, many precedents can be found across the world that demonstrate a diverse range of UA practices (see Table 2.1).

Table 2.1. The Contribution of UA Worldwide

(Retrieved from Smit, 1996b)

Country	Extent of urban agriculture
<i>Africa</i>	
Mali	<i>Bamako</i> is self-sufficient in horticulture products and some products are shipped outside the metropolitan area for consumption.
Uganda	In <i>Kampala</i> , 70 percent of poultry needs (meat and eggs) are produced inside the city.
Zambia	In <i>Lusaka</i> , subsistence food production accounts for 33 percent of the total consumption by squatters.
<i>Asia</i>	
China	In the 1980s, over 90 percent of vegetable demand and over half of meat and poultry demand in China's 18 largest cities was met through produce grown in urban provinces.
Indonesia	In <i>Jakarta</i> , almost 20 percent of the food consumed by squatters is self-produced.
Nepal	In <i>Kathmandu</i> , 37 percent of food producers surveyed met their household plant food needs and 11 percent met animal food needs.
Singapore	Eighty percent of the poultry and 25 percent of the vegetables consumed are produced within the city.
<i>Europe</i>	
Romania	With new government policies and programs, from 1992 to 1998, urban production increased from 14 to 26 percent of all agricultural production.
<i>Americas</i>	
Cuba	From 1992 to 2000, urban food production increased by 300 percent and children are eating four times as many vegetables as they were a decade ago.
USA	Thirty percent of agricultural products in the country are produced within metropolitan areas.

The 1980 US census found that agriculture in urban metropolitan areas produced 30% of the total agricultural production of the country, increasing to 40% by 1990 (Smit, 1996b). There are 80,000 community gardens in Berlin, UA in Singapore produces 25% of its vegetable needs, and 65% of Moscow families are involved in food production compared to 20% in 1970(Smit, 1996b). The latter statistics demonstrate the success and the prolific nature of UA worldwide.

UA has a strong connection with the development of the urban and rural economy, as it can potentially increase the wealth of urban citizens. As a result, this enables urban citizens to purchase more goods from rural farmers (Smit, 1996b). Urban farmers produce food that originally from rural areas and they will turn to product lines with growing market demand.

As noted above, many cities worldwide face issues of inefficiencies and inequities associated with their food system. UA acts as a tool to empower the urban poor, who are at a disadvantage in the current food system, by introducing a means of generating their own food resources. This is especially valuable in developing countries where local residents can access fresh vegetables and their living expenses lower accordingly. As a result, the local residents are able to get fresh vegetables, and their living expenses are lower than before. Zezza and Tasciotti (2010) highlighted in their research on UA that in several African countries, there is a correlation between active participation of UA and greater dietary diversity and calorie availability.

2.2 Urban Agriculture and Urban Development

In the research regarding urban development, Girardet (1999)identifies a sustainable city as one which ensures the needs of all dwellers are met without hampering/sacrificing/affecting the living environment of fellow dwellers or compromising the natural world, both now or in the future. As the centre of a sustainable city is resilience, the concept of urban resilience has gained increasing attention across a variety of research(D. Kim & Lim, 2016; Leichenko, 2011). Resilience refers to the ability of a city or urban system to recover and survive from a wide

range of disasters and stresses (Meerow, Newell, & Stults, 2016). The theoretical discussions on resilience include ecological resilience (Davoudi et al., 2012; Lindegren, Jr, Ohman, Koslow, & Goericke, 2016), engineering resilience (Holling, 1985), evolutionary resilience (Duit, Galaz, Eckerberg, & Ebbesson, 2009; Simmie & Martin, 2010) and building resilience (Comfort, Boin, & Demchak, 2010; Satterthwaite & Dodman, 2013). Discussions of resilience also focus on introducing UA as a tool towards developing more sustainable communities (Archdeacon, 2015; Burton et al., 2013; Ferreira, Guilherme, Ferreira, & Oliveira, 2018).

Green infrastructure has been highlighted as a potential resilient approach for coping with the challenges in urban areas, particularly during periods of rapid urbanisation (Benedict & McMahon, 2012; Gill, Handley, Ennos, & Pauleit, 2007). UA in the form of community gardens, for example, has become prevalent in many developed countries, such as the Netherlands (Ritter, 2017), Canada (Best Health, 2009), Australia (ACFCGN, 2018; SOAC, 2007) and North America, assisting in reducing household waste, connecting the community, and supplementing urban greening (Corrigan, 2011). In some developing countries like Indonesia (Indraprahasta, 2013), the strategies for constructing community gardens have also evolved similarly as those in many Chinese cities, including Shanghai (Erick, 2014) and Beijing (Levenston, 2015).

The United Nations adopted the Sustainable Development Goals (SDGs) in 2015 to stimulate actions to achieve these goals for both humanity and the planet over the next fifteen years (Chin & Jacobsson, 2016). The SDGs focus on solving various environmental and human development challenges through sustainable development. Grassroots innovations, for example, refers to “a network of activists and organisations generating novel bottom-up solutions for sustainable development and sustainable consumption; solutions that respond to the local situation and the interests and values of the communities involved” (Seyfang & Smith, 2007, p. 586). Studies of community, household, and local innovations mainly focus on how citizens and local communities are involved in the reproduction process of spaces in the city (MacCallum, Moulaert, Hillier, & Haddock, 2009; Seyfang & Smith, 2007). Local actions take place through various means, such as community governance (Wolfram, 2016) and urban food production (Marletto & Sillig, 2019). For example, research in UK focusses on ‘bottom-up’ UA initiatives, which aims to discuss the political and planning challenges posed

by the demand for UA practices, as well as address the potential development implications (Tornaghi, 2012).

Do-it-Yourself (DIY) urbanism is frequently mentioned in UA related research; this form of urbanism includes pop-up urbanism (Fredericks, Hespanhol, Parker, Zhou, & Tomitsch, 2018), user-generated urbanism (Bela, 2015; Parwata, 2015), insurgent urbanism (Davis & Raman, 2013; Hou, 2010), guerrilla urbanism (Hardman & Larkham, 2014; Sang, 2017), and urban hacking (Ballhausen, 2010; Valjakka, 2019). DIY urbanism practices are not exclusively planned to create long-term or permanent changes; often they are a form of transient urbanism. They have been described as “a type of street art or opportunistic placemaking but not Tactical Urbanism” (Lydon & Garcia, 2015, p. 8). However, ‘bottom-up’ UA as a tool which involves different stakeholders and can have an impact on the planning system, could be viewed as a form of guerrilla or tactical Urbanism (Hardman & Larkham, 2014; Silva, 2016). Research on guerrilla gardening is still in its infancy, but many researchers from both academic and non-academic disciplines see it as a potential framework to explain the emergence of a myriad of UA practices (Johnson, 2010; McKay & Certomà, 2012; Tornaghi, 2012; Tracey, 2007).

Researchers highlighted the need to integrate UA into the local urban planning systems so as to relieve urban-rural pressures (RUAF, 2000). For example, Quon (1999) suggested that the planning system should adapt land policy to accept and support UA in cities by establishing a UA institution in the city, recording UA land use data, and providing education to general dwellers to increase their knowledge of UA practices. Mougeot (2000) indicated that though UA is different from rural agriculture, the two practices complement each other in the food production process. Thus, integrating UA into the urban system alleviates demand on the rural sector in providing an alternate resource for sustainable development of the city and its inhabitants. Hence, promoting the integration of UA into the urban system will not only make the city more liveable but also contributes to the sustainable development of the city. Mubvami and Mushamba (2006) argued that UA should be considered as an urban land use pattern and therefore integrated into different levels of planning, from the master plan, local plan, subject plan, layout plan, to the site plan.

Despite the many benefits of UA, including promoting the healthier development of the city, challenges and risks remain in undertaking UA activities. One challenge is the area of land available for UA practices is limited and urban growers face the threat of losing access to their plot and being forced to stop production (Adedeji & Ademiluyi, 2009). Also, the risks to public health posed by UA production systems need to be considered, for example, the potential for soil contamination from the inappropriate use of pesticides and fertilisers (Adedeji & Ademiluyi, 2009; Wortman & Lovell, 2013). Water availability and safety poses another challenge as the scarcity of water resources is driven by climate variability (Rosenzweig et al., 2004; Wortman & Lovell, 2013). Furthermore, many large-scale UA projects depend heavily on external grant funds to support planting operations (Wortman & Lovell, 2013).

Recently, many efforts have been made to solve the issues of UA. For example, inventive solutions to space limitation include growing food on rooftops or in abandoned industrial yards (Caputo, 2018). UA growers nowadays are also using agricultural technologies such as aquaponics, aquaculture, and hydroponics for planting, thereby removing any possible pollution to the soil (Caputo, 2018). In terms of the irrigation resources, a non-profit organisation in California is currently collecting rainwater and greywater for UA use to decrease consumption of expensive and energy-intensive potable water (Nolasco, 2011). Research from the International Network of Resource Centers on Urban Agriculture and Food Security (RUAF) indicates that the cooperation of governments, banks, and international aid agencies could provide financial support to urban farmers so as to maintain affordable and accessible food production in cities (Cabannes, 2011).

2.3 Urban Agriculture in a Global Context

2.3.1 The Development of Urban Agriculture in Developing Countries

In some developing countries, the absence of formal employment opportunities from the economy, industries, and services leads to a situation where agriculture remains an essential contributor to livelihoods (Ellis & Sumberg, 1998). The emergence of UA provides more employment opportunities and survival strategies for the local population (Reardon, Berdegué, & Escobar, 2001; The World Bank, 2007).

UA is a growing necessity in developing countries as food-supply demand rises provide the increasing population of city dwellers, as well as and reducing the gap between urban rich and poor through integrating UA into food production processes. An example of cities in developing country introducing UA into local planning systems can be seen in Havana, Cuba, where the 1989 food crisis prompted a large shift towards UA practices. Food production was decentralised by local government, linking production instead directly to the transportation and consumption patterns of residents. The self-supply plan saw expanded urban gardens appearing across Havana, with the residents producing their own food and raising animal (Henn & Henning, 2002).

Dar es Salaam in Tanzania provides another example of UA integration into local supply practices, where approximately 30% of the urban population in 1995 gained their income in the informal sector, and about 6.5% of the informal urban workforce gained employment in UA (Muhanga, 2017). A large number of cultivators in the public open spaces appropriated their plots during the economic crisis in Tanzania in the early 1970s when the government encouraged people in the city to cultivate ‘usable’ pieces of land(Jacobi, Amend, & Kiango, 2000; Mlozi, 1996). In addition to the above examples, other UA practices can be also seen in Mexico City Metropolitan Zone (Lima, Sanchez, & Uriza, 2000) and La Paz in the Republic of Bolivia (Kreinecker, 2000).

In many developing countries, UA can be viewed as a response to many issues caused by the increasing rate of urbanisation. As a mode of food production in the city, UA is vital for the survival of the urban poor (Ratta & Nasr, 1996). Understanding of the importance and benefits of UA, some developing countries like Zambia (Hampwaye, Nel, & Rogerson, 2007) and Uganda (David et al., 2010) have already taken positive steps to help transfer UA into legal performance. However, UA is still illegal in some African countries and local urban growers still struggle to find places to undertake agricultural activities (Beach, 2013). Many researchers argued that it is essential for the governments in developing countries to legalise UA and provide more policy support to urban growers so as to maximise the advantages of UA (Bryld, 2003; Orsini, Kahane, Womdim, & Gianquinto, 2013).

2.3.2 The Development of Urban Agriculture in Developed Countries

Compared to developing countries, the share of food expenditure in developed countries constitutes a small part of household spending (see Figure 2.2). For example, food costs in the US and UK households in 2011 were approximately 6% and 9% respectively, meaning UA plays a minimal role in improving food security in these countries. Citizens in these locations can still afford access to food regardless of price shocks or circumstances that drastically alter the supply and demand of local production resources. Thus, the role of UA in developed countries is more like “a driver for developing new types of urban places and buildings, along with their capacity for contributing to locally based food systems” (Gorgolewski, Komisar, & Nasr, 2011, p. 11). In developed countries, the development of UA can be seen as a partial expression of changing lifestyles that provide healthier food resources, reduces the impact of climate change, strengthens community connections, and lowers unemployment rates (Deelstra & Girardet, 2000; Urban Green - Blue Grids, 2015).

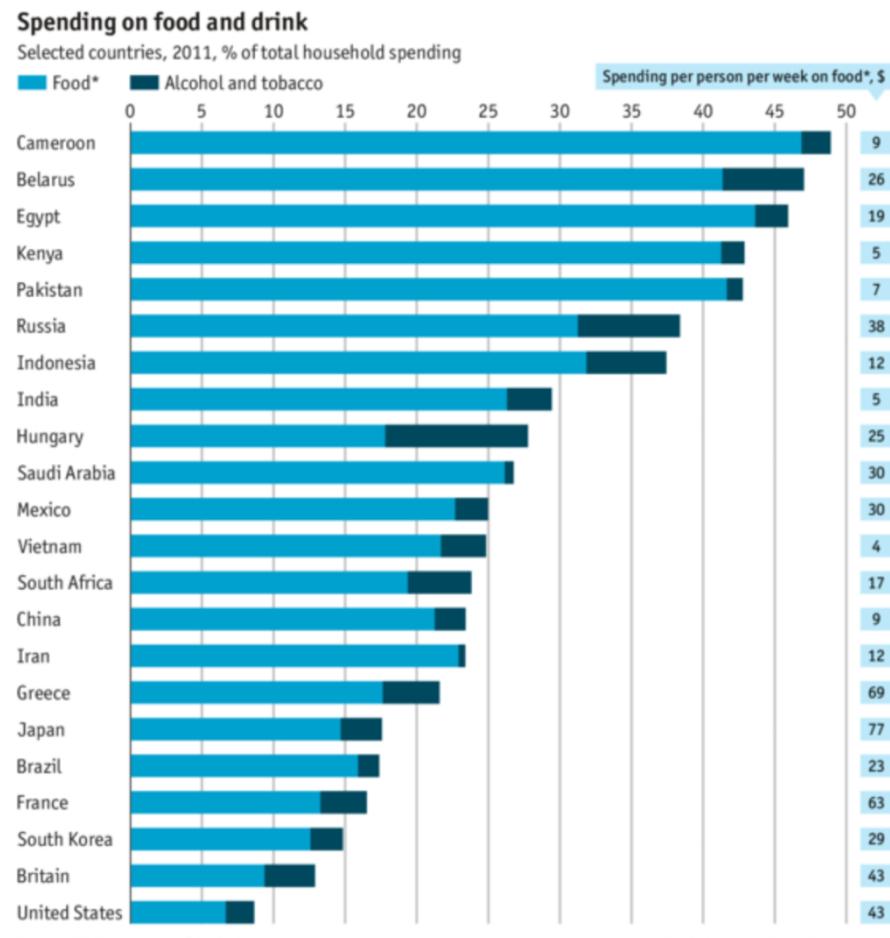


Figure 2.2. Food Share of Household Spending in 2011

(Retrieved from Pilloni, 2014)

The roots of UA in contemporary North America can be traced back to war times. During World Wars I and II, the *War Garden* movement was promoted as a way to increase food security and patriotism (Pack, 2013). After the wars, the demand for food reduced and the emergence of neighbourhood supermarkets rendered backyard food production unnecessary (Press & Arnould, 2011). In the late 1960s and early 1970s, growing environmental awareness contributed to the reappearance of community and backyard gardens (Press & Arnould, 2011). Through the prevalence of these gardens, food security issues were reduced through the improved accessibility, affordability and self-reliance (Kortright & Wakefield, 2011).

Rooftop UA was also a new method of urban food production in North America since 2009, including commercial-scale, community-focused, and household-scale rooftop gardens (Engelhard, 2010). Similar movements were also occurring in Toronto, Canada at the same

time. In 2009, the City of Toronto introduced a regulation that new commercial, institutional and residential buildings should install green roofs so as to provide opportunities for local food production (City of Toronto, 2009).

There are also some institutions and organisations in developed countries that focus on establishing platforms for innovative UA projects, including constructing a spatial network for UA practices in the city. The '*Carrot City*' and '*Continuous Productive Urban Landscapes*' (CPULs) projects are specific examples of these initiatives. Ryerson University's Department of Architectural Science in Toronto established a communication platform named '*Carrot City*'. This platform provides a research initiative that explores how design can enable the production of food in cities (Carrot City, 2009). Using the *Carrot City* platform, various groups of researchers and designers share and exchange their ideas and projects about UA practices. In 2005, Katrin Bohn and Andre Viljoen published their book '*Continuous productive urban landscapes*' and put forward the concept of CPULs (Viljoen & Howe, 2005). Their concept proposes a new urban design strategy aiming to connect existing inner-city open spaces to then be linked with the surrounding rural areas that fringe the city. Bohn and Viljoen's proposal creates a multi-function urban-rural network that incorporates both UA and public land areas allocated for leisure or agricultural use, supporting the existing planning system.

2.3.3 Review of Relevant Research on Urban Agriculture

Many non-government organisations (NGOs) have undertaken the investigation into UA in developing countries for over 20 years and these have formed the theoretical framework underpinning UA. In the 1990s, the FAO, Consultative Group on International Agricultural Research (CGIAR), the United Nations Development Programme (UNDP), World Health Organisation (WHO), and the International Development Research Centre (IDRC) established the 'Support Group for Urban Agriculture' (SGUA) and RUAF (Veenhuizen & Danso, 2007). The objectives of these two groups were to respond to "the expressed need of organisations and local governments in the South for effective mechanisms for the documentation and exchange of research data and practical experiences on UA" (Leusden, 2011, p. 2). Through the case studies of UA in developing countries, the definition of UA

has become explicit and the classification systems of UA have evolved. Globally, the research of UA focusses on three major aspects; namely social, economic, and environmental (see Table 2.2). Urban planning research primarily concentrates on the role of UA as related to green infrastructure, sustainable city, and buffer zones.

Table 2.2. Primary Research on UA Worldwide

Area of Inquiry		Themes	Authors
Social	Urban food	Food security	Islam (2004); Tasciotti and Wagner (2015)
		Peri-urban and rural food supply.	Grivins and Tisenkopfs (2014); Pendleton, Crush, and Nickanor (2014)
		Foodscape	Morgan and Sonnino (2010); Cummins and Macintyre (2002); Moragues-Faus and Morgan (2015)
	Sense of place	Greenbelts	Rettig (1976)
		A resident's place-experience	Brandenburg and Carroll (1995)
	Aesthetics	Plants in offices spaces	Hansen and Machin (2008)
		Harmonious human-nature interaction	Brady (2006)
	Social interactions	Community cohesion	Armstrong (2000); Ohmer, Meadowcroft, Freed, and Lewis (2009); Brown and Jameton (2000)
		Disadvantaged groups	Mudimu (1997)
	Urban planning	Green infrastructure	Löhmus and Balbus (2015); Amati and Taylor (2010)
		Sustainable city	U. Lang (2014); Cohen and Reynolds (2015)
		Buffer zones	Tarmi and Hyvönen (2012)
Economic	Employment and income	Employment opportunities	Poulsen and Spiker (2014)
		Commercial market and benefits	Drechsel and Dongus (2010)
	Diversified industry	Enterprise development	Nugent (2003)
	Food transport	Energy consumption	Mohareb et al. (2017)
Environmental	Weather and air	Urban heat	Waffle, Corry, Gillespie, and Brown (2017)
		Carbon sequestration	Russo, Escobedo, Cirella, and Zerbe (2017); Thornbush (2016)

Area of Inquiry	Themes	Authors
Water	Air quality	Ortolo (2017)
	Water recycling	Nolasco (2011);
	Wastewater filtration	Miller-Robbie, Ramaswami, and Amerasinghe (2017)

2.4 Typologies of Urban Agriculture

UA contributes to the urban food supply system by producing food within the city. Hence, the connection between urban dwellers and the food production process is strong where residents value the practices and outcomes of engaging in UA. As discussed later in Chapter 3, typology is an excellent tool to better understand the patterns embodied in the urban fabric. Adams (2015) summarised the academic typologies of UA, including academic typologies between cities and academic typologies within cities (see Table 2.3).

Table 2.3. Academic Typologies of UA

(Retrieved from Adams, 2015)

Category	Description	Sub-category	Authors
Academic typologies between cities	This category looks at city as a type itself, at a macro urban scale, and then compares different cities to one another	In urban design research	Forsyth and Crewe (2009)
		In urban design theory	Duany (2011)
		In human ecology research	Alessa, Kliskey, and Altaweelel (2009)
Academic typologies within cities	This category looks at all the forms of UA in a city and puts a framework on to these different types	Ecological types within cities	King (2008)
		Typologies within cities but across time	Laura Lawson (2004)

In order to summarise the existing types of UA activities, there are three main classification systems of UA practices, the former two focus on functionality, and the latter applies socio-economic profiles of UA to identify the type. Firstly, the Research Centre for Urban Agriculture and Food Security summarised a classification system of UA activities in 2015 (RUAf, 2015), categorising them by function and spatial characteristics to highlight existing UA patterns (see Table 2.4).

Table 2.4. Classification System of UA by Research Centre for UA and Food Security

(Retrieved from RUAf, 2015)

	Name/Functionality	Spatial Characteristics
Non-commercial UA	Micro-farming	On balconies, roof-top terraces, gardens and window sills
	Garden plots	On specially-assigned land (Private)
	Institutional gardens	On specially-assigned land (Public)
Market-oriented UA	Small-scale commercial or semi-commercial agricultural and horticultural businesses	On enterprise owned land
	Small-scale commercial or semi-commercial stock-breeding businesses or aquaculture businesses	On enterprise owned land
	Specialised businesses	On enterprise owned land
	Large-scale agro-businesses	On extremely specialised land, usually situated on the edge of the city and equipped with advanced technology
	Multi-functional UA businesses	Often located on the edge of the city; can also be in the city
Other	Guerrilla gardening	Vacant lots or roofs in the city transformed into garden spaces
	Multi-cultural gardens or community vegetable gardens	In residential areas or multi-nationality living areas

The second classification system of UA, as defined by the American Planning Association in the report *Urban Agriculture: Growing Healthy, Sustainable Places* (Hodgson, Campbell, & Bailkey, 2011), is similar to the typology summarised in Table 3.4. However, the main difference to the typology summarised in Table 2.5 is that it places a greater emphasis on non-commercial UA, such as private gardens, guerilla gardening, and edible landscapes.

Table 2.5. Classification System of UA by the American Planning Association

(Retrieved from Hodgson et al., 2011)

	Name/Functionality	Spatial Characteristics
Non-commercial UA	Private garden	On backyards, corner yards, balconies, roof-top terraces, and windowsills
	Community gardens	Located on the residential areas (Public), among the buildings
	Institutional gardens	On specially-assigned land (Public)
	Demonstration gardens	On specially-assigned land (Public)
	Edible landscapes	Located on the residential areas, among the buildings, along the street or specially-assigned land (Public)
	Guerrilla gardening	Vacant lots or roofs in the city transformed into garden spaces
	Hobby bee-keeping	On the scope of private property
	Hobby chicken-keeping	On the scope of private property
Commercial UA	Market farm	On enterprise or organisation-owned land
	Urban farm	On extremely specialised land, usually situated on the edge of the city and equipped with advanced technology
	Peri-urban farm	Usually located on the edge of the city
	Bee-keeping	On enterprise or organisation-owned land
Hybrid UA	The combination of non-commercial UA and commercial UA	

Apart from the classification system of UA based on functionality and spatial characteristics, several researchers use socio-economic profiles as criteria for categorisation (Bakker et al., 2000; Moustier & Danso, 2006) (see Table 2.6). This classification differs from the former two systems by including data on land cultivation area size, product types, and the gender of growers.

Table 2.6. Summary of Typology of Urban Agriculture Socio-economic Profiles

(Retrieved from Moustier & Danso, 2006)

	Home subsistence farmers	Multi-cropping peri-urban farmers	Family-type commercial farmers	Entrepreneurs
Location*	U Home	P Home + urban markets	UP Urban market	P Urban market + export
Outlets Objective	Home consumption	Home consumption and income for subsistence	Income for subsistence	Additional income Leisure
Size	Usually < 100 m ²	Usually > 5000 m ²	Usually < 1000 m ²	Usually > 2000 m ²
Products	Leafy vegetables, cassava, plantain, maize, rice, goats and sheep, poultry, fruits,	Staple food crops, local vegetables	Leafy vegetables, temperate vegetables Poultry (Sheep) (Milk)	Temperate vegetables, fruits, poultry, livestock, fish
Intensification (inputs/ha)	2	1	2 to 3	4
Gender	F	F + M	F + M	M
Limiting factor	Size	Access to inputs Fertility	Size, land insecurity, access to inputs, water and services, marketing risks	Technical expertise, marketing risks

These three classification systems consider UA practices by functionality or by socio-economic profiles. It is argued by the author that there are more criteria that can be applied to better understand UA and its dynamics in the urbanisation process, such as understanding stakeholder motivations, space types, physical forms, village types, and rules and regulations. These topics can be further explored by questioning who are the main stakeholders of UA, why they participate in UA, where and how they undertake UA practices, and what are the main attitudes of stakeholders and whether or not they differ.

2.5 Urban Agriculture in the Context of China

The notion of UA originally emerged in China in the 1990s along the eastern coastal areas (Wen, 2003). The concept of UA in China stems from the development of both rural village based agriculture and peri-urban agriculture; the latter focussing on promoting agriculture activities in the rural-urban fringe (Guan, 2010). With the transformation of the structure of the Chinese economy from planned to a market economy, the pressure of the shortage of agricultural produce for the population has been relieved, and living conditions of rural and urban populations have gradually improved (Guan, 2010). In this context, there is a need to understand UA within the boundaries of the city and analyse the types of UA functionality.

In 1994, the Shanghai Municipal Government introduced the concept of ‘modern UA’ and became the first Chinese city to include UA in their local development strategies (Guan, 2010). In 1996, the Research Centre on Rural Economy in Beijing hosted a conference titled ‘*Urbanisation and UA*’ and published the conference proceedings as ‘*Theory and Practice of UA*’ (Guan, 2010). Following this conference, research on UA became more prevalent, prompting several other large cities in China to focus on developing UA practices for their local urban centres, including Beijing (Han, Cai, & Liu, 2010; W. Li, 2012; W. Liu, Tong, Zhang, & Yu, 2011), Shanghai (K. Chen et al., 2009; Deng, Xie, Wu, Li, & Fu, 2010; Yu & Wu, 2009), Guangzhou(C. Chen, Cai, & Chen, 2012; W. Chen, 2005), and Chengdu(Su, Yu, Chen, & He, 2010).

Since 2006, the research on UA in China has focussed on the analysis of theories and practices of UA, and also its contribution to sustainable development (Deng, 2009; L. Li, 2006). Y. Xu (2011) reviewed the precedents of UA in western countries and discussed the possible UA modes that could be applied in China. Other researchers such as Gao (2012) focussed on agrarian urbanism and the motivations of stakeholders undertaking UA in the city. In summary, the primary research on UA in China concentrates four main areas; that is research on theory, food production, urban planning, and UA and its contribution to the urban economy (see Table 2.7).

Table 2.7. Primary Research Topics on UA in China

Area of Inquiry	Themes	Authors
Theory research	Theory analysis	Yu (1999); Fang, Wu, and Wang (2008)
	Implications from abroad	Yu and Liu (2001); C. Liu (2006)
	Research review	Zhao, Chen, and Mu (2011); Zhao and Zhang (2012)
	Dynamic mechanism	D. Zhou and Yang (2002)
	Future development	W. Liu et al. (2011); Q. Wang and Liu (2012)
Food production	Food security	Du, Cai, and Fan (2012)
	Food urbanism	L. Sun and Zhang (2003)
Urban planning	Small town	L. He (2013)
	Urbanisation	Qi, Zhou, and Liu (2013); Gao (2012); J. Liu (2011)
	Spatial arrangement	W. Yang and Li (2011); Y. Xu (2011)
	Sustainable development	L. Li (2006); Deng (2009)
Economy	Urban income	Shi et al. (2011)
	Rural economy	Wen (2003)

There are Chinese cities that have been proactive in implementing UA needs in their local planning systems. The Shanghai Municipal Government issued the '*Shanghai Master Plan, 1999-2020*' in 2003 in order to increase the areas of land available for UA practices within the urban boundaries of Shanghai (SH, 2003). In 2011, the Wuxi Municipal Government issued '*The Development Plan for Modern Agriculture in Wuxi*', which included a master plan and land use distinctions for UA in Wuxi (WX, 2011). Other cities like Wuhan (WH, 2010), Kunming (KM, 2012a), and Harbin (HEB, 2003) have also integrated UA into their local plans.

In China, the formal ‘top down’ planning system for UA starts from the national government and filters down to the local level municipal governing bodies. However, the approval process for these initiatives and plans only considers large-scale agricultural projects, ignoring the detailed, small-scale UA practices occurring at the local level. The general approval process of agricultural projects in China can be briefly summarised as below (see Table 2.8):

Table 2.8. A Typical ‘top down’ System of UA in China

(Retrieved from DDP, 2011)

Process	Level	Primary Actions
Issuing a master plan for UA	National	The Department of Development Planning (DDP) under the Ministry of Agriculture of the People’s Republic of China (MAPRC) and related departments submit the annual master plan for agriculture, including UA. The guidelines of agriculture and UA are distributed to provincial governments to conduct their future developments.
Call for development proposals	Provincial	According to the guidelines, the agricultural departments in each province announce the guidelines and call for development proposals. Commercial operators with professional licenses can submit their development applications for UA projects.
Pre-selection of the proposals	Provincial	The agricultural departments in each province organise the pre-selection for the proposals submitted by the local commercial operators. The main objective of the pre-selection is to confirm whether the proposals corresponds to national guidelines and related regulations. The selected projects are then submitted to DDP for further review.
Initial Review	National	DDP conducts the initial review of the proposals. The qualified projects are selected for expert review while rejected projects are returned to the agricultural departments in each province for further revision.
Expert review	National	DDP organises the expert review, inviting certified experts (groups or individuals) to discuss the feasibility of the development proposals. The feedback from the expert review is sent back to the agricultural departments in each province.
Announcement of confirmation	Provincial	The agricultural departments in each province announce the approved development proposals.
Construction	Local	Local commercial operators can begin construction of the approved projects.

Compared to the formal ‘top down’ planning system and approval processes, a multitude of UA practices in China have emerged directly from resident initiatives based on self-organisation. Two primary types of informal ‘bottom up’ systems of UA are identified as follows:

- Private agriculture (Y. Wang, 2013): Residents use limited plots in their properties to undertake agricultural activities. Potential locations include private rooftops, balconies,

yards, as well as the private cultivated land in VICs reserved for UA for personal consumption or, in the minority of cases, for profit (see Figure 2.3).

- Adaptive agriculture (Y. Lu, 2015; T. Wang, 2013): Residents adapt the public space in residential areas and street areas for agricultural use for personal consumption (see Figure 2.4). These types of encroachment by UA practices have been termed ‘tactical urbanism’ and ‘adaptive urbanism’ (Silva, 2016).



Figure 2.3.UA in the Private Space in China

(Source: Author, 2017)



Figure 2.4.UA in the Public Space in China

(Source: Author, 2017)

2.6 Summary

The process of rapid urbanisation in China in the last 30 years has given rise to numerous issues, including arable land deficiency and unstable food resources. Despite the late adoption of widespread UA development, such practices have continued to emerge as a means of alleviating food production pressures and increasing the sustainability of the nation’s cities. The resilience of local households is also improved by means of growing

food for their own consumption. In the short term, UA practices can supplement local food markets and household consumption options, lower unemployment rates, and can boost the income of some urban residents involved in commercial UA activity. In the long term, localities used for large-scale UA practices like urban farms can be viewed as ‘buffer zones’, protecting these areas from annexation in future ad-hoc urban development.

The literature review reveals that research related to UA is innovative but remains limited in terms of popularity as an area of study. Much of the research to date concentrated on agricultural economy, food systems, market management, environmental impacts and concerns, and planting technologies. However, several topics remain under-researched, including the relationships between UA practices, spatial form, evolving city structures, and land use patterns, particularly in the context of China.

Several cities in China have examples of UA activities expressed in a myriad of forms during the process of urbanisation. These forms and practices originate from the application of both 'top down' and 'bottom up' rationales. 'Bottom up' rationales include residents in communities who have claimed public open spaces to intentionally transform them into vegetable plots, an action which has caused conflicts and disputes (Ji, 2018; B. Zhang, 2017). In other Chinese cities, local governments have recognised the importance of UA and focus on the development and maintenance of large-scale UA projects in urban areas as a means of addressing local food, water, and resource constraints (Cai, 2014; Levitt, 2013). This research will therefore focus on both the 'top down' and 'bottom up' UA systems that have emerged in urban areas and analyse the motivations of the different types of UA practices.

3 Research Approach and Design

3.1 Introduction

This research aims to obtain a deeper understanding of the role and nature of UA in the urbanisation process in Kunming by exploring the changing functions, types, and forms of UA in the transformation of the city. This aim gives rise to the following preliminary research questions and sub-questions (see Table 3.1):

Table 3.1. Preliminary research questions

Main Questions	Sub-questions
1. What are the functions, types, and forms of UA practices in the transformation of VICs and the wider city?	1) Who are the main stakeholders of UA practices? 2) What types of space do UA practices appear in VICs and the wider city? 3) What are the physical forms and scales of UA practices? 4) What are the functions of UA practices? 5) Which rules and regulations are related to UA practices?
2. What are the motives of the various stakeholders who undertake these UA practices and how do they create and shape the form and function of the cities?	1) Why do the stakeholders undertake UA practices? 2) Why do the stakeholders choose the specific space types to undertake UA practices? 3) Why do the stakeholders undertake UA practices for specific functions? 4) Why do the stakeholders undertake UA practices in specific physical forms? 5) How do stakeholders create, negotiate, and participate in the related rules, regulations, and governance arrangements?
3. How should the planning system respond to the range of UA practices emerging in the city?	

The first question and its sub-questions focus on analysing the expressions of UA in different spatial rings and different development types in both VICs and non-village areas, including functions, space types, physical forms, rules, and regulations. The second research question investigates the motivations of stakeholders who are involved in UA activities. Based on the answers of these two questions, question three provides insight into the future development of UA in Kunming.

3.2 Research Framework

The concept of assemblage was put forward by Deleuze and Guattari in their book titled '*A Thousand Plateaus: Capitalism and Schizophrenia*' (Deleuze & Guattari, 1987). The concept deals with the part-to-whole relationship of groups, where assemblage is a collection of parts which do not have properties recognisable in the whole. In a system, the parts must interact with each other so as to obtain the properties of the whole (DeLanda, 2006). Assemblage theory provides a theoretical grounding for working with complex dynamic systems, such as cities. For example, in urban planning research, a street can be viewed as an assemblage that contains buildings, trees, cars, people, and sidewalks (Dovey, 2010). Furthermore, in terms of an assemblage system, the whole is more than the sum of its parts and is also irreducible to its parts. Assemblages are an emergent outcome that strongly ties to self-organisation, which aims to explore the characteristics and interconnections of physical self-organisation mechanisms that exist in cities so as to promote liveability, economic viability, and avoid negative development (Barnett, 2013; Partanen, 2015).

Typology research is "a strategy for descriptive qualitative (or quantitative) data analysis whose goal is the development of a set of related but distinct categories within a phenomenon that discriminates across the phenomenon" (Ayres & Knafl, 2012, p. 901). Typology research is characterised by categorisation without hierarchical arrangement and the categories are related to one another, rather than subsidiary to one another (Ayres & Knafl, 2012). It has been argued to be a key tool for application when deconstructing complex urban contexts such as urban informality, land uses, and livelihoods (P. Jones, Maryati, & Suhartini, 2018). In this study, typology research approach provides an adaptable framework which recognises the relevance of individual categories while acknowledging the greater context which links them together.

As mentioned above, function, space type, physical form, rules and regulations are the four key criteria in this research (see Figure 3.1). They are crucial parts of UA, which it is argued will contribute to a deeper understanding of both local and wider city urbanisation processes. The four parts of UA relate to one another, as they shape the system of UA

practices in both private and public spaces. By utilising typology research, which leverages off the investigation and analysis of the four parts of UA, as well as the connection and correlation amongst the parts, it is possible to understand the city in scales by using UA through temporal, spatial, and scale perspectives. Figure 4.1 shows the framework of this research.

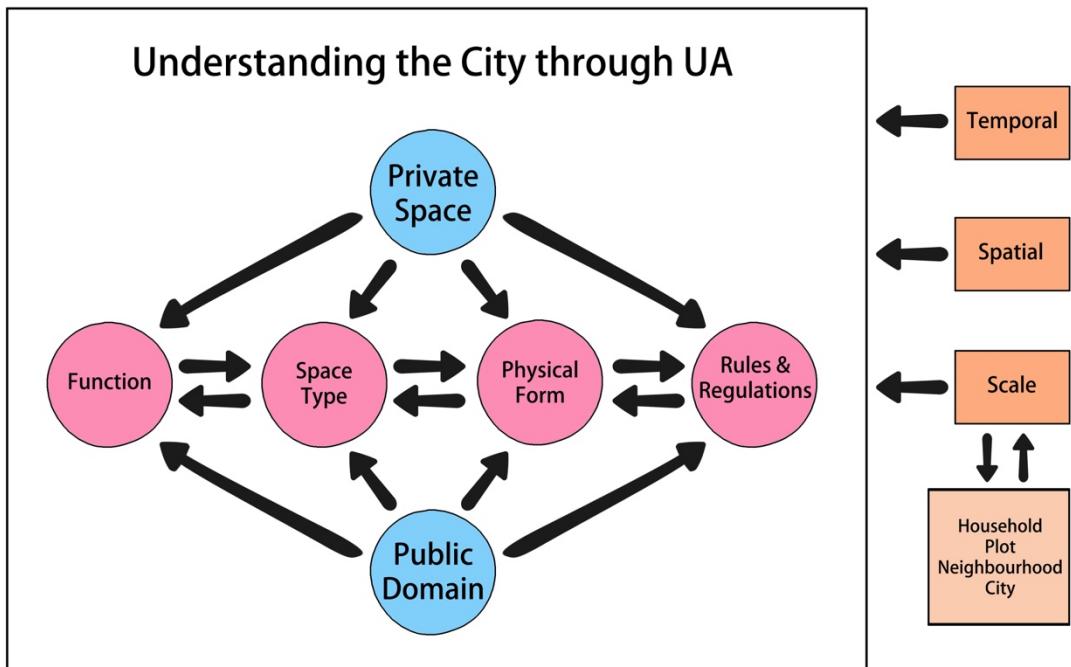


Figure 3.1. Research Framework

3.3 Research Design

3.3.1 Methods

In social research, quantitative research provides “a measurement orientation in which data can be gathered from many individuals and trends assessed across large geographic regions” (Creswell & Garrett, 2008, p. 322). On the other hand, qualitative research focusses on the detailed information that collected from the participants so as to understand their experiences and the rationale of their experiences (Creswell & Garrett, 2008). In this context, researchers need to use ‘mixed methods’, which integrates both quantitative and qualitative research so as to address complex and interdisciplinary research questions (Creswell, 2008). The mixed method approach is applicable for

researching Kunming, as it allows for an in-depth analysis of UA in consideration of expression and motivations (see Figure 3.2).

The emergence of ‘mixed methods’ can be traced back to the 1980s, when researchers recognised the importance of gathering both quantitative and qualitative data in social research (Jick, 1979; Reichardt & Cook, 1979). Since that time, many writers began working independently on conceptualising the role of ‘mixed methods’ (Brewer & Hunter, 1989; Bryman, 1988; Creswell, 1994; Greene, Caracelli, & Graham, 1989). Mixed methods research represents “research that involves collecting, analysing, and interpreting quantitative and qualitative data in a single study or in a series of studies that investigate the same underlying phenomenon” (Leech & Onwuegbuzie, 2007, p. 266).



Figure 3.2. Mixed Methods in this Research

According to Yin (2014), a case study approach is best used when applied to contemporary phenomena in a real-life context with ‘how’ or ‘why’ questions. By conducting a case study, researchers can focus on the cases while retaining a holistic perspective (Yin, 2014). Hence, the investigation of separate cases in one research field and the analysis of their

connections, similarities, and differences allows researchers to better understand their assemblage. The empirical case studies in this research provide the opportunity to identify various UA practices within the city so as to find the dominant patterns and characteristics, and to understand how UA helps to make and shape the city.

In social research, the survey questionnaire is perhaps the most frequently adopted method used to collect data (Groat & Wang, 2013). One of the advantages of questionnaires is that they provide the researchers with an extensive amount of information, such as behavioural habits and demographic characteristics, as well as the opinions or attitudes on a specific research topic (Groat & Wang, 2013). For example, J. Kim (2007) selected survey questionnaires as a tool to collect residents' overall assessments of the 'sense of community' in the US in 2007. B. He and Zhu (2018), they designed a questionnaire to investigate the motivations for local residents to plant vegetables in the public green spaces in a residential area in Hangzhou, China. In this research, the purpose of using questionnaires is to collect the preferences and perceptions of people who undertake various UA practices. For example, the questionnaire designed for individual and household participants who undertake UA practices in or around their private properties includes the questions - "how do you deal with your UA products and why?", "where do you choose to grow and why?", and "what kinds of containers do you use for planting?". The questionnaire used in this research can be found in Appendix B.

Interviews are ubiquitous in a variety of research areas, including structured, semi-structured, and unstructured interviews (Babbie, 2007; Bryman, 1988; May, 1997). Structured interviews include explicit questions with prepared answers and options, which are similar in nature to survey questionnaires (Berg, 2009). Semi-structured interviews contain a series of open-ended questions that relate to one particular topic (Blackstone, 2012; Bryman, 2004). Unstructured interviews are those without any specific framework for questioning, and the interviews follow the direction of the interviewee's responses (Moyle, 2002). In this research, in order to better understand the motivations, experiences, and perspectives of UA participants, semi-structured interviews have been conducted with different groups of people who participated in UA activities.

Mapping is another technique frequently used in social research. For example, Lynch (1960) adopted the sketch maps drawn by local residents to summarise the five general categories of urban features, including paths, edges, nodes, landmarks, and districts. In this research, the planting preferences of the UA growers can be summarised through the physical characteristics and spatial distribution of UA practices. The maps retrieved from Google Earth help to analyse the land use changes in VICs over a course of several years, in particular the transformation of the cultivated land attached to VICs, assisting in understanding the motivations of UA participants.

In summary, questionnaires, semi-structured interviews, field observation, mapping, and case studies are used as a toolkit for this research so as to obtain a deeper understanding of the role and nature of UA practices in VICs and non-village areas. Table 3.2 shows the various methods used for each research question and the key required data for the answers. The primary data for this research were gathered from three main sources: questionnaires, semi-structured interviews, and field observation. The secondary data is supplemented by documentation such as google map, government documents, newspaper articles, authority reports, advertising texts and press releases. This research was conducted with human ethics consideration approved by the Research Integrity and Ethics Administration, The University of Sydney in 2017 (project number: 2016/836).

Table 3.2. Data for each Research Question

Main Questions	Sub-questions	Methods	Data Type	Key Data Required
1. What are the functions, types, and forms of UA practices in the transformation of VICs and the wider city?	1) Who are the main stakeholders of UA practices?	Questionnaire	Primary data	Stakeholder groups
	2) What types of space do UA practices appear in VICs and the wider city?	Observation, Questionnaire	Primary data	Public or private Semi-public or semi-private
	3) What are the physical forms and scales of UA practices?	Mapping, Observation, Questionnaire	Primary data Secondary data	Linear or Non-Linear
	4) What are the functions of UA practices?	Observation, Questionnaire	Primary data	Commercial or non-commercial
	5) Which rules and regulations are related to UA practices?	Questionnaire, Interview	Primary data Secondary data	Rules and regulations in different level
2. What are the motives of the various stakeholders who undertake these UA practices and how do they create and shape the form and function of the cities?	1) Why do the stakeholders undertake UA practices?	Questionnaire, Interview	Primary data	Factors that affect the changes
	2) Why do the stakeholders choose the specific space types to undertake UA practices?	Interview	Primary data Secondary data	Selection reasons
	3) Why do the stakeholders undertake UA practices for specific functions?	Interview	Primary data	Selection reasons
	4) Why do the stakeholders undertake UA practices in specific physical forms?	Interview	Primary data Secondary data	Selection reasons
	5) How do stakeholders create, negotiate, and participate in the related rules, regulations, and governance arrangements?	Interview	Primary data Secondary data	Perspectives
3. How should the planning system respond to the range of UA practices emerging in the city?	Overall analysis	Primary data Secondary data	All data from the former questions	

3.3.2 Case Study Selection

Kunming is located in the southwest of China and is the capital city of the Yunnan Province (see Figure 3.3). As the largest city in Yunnan Province, Kunming is the political, economic, cultural, technological, and communicational centre of this province.



Figure 3.3. The Location of Kunming in China

(Retrieved from China Highlights, 2018)

According to the statistics published by the Kunming Municipal Bureau of Statistics, the urbanisation rate in Kunming was 70.05% in 2015 (KBS, 2016). The total population was recorded at 6.626 million persons, with a density of 320 persons per kilometre, ranked 16th most densely populated city in China (Demographia, 2018) (see Table 3.3).

Table 3.3. Basic Information of Kunming, 2018

(Retrieved from Demographia, 2018)

Total area (km ²)	Total population (million persons)	Population density (persons per km ²)
21,015	6.626	320

Compared with many developed cities in China, Kunming is a newly developing city, with many issues emerging as a result of its rapid urbanisation. One such example is the lack of spatial layout order in VICs and full occupancy of the arable land has had a detrimental effect on the production and distribution of food. Kunming is currently undergoing a revolution and transformation process in all areas, including the VICs and non-village areas.

Compared to cities in the final stages of development, it is easier to locate and observe the different stages and degrees of development in a rapidly growing city. This thesis argues that the transformation of the urban forms in Kunming will impact the means of food production, specifically the transference of agriculture from rural areas to UA.

Furthermore, as a migrant city in southwestern China, there were 1.98 million migrants in 2011, which was 27.3% of the total population in the same year (NBSC, 2011). The migrants moved to Kunming from other provinces or other cities and counties in Yunnan Province. Some migrants had a connection to agricultural production and held rural *hukou* before moving to Kunming. The transformation of lifestyles and occupations can be argued to have an impact on their ways of adapting the living environment and claiming spaces, such as individuals growing vegetables in private or public spaces in or around their properties.

Kunming is known as a city characterised by UA, which has developed over its urban growth period in response to the continual resource demands of its residents (M. Li, Liu, & Long, 2014; Yuerong Wang & Jia, 2017). For example, the residents' initiatives of growing vegetables in public or private spaces reflects the demand for DIY planting and harvesting (China News, 2014; X. Lang, 2014). The Kunming Municipal Government also holds a supportive attitude in relation to developing urban farms, demonstrating their consideration of UA as an essential agenda for the city's urban development (KM, 2010, 2016). This context provides an opportunity to obtain empirical evidence to understand the role and nature of UA in the urbanisation process of Kunming.

3.3.3 Defining the Stakeholders

Many studies on urban development focus on identifying and analysing the interests and motivations of the individuals and groups who are involved in the particular urban phenomenon (Louise Lawson & Kearns, 2010; Mahjabeen, Shrestha, & Dee, 2008; Taylor, 2007). As P. S. Jones (2003, p. 581) stated, it is essential to "stress exactly who the participants (stakeholders) are" in urban research, so as to identify their real interests and thoughts regarding the specific research topic. In this research, there are four main groups of stakeholders who are involved in UA activities in Kunming:

- Individuals/Households¹: this refers to the residents who undertake UA practices on their own in both private and public spaces in VICs and non-village areas. For the purpose of analysis, the individual and households' participants have been merged together as one group of stakeholders. Households constituted the majority participant type at this level; individual participants were rare.
- Community Groups: this refers to the non-government groups who act as the governance teams in VICs and non-village areas. For example, the key community group in VICs and low-income communities is the community committee, which is the resident autonomous organisation that manages the residential area based on the national and local rules and regulations. Also, in middle-income and high-income communities in non-village areas, the community group is the professional management company who provides services to oversee the operation of safety, sanitation, and infrastructure systems in the residential area.
- Commercial Operators: this refers to companies who undertake UA practices for profit or non-profit purposes.
- Government/related Departments: this refers to the policymakers and officers who have connections with UA projects.

The largest group of stakeholders for UA are household participants; they have various preferences and attitudes regarding agricultural practices. In the context of Kunming, it is difficult to find UA practices undertaken by community groups, such as community gardens. This is in part because members who work in local community committees are also residents of the area, and their UA practices can be considered as being part of their household's activities. In other words, in these common instances the UA practices are predominantly for their individual households rather than for the benefit of the whole community. As such, the data collected in this research from the community groups has been merged with the data of household participants. The analysis of community groups focusses on their attitudes toward UA so as to understand their role in governing and supporting UA practices.

¹ "Household participants" in the following text refers to a collection of individual and household participants.

3.3.4 Sample Selection and Size

In order to identify whether UA practices in Kunming vary in different locations and different development types, this research investigates the expressions of UA and motivations of stakeholders in 1) both VICs and non-village areas and 2) within different ring roads of Kunming. Like many other Chinese cities, the urban sprawl in Kunming also follows a concentric zone model. Three ring roads in Kunming can be determined as the framework that shapes the main urban area of Kunming (see Figure 3.4). The building density, status of infrastructure, and urban landscape vary in different locations of Kunming. Furthermore, due to the uneven developmental status, three types of VICs can be found in Kunming: the fully-acquired, partially-acquired, and developing VICs. Compared to fully-developed areas, the latter two VIC types have their own unique characteristics and diverse expressions of UA. Thus, 15 areas in Kunming were chosen as the research sites to thoroughly analyse the role and nature of UA in Kunming (see Table 3.4).

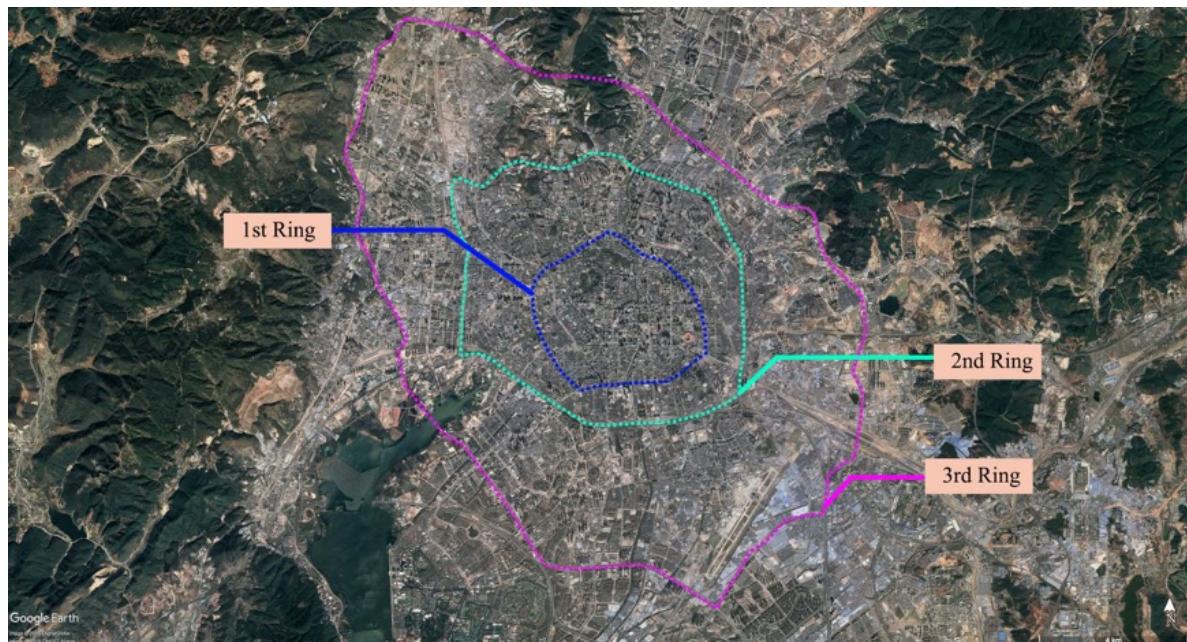


Figure 3.4. City Structure of Kunming

(Map captured from Google Earth, 2017)

Table 3.4. Case Studies in Kunming

Location	VICs	Non-village Areas
Within First Ring Road	Fully-acquired VIC: Beihegeng Village	Low-income Community: Milesi
Within Second Ring Road	Fully-acquired VIC: Dashuying Village Partially-acquired VIC: Xiaotun Village	Low-income Community: Jiangan Xiaoqu
Within Third Ring Road	Fully-acquired VIC: Jindaoying Village Partially-acquired VIC: Changdigeng Village Developing VIC: Linjiayuan Village	Institution: Southwest Forestry University Eastern Campus
Outside Third Ring Road	Fully-acquired VIC: Yunshan Village Partially-acquired VIC: Yangchang Village Developing VIC: Baofeng Village Developing VIC: Xiaoxince Village	Middle-income Community: Jiangdong Huacheng High-income Community: Qingshui Muhua

According to the statistical report by Kunming Municipal Bureau of Statistics, the total population in Kunming in 2017 was 6,626,000 and the number of households is 2,473,000. Using the Confidence Level¹ of 95% with a Margin of Error² of 5.5%, the minimum required sample size for households is 317. Hence, in order to obtain a reliable result from case studies, there are at least 317 questionnaires and semi-structured interviews which must be collected from households and community groups. As for commercial operators and governments, semi-structured interviews have been conducted to investigate their perspectives and attitudes of UA. The sample questions for semi-structured interviews can be found in Appendix C. Table 3.5 displays the number of questionnaires and semi-structured interviews collected from the site visit in Kunming.

Table 3.5. Samples Collected from Stakeholders

Stakeholder	Questionnaires	Semi-structured Interviews
Households		
Community groups	300	75
Commercial Operators	-	10
Governments/related departments	-	10

¹ 'Confidence Level' refers to how reliable a measure is.

² 'Margin of Error' refers to the percentage that describes to what extent the opinions and behaviour of the sample in this research is likely to deviate from the total household population.

3.4 Summary

In order to understand the role and nature of UA practices in the transformation of Kunming, assemblage theory and typology research provide the theoretical support for this research. The aim is to deconstruct the current situation of ‘formal’ and ‘informal’ UA in both VICs and non-village areas of Kunming so as to understand the entire UA system, both in parts and as a whole. This research involves mixed methods including mapping, observation, questionnaires, and semi-structured interviews to establish the expressions of UA practices in different spatial rings and development modes in Kunming.

The economic growth, land reforms, and housing commercialisation has transformed Kunming into a regional megacity (Wu, Cheng, Liu, Han, & Yang, 2015). However, there are many issues emerging as a consequence of the continuing urbanisation of the city, such as the loss of arable land, limited land supply, and the increasing population growth from migration (Vandamme, 2017; Wu & Cheng, 2018; Wu et al., 2015). The transformation of urban form in Kunming has triggered the coexistence of VICs and non-village areas in the city simultaneously. Since Kunming has experienced a slower urban transformation compared to other developed cities due to its urbanisation being a more recent phenomena, the different development stages and degrees are more apparent for observation and research. Furthermore, given agriculture is an essential component in most Chinese cities, its role and the methods of food production has changed as a result of the urbanisation process. Within this context, Kunming has been identified as an ideal case study option as it provides a unique opportunity to observe and analyse the relationship between urbanisation and UA.

4 The Setting of Kunming and the Case Studies of Urban Agriculture

4.1 Basic Information of Kunming

Kunming is located from 102°10' to 103°40'E and 24°23' to 26°33'N in the north-central Yunnan province(KM, 2007). It is situated in the centre of Yunnan-Guizhou Plateau with the city centre located 1892 meters above sea level. Impacted by the warm and humid air currents from the Indian Ocean, Kunming is characterised by a subtropical highland climate and features long daylight time and short frost periods. Due to its climatic features, Kunming is known as the “City of Eternal Spring”, which means the climate in all seasons is similar to the climate in spring(KM, 2007). The spring-like weather provides the ideal climate for cultivating plants and flowers, a key result being that the city is covered with blossoms and lush vegetation all-year around. As the capital city of Yunnan province, Kunming is also the political, economic and cultural centre of the province. Kunming is a prefecture-level city that comprises 7 districts, 1 county-level city, 3 counties and 3 autonomous counties (see Figure 4.1). This research will focus on the main built-up areas of Kunming, including Panlong District, Wuhua District, Guandu District and Xishan District.



Figure 4.1. The Administrative Divisions of Kunming

(Retrieved from KM, 2015)

4.2 Urban Development in Kunming

The urbanisation of Kunming started after the establishment of the People's Republic of China in 1949. In 1953, during the 'First Five-Year Plan' period, the Kunming Construction Bureau introduced the *Initial Urban Plan for Kunming (draft edition)*(KMCB, 1953). The first planning strategy designed the ring road system as the framework of development in Kunming. In 1959, the *Master Plan for Kunming* was released as the guideline for the industrial and residential layouts of the city. The urban area of Kunming increased from 7.8 km² in the early 1950s to 20.42 km²in the mid-1960s (KMCB, 1959). With the transformation of the structure of the Chinese economy in the 1960s, the Kunming Construction Bureau issued the *Ten-Year Urban Construction Plan for Kunming (1962-1972)*, which included an initiative to relocate several factories that were causing environmental issues to the peri-urban area of Kunming (KMCB, 1962). Further issues continued to arise with the increasing population in urban areas, such as inadequate infrastructure, traffic congestion, and insufficient urban greening.

In order to minimise the development limitations and mistakes from past decades, Kunming Construction Bureau introduced the *Master Plan for Kunming (1981-2000)* (KMCB, 1982) in 1982. The plan aimed to reconstruct selected areas in Kunming and strictly control the rapid increase in urban population, as well as providing more infrastructure facilities. In the mid-1980s, the urbanisation process in Kunming gained momentum and by 2002, the built-up area of Kunming had increased to 180 km². This is nine times more than the area had been in the 1950s (KMCB, 2003). In 2015, 70% of the land in Kunming had been urbanised and the built-up area had increased to 420.5 km²(KBS, 2016). Since the mid-1990s, Kunming has experienced the redevelopment of many old buildings within the urban area. As anthropologist L. Zhang (2006, p. 461) stated:

"The old narrow alleyways and traditional residential houses with their dark-blue tile roofs are quickly disappearing, giving way to multilane boulevards, gigantic shopping plazas, up-scale housing compounds, luxury hotels, and neon-lighted entertainment centres, all-powerful physical markers of modernity in today's China."

Kunming has experienced unprecedented development during the last two decades, including the successful hosting of the Horticultural Exposition in 1999 (Dai & Bao, 2006). This growth is reflected in the Gross Domestic Product (GDP) increasing from 16.9 billion Chinese Yuan in 1992 to 396.8 billion in 2015 (KBS, 2016). The rapid increase in the social and economic development of Kunming is mainly due to the implementation of the plans titled the *Western Development Strategy*¹ in 2000 and the *Belt and Road Initiative*² in 2013. As one of the provinces in the *Western Development Strategy*, Yunnan has received strong attention from the Chinese Central Government, especially the development of its capital city, Kunming. In the *Belt and Road Initiative*, Kunming is positioned as the transportation hub to connect China with other countries in Southeast Asia (see Figure 4.2). Hence, the implementation of these strategies provides more development opportunities to Kunming, as well as many urban planning challenges.

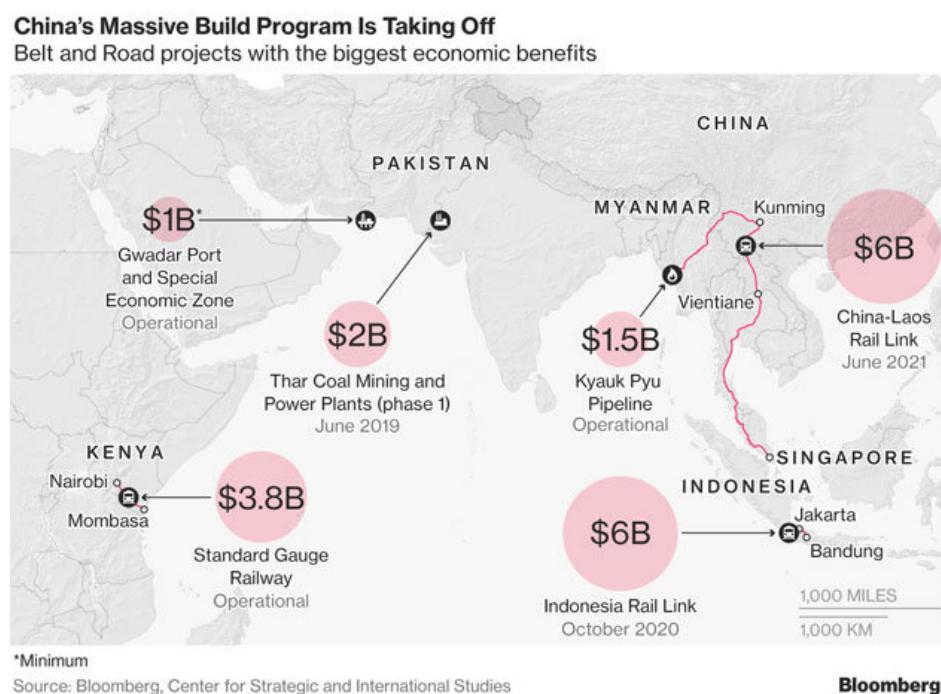


Figure 4.2.Kunming within the *Belt and Road Initiative*

(Retrieved from Bloomberg, 2018)

¹*Western Development Strategy*: this refers to the development strategy designed for western regions in China, including six provinces (Gansu, Guizhou, Qinghai, Shanxi, Sichuan and Yunnan), five autonomous regions (Guangxi, Inner Mongolia, Ningxia, Tibet and Xinjiang), and one municipality (Chongqing) (China Daily, 2009). Compared to the prosperous eastern region, the western region is undeveloped.

²*Belt and Road Initiative*: also known as the *Silk Road Economic Belt and 21st-century Maritime Silk Road*, this refers to "a development strategy adopted by the Chinese Central Government involving infrastructure development and investments in 152 countries and international organisations in Europe, Asia, Middle East, Latin America and Africa" (Belt and Road, 2018; The World Bank, 2018).

Increasing urban development and population in Kunming has resulted in a continual loss of arable land as space is reclaimed for residential needs (see Figure 4.3.). The arable ‘land bank’ allocated for the growth of urban areas declined from 15.69 km² in 2007 to 8.78 km² in 2017. As a result of the urban expansion, many people lost access to their original cultivated lands, and thereby their livelihoods (First Financial Daily, 2014). Many efforts have been made in Kunming to improve the living conditions of those who lost their cultivated land, such as relocation and allowances for loss of employment, as well as to ensure their ‘sense of belonging’ is not compromised when living in a modern urban environment that is different from their original settlements (H. Zhang, 2015).

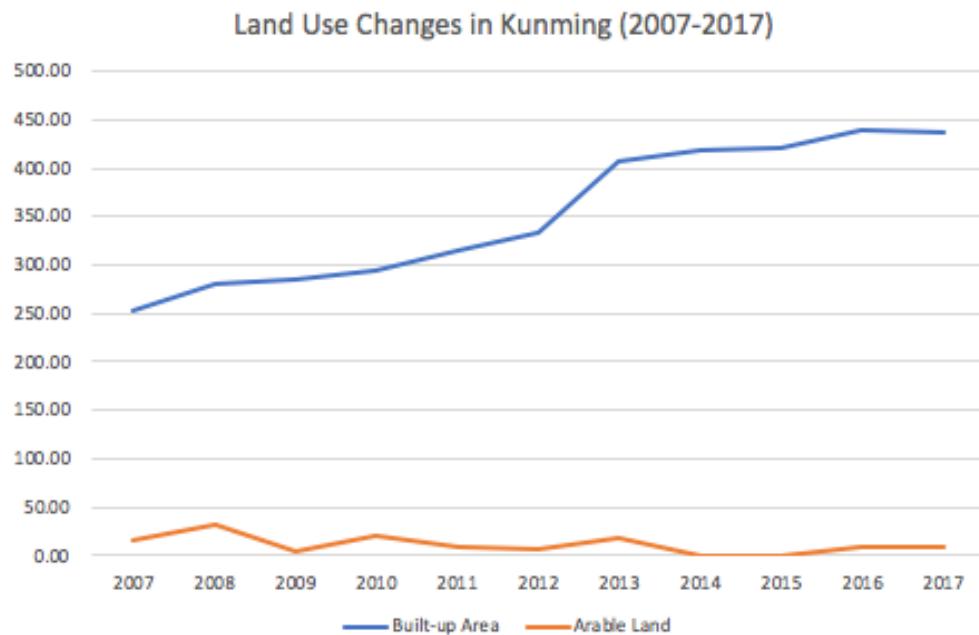


Figure 4.3.Land Use Changes in Kunming (2007-2017)

(Retrieved from MOHURD, 2019)

Like many Chinese cities, Kunming has a primary city centre, which is within the First Ring Road. The primary centre has the highest density of residential, commercial, business, and service facilities. Compared with the outer parts of this city, the population density in the main centre of Kunming is higher. Citywide, there were 6.626 million people living in Kunming (21,015 km²) in 2018, with a density of 320 persons/km² (Demographia, 2018). In the urban built-up area (712 km²), there were 3.895 million residents, with a much higher density of 5,500 persons/km² (Demographia, 2018).

Since the 1980s, Kunming has experienced many challenges caused by urban development. Of these, VICs feature as the most prominent, as they have several negative impacts on the social environment of Kunming. In 2007, there were 336 VICs within the 253.3 km² built-up area of Kunming. The overall area of these VICs were measured at 19.5 km², comprising 7.8% of the built-up area (T. Xu & He, 2017). Based on the Opinions on the Redevelopment of the Village in the City issued by the Ministry of Housing and Urban-Rural Development of the People's Republic of China (MOHURD) in 2008 (MOHURD, 2008), the Kunming Municipal Government intended to complete the redevelopment of the 336 VICs before 2012 (KM, 2008). The number of VICs in Kunming continued to climb despite this plan, rising to 382 in 2011 as rural villages continued to be absorbed into urban areas as the city expanded (KM, 2011). In 2017, 208 VICs were still awaiting reconstruction (XSKM, 2017). Table 4.1 shows that most inner city VICs have been redeveloped, while most types of VICs in the second and third rings are currently undeveloped.

Table 4.1. Current Status of VIC in Kunming (2017)

(Retrieved from XSKM, 2017)

	Fully-acquired VIC	Partially-acquired VIC	Developing VIC
First Ring	11	-	-
Second Ring	25	12	-
Third Ring	29	25	21
Outside Third Ring	17	31	37
Total		208	



Figure 4.4. Non-village areas (left) and VICs (right) in Kunming

(Source: Author, 2017)

The non-village residential areas in Kunming can be differentiated according to three main types (Cui, 2008):

- **Low-income communities:** These communities were built before the 1990s as small-scale construction projects, including welfare housing commissioned by local enterprises or educational institutions to provide homes for their employees. Often, there are no professional property management companies to ensure the safety of residents or manage community routines, and the infrastructure systems are in poor condition. Residents' self-organised committees, similar to those found in VICS, manage most low-income communities. Communities are usually gated; boundaries are maintained through fences or walls.
- **Middle-income communities:** These refer to the apartments and units built by real estate developers for commercial purposes. Many of these residential areas were built after 2000 and are managed by professional property management companies. Management companies provide various services to the communities, including security and general maintenance of infrastructure systems. The middle-income communities are also gated communities, either enforcing boundaries with fences or walls.
- **High-income communities:** These refer to the detached villas, townhouses, and semi-detached villas built by real estate developers for commercial purposes. Similar to middle-income communities, professional property management companies are responsible for providing general maintenance and security services to these communities. High-income communities are also gated communities with fences or walls.

4.3 Current Situation of Urban Agriculture

4.3.1 Urban Agriculture Development in Kunming

As discussed above, the development of UA has two modes: the formal ‘top-down’ mode and the informal ‘bottom-up’ mode. With the emergence and development of formal UA, three main aspects have been identified in Kunming (L. Wang, 2016; Q. Zhou, 2014):

- Economic aspect. UA plays various roles within the local economy. Firstly, UA emerged as a modern form of traditional agriculture, which contributes to the primary sector of the local economy by producing raw materials such as crops and vegetables. Also, UA is strongly connected to the tertiary sector of the local economy by providing various services, for example, the restaurants in the urban farms provide dining to local residents. The positive development of UA in Kunming will encourage the agricultural development of surrounding areas and become a demonstration site of economic importance.
- Ecological aspect: Similar to parks, green spaces, forests, and wetlands, UA contributed an essential part of the ecological system of the city, creating an agricultural landscape within its urban fabric. Though the natural landscape cannot be replaced, the ‘artificial’ urban agricultural landscape continues to be a beneficial contributor to human health and wellness.
- Social aspect: As the capital city of Yunnan province, the development of Kunming directly or indirectly determines the development level of the entire province. UA provided the local labour market and decreased the unemployment rate. Improvements to the unemployment situation contributed to a higher level of mental and physical wellbeing among urban dwellers.

In 2008, ‘top down’ UA development was enacted by the Yunnan Provincial Government, proposing the building of modern agricultural projects with plateau characteristics¹ across the province. To implement this strategy, the Kunming Municipal Government introduced plans for developing UA, and by 2013 there was a total of 51,901 hectares of agriculture-specific parks built. The establishment of more than 200 agricultural-related enterprises to be linked to this development, such as Chennong Pty., Ltd and Yunnan Xinyizhou Agricultural Technology Co., Ltd. These agriculture-specific parks have achieved initial success in the construction of infrastructure, promotion of investment, industrial training, and innovation of agricultural technology, which provides the opportunity for developing urban farms in Kunming (see Figure 4.5). On the other hand, rapid urbanisation has driven the decline of peri-urban cultivated land, as well as transferring more residents from those designated as rural dwellers into urban citizens. Hence, there is an increasing demand for food in urban areas and the need for more efficient modes of food production. In this context, the construction of urban farms provided a means of alleviating some of the issues caused by the urbanisation process. In 2012, the Kunming Municipal Government introduced a strategy of constructing 100 urban farms during the ‘Twelfth Five-Year Plan’ period, spanning from 2011-2015 (KM, 2012a). By 2016, there were 48 urban farms opened for public access (KM, 2016).



Figure 4.5.Urban Farms in Kunming

(Source: Author, 2017)

¹ Modern agricultural projects with plateau characteristics refers to the mode of agricultural development based on the characteristics of Yunnan Province, including better temperature and sunlight conditions, less industrial pollution, diverse flora and fauna species, and clean air and water.

As for the ‘informal’ bottom-up UA developments, these stem mainly from the initiatives of the households living in both the VICs and non-village areas of Kunming (see Figure 4.6). Currently, resources discussing the phenomenon of the adaptive performance of UA practices in the public domain in Kunming is limited to a few newspaper articles (China News, 2014; X. Lang, 2014). As UA affects the spatial layout of the city at varying scales, it is argued that there is a need to further investigate the expressions of these ‘informal’ UA practices, including the motivations, perspectives, and attitudes of the stakeholders.



Figure 4.6.Adaptive UA in Kunming

(Source: Author, 2017)

4.3.2 Basic Information of the Participants from Households and Community Groups in this Research

In this research, a total of 375 people completed the questionnaires and semi-structured interviews. These participants consisted of household members and the representatives of local community groups who were randomly chosen from the 15 surveyed areas in both VICs and non-village areas in Kunming. The basic information for all respondents is displayed in Table 4.3. This sample comprised 177 male (47.2%) and 198 female (52.8 %) participants, indicating the gender balance in the selected areas. Regarding the age of participants, the largest proportion of those who completed the questionnaires and were interviewed are between 41-50 and 51-60 years of age, which is approximately 27.7% and 28% respectively. In regards to the educational background, the participants had mainly received high school or equivalent education (54.4%). The monthly household income of participants varied significantly, the largest proportion being in the range from CNY ¥3,000 - ¥8,000 (AUD \$600 - \$1,600), which is 46.9% of the sample. Some 66.7% of the participants were living in VICs, while the remaining 33.3% were from non-village areas. In

regards to the previous agricultural background of the participants, this refers to whether the participants had rural *hukou*, or were connected in some manner to agricultural production before moving to Kunming, such as from other urban areas. 69.3% of the participants indicated they had previous agricultural background, while the remaining 26.3% of participants were born in Kunming and therefore held an urban *hukou*. Regarding the current participation rate of UA activities, 61.6% of the participants were undertaking UA by themselves, while the remaining 38.4% were not involved in any UA practices.

Table 4.3. Basic Information of Respondents from Households and Community Groups

Item	Group	Number	Proportion (%)
Gender	Male	177	47.2
	Female	198	52.8
Age	18-30	47	12.5
	31-40	87	23.2
	41-50	104	27.7
	51-60	105	28.0
	>60	32	8.5
Education	< High School	96	25.6
	High School	204	54.4
	≥ Undergraduate	75	20.0
Monthly Household Income	< CNY ¥3,000(AUD \$600)	55	14.7
	CNY ¥3,000 - ¥8,000(AUD \$600 - \$1,600)	176	46.9
	CNY ¥8,000 - ¥20,000(AUD \$1,600 - \$4,000)	115	30.7
	> CNY ¥20,000 (AUD \$4,000)	29	7.7
Living Areas	VICs	250	66.7
	Non-village Areas	125	33.3
Previous Agricultural Background	Yes	260	69.3
	No	115	30.7
Current Participating in UA	Yes	231	61.6
	No	144	38.4

Table 4.4 presents the basic information of the 231 people who were undertaking UA practices in relation to their age, education, monthly household income, and previous agricultural background. The number of participants involved in UA clearly increases in the age groups 41-50 and 51-60 years, namely 35.9% and 33.8% respectively. The smallest age range who undertake UA practices is 18-30 years. Regarding the participants' educational background, 50.2% of the participants received high school or equivalent education. As for the monthly household income for the participants, the largest proportion of people fall in the range of CNY ¥3,000 - ¥8,000 (AUD \$600 - \$1,600), which is 47.6% of the sample. Finally, over half of the participants had previously engaged in agricultural production before they moved to Kunming, while the remaining 41.6% of participants have no experience of growing food or UA by themselves.

Table 4.4. Basic Information of UA Participants

Item	Group	Number	Proportion (%)
Age	18-30	7	3.0
	31-40	44	19.0
	41-50	83	35.9
	51-60	78	33.8
	>60	19	8.2
Education	< High School	67	29.0
	High School	116	50.2
	≥ Undergraduate	48	20.8
Monthly Household Income	< CNY ¥3,000(AUD \$600)	31	13.4
	CNY ¥3,000 - ¥8,000(AUD \$600 - \$1,600)	110	47.6
	CNY ¥8,000 - ¥20,000(AUD \$1,600 - \$4,000)	71	30.7
	> CNY ¥20,000 (AUD \$4,000)	19	8.2
Previous Agricultural Background	Yes	135	58.4
	No	96	41.6

4.4 Summary

Kunming has been experiencing unprecedented urban development from 1974 to 1990(Deng, Huang, Rozelle, & Uchida, 2008; X. Wang et al., 2005). Since that period, tremendous changes have continued to occur driven by the changes in the urban economy, including population growth, industrial restructuring, new transportation, and changing city form. Kunming is now characterised by its transition from a socialist manufacturing centre into a free market service economy focussing on tourism, biochemicals and flower production. With the implementation of several development strategies such as the *Western Development Strategy* and the *Belt and Road Initiative*, Kunming gained momentum in economic and urban growth. However, there are many challenges and issues emerging as a consequence of urbanisation and urban development, such as the concentrated population in urban built-up areas, the mix of VICs sitting next to the developed non-village areas, the loss of arable land for food production, and the emergence of urban farms. In this context, the following chapters focus on evaluating the expressions of various UA practices in both VICs and non-VICs in Kunming.

5 Urban Agricultural Practices in Village in the City

5.1 Introduction

This chapter identifies the expressions of UA practices in VICs within each spatial ring road of Kunming, as well as the peri-urban area outside the Third Ring Road. The four variables applied to deconstruct and better understand UA included function, space type, physical form and rules and regulations. Each VIC type will be analysed by its basic information including location, plot area, and population. Finally, there will be a summary to conclude the similarities and differences of each UA practice in all VICs' types in each ring, as well as to discuss the results emerging from the four variables collectively. Figure 5.1 displays the framework of this chapter:

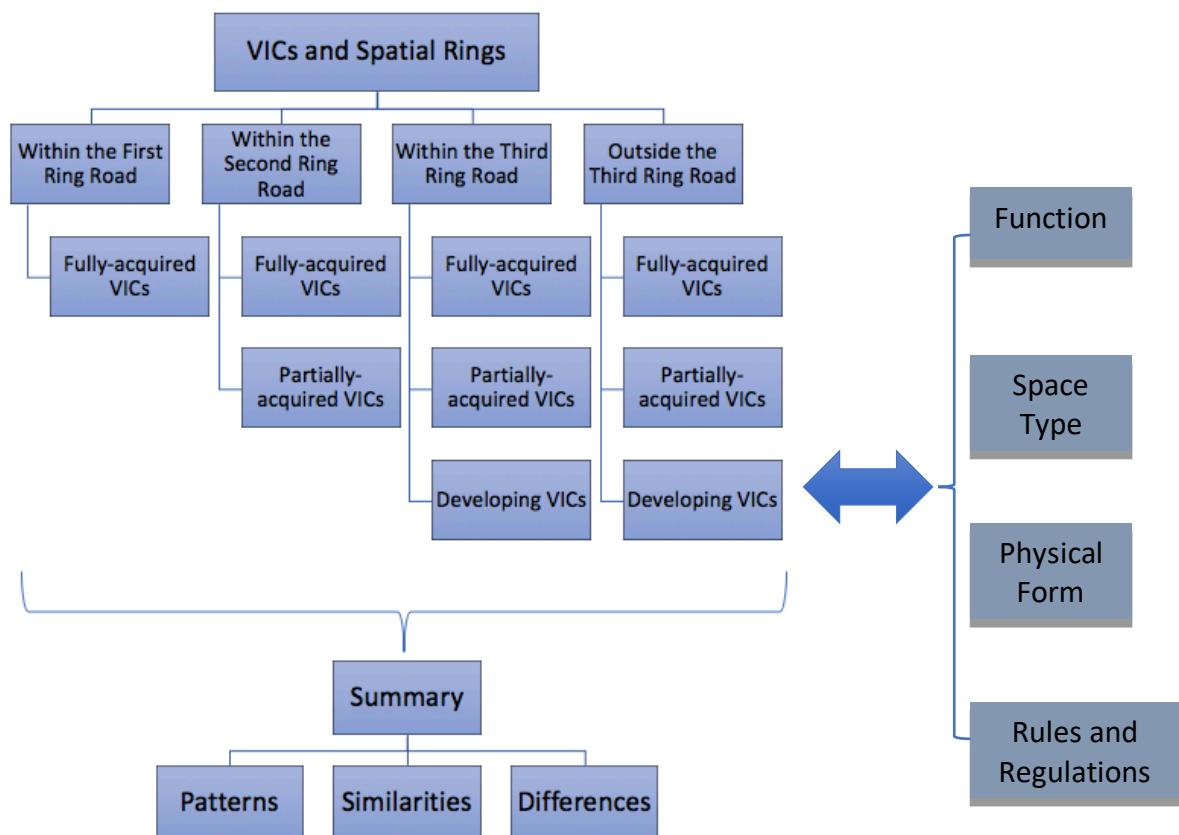


Figure 5.1.Framework of Chapter 5

There were ten VICs sampled from all ring roads in Kunming. Considering some VICs (highlighted below) have many similarities in UA expression, only five VICs will be analysed and illustrated in detail in this chapter. The VICs as highlighted below are contained in Appendix A with a brief introduction. The sample of VICs analysed in this chapter are summarised below; note the overall analysis at the end of this chapter contains information from all ten VICs:

- VICs Within the First Ring Road¹:
 - Fully-acquired VIC: Beihegeng Village
- VICs Within the Second Ring Road²:
 - Fully-acquired VIC: Dashuying Village (See Appendix)
 - Partially-acquired VIC: Xiaotun Village
- VICs Within the Third Ring Road:
 - Fully-acquired VIC: Jindaoying Village (See Appendix)
 - Partially-acquired VIC: Changdigeng Village (See Appendix)
 - Developing VIC: Linjiayuan Village
- VICs Outside the Third Ring Road:
 - Fully-acquired VIC: Yunshan Village
 - Partially-acquired VIC: Yangchang Village (See Appendix)
 - Developing VIC: Baofeng Village (See Appendix)
 - Developing VIC: Xiaoxince Village

¹There are no partially-acquired VICs or developing VICs within the First Ring Road.

²There are no developing VICs within the Second Ring Road.

5.2 Urban Agricultural Practices within the First Ring Road

Construction of the First Ring Road started in 1956 and finished in 1963, with the total length of the First Ring Road being 14km (see Figures 5.2 & 5.3). During the urban development process of Kunming since 2008, various VICs were demolished and reconstructed. Until mid-2017, there were 11 fully-acquired VICs within the First Ring Road (Housing YN, 2018). These VICs have many similar features, including a high proportion of temporary residents, narrow spatial layout, poor living conditions, lack of public open space, and lack of land for agricultural cultivation (Mercury, 2005). As to be expected, this is an inner-city precinct and much land has been developed. As a result, there exists only several fully-acquired VIC left to be developed. Hence other VIC types as seen in the outer rings, such as the partially-acquired VICs and developing VICs, have already undergone development processes in this ring.

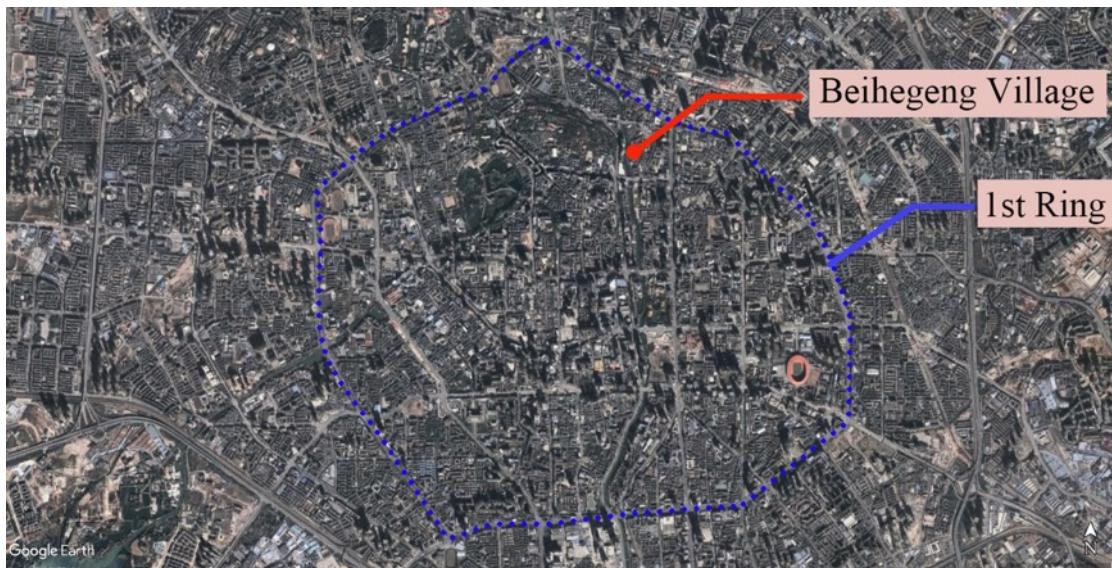


Figure 5.2. Location of the First Ring Road in Kunming

(Map captured from Google Earth, 2017)



Figure 5.3. Street View of the First Ring Road in Kunming

(Source: Author, 2017)

5.2.1 Fully-acquired Village in the City- Beihegeng Village

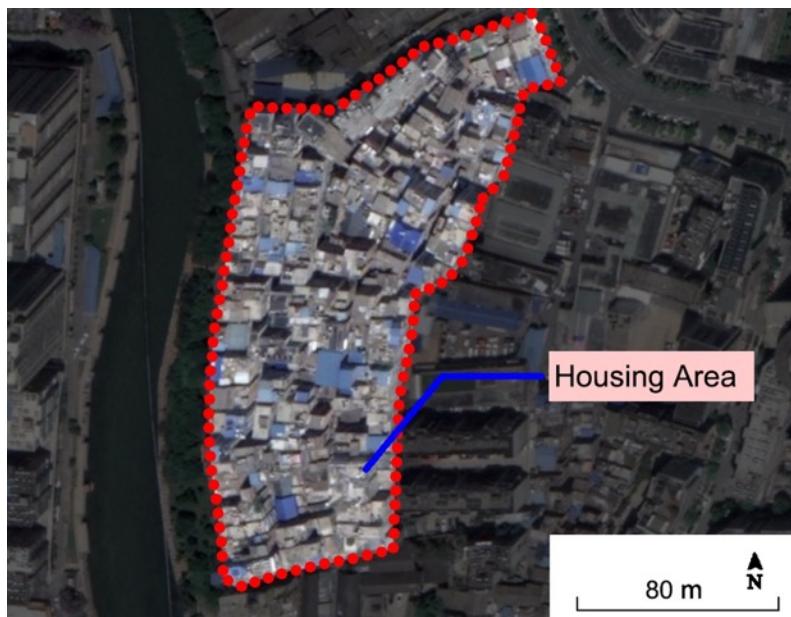


Figure 5.4. Satellite Map of Beihegeng Village

(Map captured from Google Earth, 2017)

Background:

Beihegeng Village belongs to the Gulou Community, Panlong District, and it is one of the fully-acquired VICs within the First Ring Road (see Figures 5.2 & 5.4). It is located near the main river of Kunming, Panlong River, and it is one of the oldest districts in the area. Basic information of Beihegeng village can be found in Table 5.1. Among the residents, 95% are temporary migrants who moved to Kunming from other towns and cities in Yunnan Province or other provinces (PLKM, 2016a).

Table 5.1. Basic Information of Beihegeng Village

(Data retrieved from PLKM, 2016a)

Total Area (ha)	Housing Area (ha)	Number of Buildings	Floor Area Ratio	Number of Residents
1.74	1.74	252	4.28	6048

This VIC is a low-income community and the monthly average household income is less than CNY ¥3,000 (AUD\$600). Some of the residents are unemployed and currently receive low-income allowances from the Kunming Municipal Government at the rate of CNY ¥ 530

(AUD\$106) per month. The average education level in Beihegeng Village is secondary school level (PLKM, 2016a).



Figure 5.5. Street View and Building Style of Beihegeng Village

(Source: Author, 2017)

There are approximately 252 brick buildings in Beihegeng Village, with most buildings being 3-5 storeys in height. For some buildings, the ground floor provides commercial functions including grocery stores, laundry facilities, and restaurants. In this low-income community, a large proportion of the exterior walls of buildings retain the original brick colour without any decorations. Only a small part of the exterior walls is painted or tiled (see Figure 5.5). Within this VIC, there are no specific public open spaces, such as public parks or piazzas for general residents. The alleyways range from 1.5m to 4m in width and comprise the interior road system and public domain for this VIC. Commencing in February of 2017, the Kunming Municipal Government issued a tender notice for the redevelopment of Beihegeng Village on its official website (PLKM, 2017). The tender notice indicated the proposed development aimed to upgrade the living conditions in Beihegeng Village and the surrounding areas, including improving the sanitation facilities and enhancing the fire protection system.

Expressions of UA:

In Beihegeng Village, there were 23 UA practices in both public and private spaces (see Figure 5.6), with a density of 13.2 practices per hectare.



Figure 5.6. Distribution of UA Practices in Beihegeng Village

During the investigation, 25 people were randomly chosen as household and community committee representatives to complete the questionnaires and semi-structured interviews (see Table 5.2). According to the results of the questionnaires and interviews, 32% of the participants had experience undertaking UA practices, while the remaining 68% reported having no UA experience.

Table 5.2. Mix of Questionnaires and Interviews Collected in Beihegeng Village

	Questionnaires	Semi-structure Interviews
Households	15	4
Community committee	5	1

*'Community committee' refers to an autonomous resident-run organisation that manages the variety of affairs related to local residents.
*The participants of questionnaires and interviews are different people.

When respondents were asked about their reasons for participating in UA practices, the dominant answer was their pre-existing agricultural background (63%) (see Figure 5.7). Some of the participants had engaged in agricultural production before migrating to

Kunming. The UA practices performed helped these residents to create a ‘sense of belonging’ when living in the city far removed from their original homes, whether from the other villages or cities. Approximately 25% of participants indicated that UA was performed as an effective way of reducing personal living expenses.

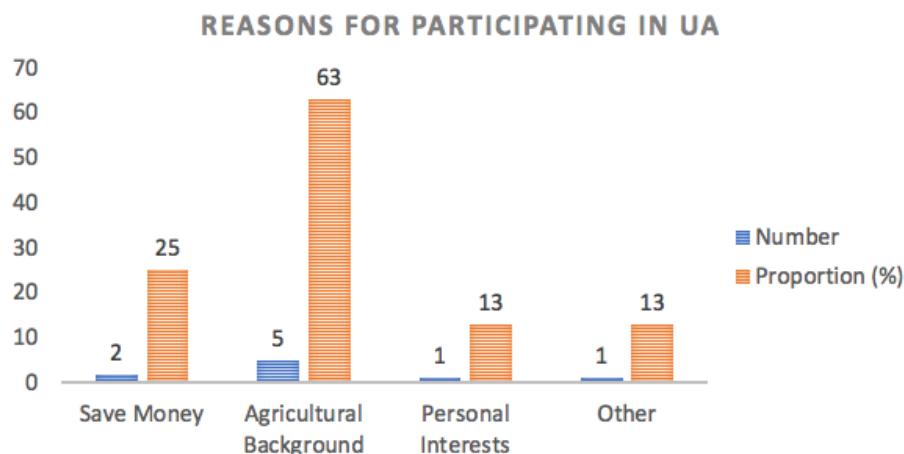


Figure 5.7. Primary Reasons for Participating in UA in Beihegeng Village

Among the participants, the dominant reason for not participating in UA was space restrictions (41%) (see Figure 5.8). For the participants who rent rooms from the landlords in Beihegeng Village, there was not enough space for them to carry out UA practices. A “typical” size of a room for rent in Beihegeng could be in the range of 10-15m². Some participants (18%) were migrant workers with heavy workloads and expressed they did not have enough time devote to maintaining plants. Furthermore, there were about 18% of participants who indicated they were not interested in UA planting or any activities related to UA.

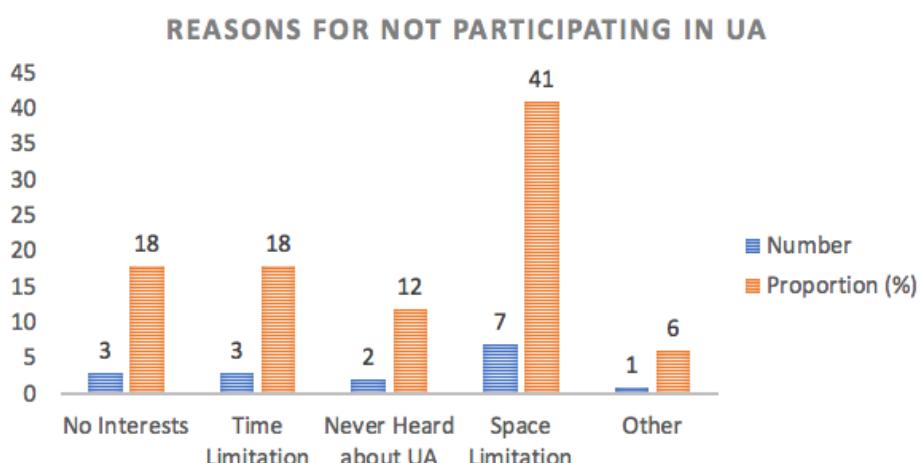


Figure 5.8. Primary Reasons for not Participating in UA in Beihegeng Village

Function:

The functional preferences were collected from questionnaires and semi-structured interviews. The results showed that all participants tended to undertake UA practices for their household consumption, noting that all eight participants held the same response that space was limited both indoors and outdoors in this VIC (see Figure 5.9). In this situation, the participants could only harvest a small amount of produce every week; their daily household consumption still needs to be supplemented by market purchases.

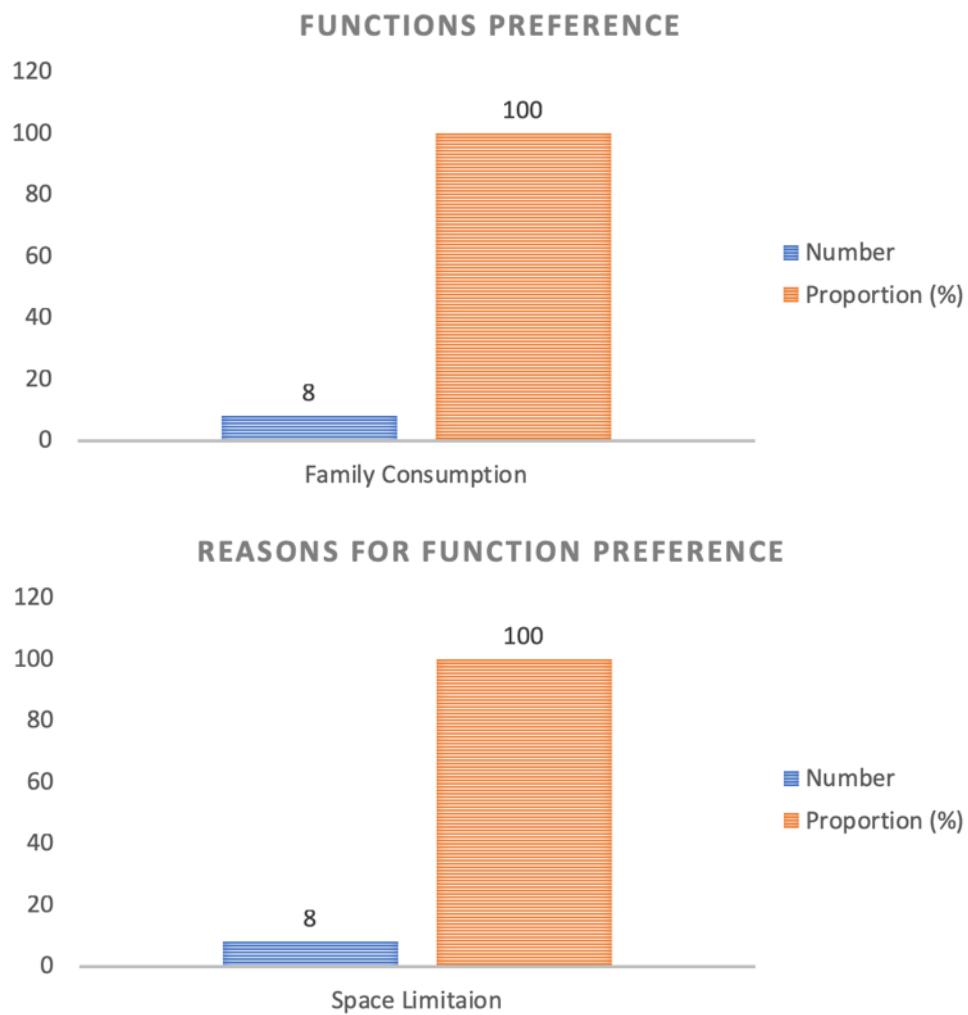


Figure 5.9. Functions Preferences of UA in Beihegeng Village

Space Type:

The space type preferences were collected from observation, questionnaires, and semi-structured interviews. Further data regarding the reasons of space selection were collected from the eight participants who had experience in UA. Participants were permitted to choose more than one reason in their questionnaire and interview responses. UA practices can be found in both the private and public domain in Beihegeng Village (see Figures 5.10 & 5.11). As shown in Figure 5.12, 78% of UA practices emerge in the private space, where residents usually chose their rooftop (48%), windowsill (17%), and balcony (13%) to undertake UA practices. Containers were put on the rooftops to maximise access to sunlight and collect rainwater to irrigate the plants. Some 22% of UA practices were found in the public domain, the sidewalks and alleyways between buildings being the dominant space type preferred by the participants.



Figure 5.10. UA Practices in Beihegeng Village- Private Space

(Source: Author, 2017)



Figure 5.11. UA Practices in Beihegeng Village- Public Domain

(Source: Author, 2017)

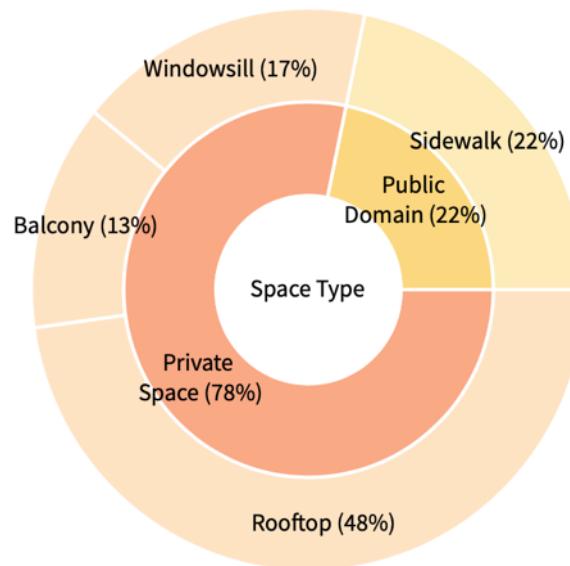


Figure 5.12. Space Type Preference of UA in Beihegeng Village

According to the eight participants who have UA experience in Beihegeng Village (see Figure 5.13), the dominant factor considered when selecting space for UA practices was whether the location had access to sunlight (63%). Since sunlight is one of the necessary requirements for sustaining plant life, many north-facing windowsills and balconies are appropriate for placing planting containers.

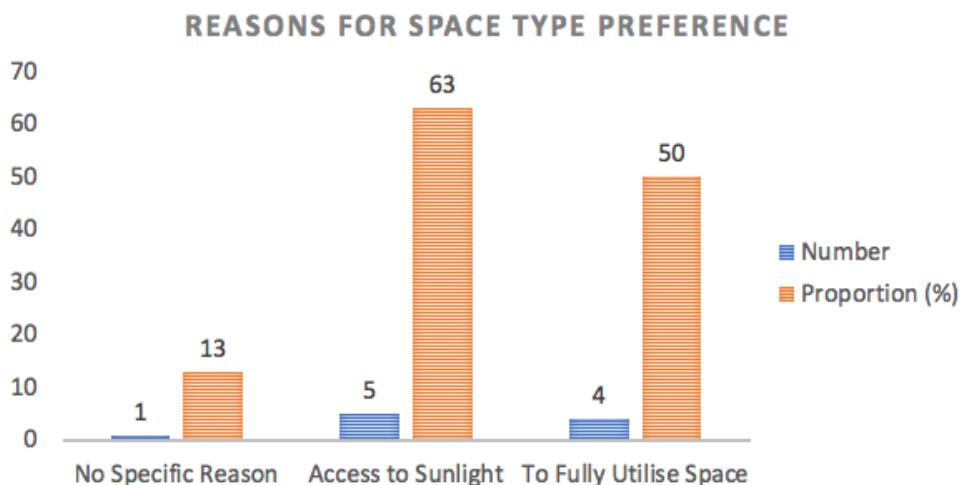


Figure 5.13. Reasons for Space preferences of UA in Beihegeng Village

Physical Form:

As shown in Figures 5.14 & 5.15, the dominant geometric shapes of the practices from the plan view were rectangle/square (53%) and circle/ellipse (47%). The conventional containers used were recycled containers (59%) and gardening-specific containers (37%). Both types of containers were mass production containers with regular shapes. The recycled containers included foam boxes (31%) previously used to store vegetables or seafood, plastic boxes (14%) used to bottles, and metal buckets (14%) used for paint oil. The gardening-specific containers included purchased clay and plastic flowerpots. Spices (61%), including shallots (31%), mint (16%), and coriander (14%) were the favourite species grown by participants. The participants chose to use movable containers to grow spice plants, as they are compact and do not require large containers. The remaining 39% of the UA practices in Beihegeng Village were for growing vegetables, predominantly Bok choy.

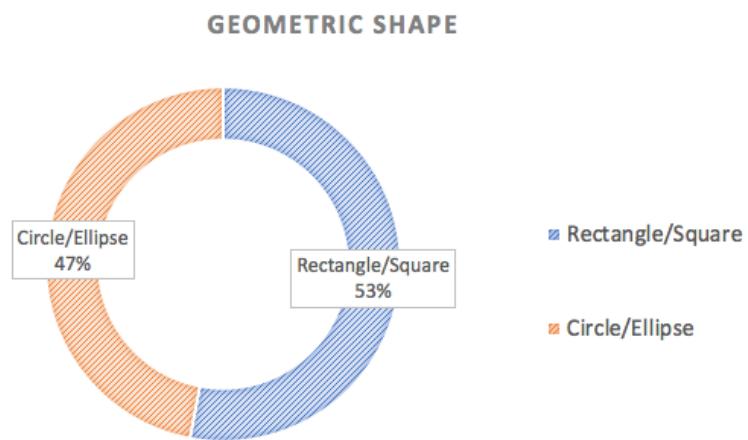


Figure 5.14. Physical Form of UA in Beihegeng Village

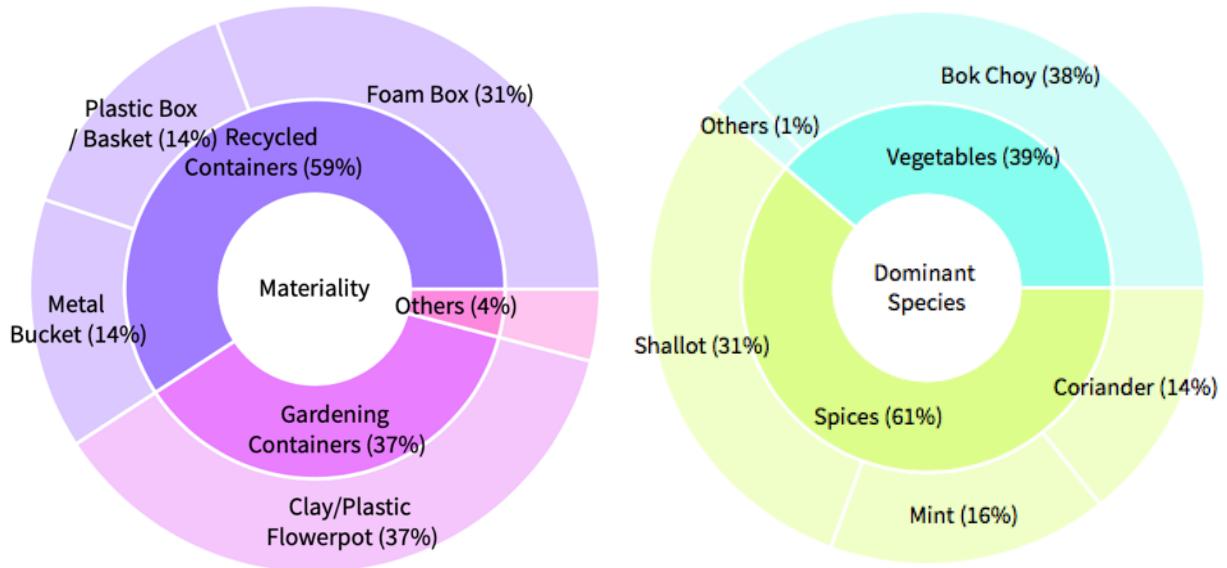


Figure 5.15. Physical Form of UA in Beihegeng Village

Rules and Regulations:

As Beihegeng Village is an old residential area and a fully-acquired VIC, there are no strict rules and regulations for UA activities. According to the interviews, the local community accepted UA practices in the public domain, provided that they do not destroy public facilities or cause connectivity and access issues for local transport. In private spaces, the residents did not have any specific rules for UA practices in relation to cultivation techniques or the dominant species planted. All these informal UA practices remained unregulated by formal community governance.

5.3 Urban Agricultural Practices within the Second Ring Road

Completed in 2009, the Second Ring Road performs a crucial role in providing important connectivity between urban areas of Kunming. The total length of the Second Ring Road is 27.1km, and it is a double-layer road (see Figures 5.16 & 5.17). Within the Second Ring Road, there are two development types of VICs -the fully-acquired and partially-acquired VIC. By May 2017, there were 25 fully-acquired VICs and 12 partially-acquired VICs between the First Ring Road and Second Ring Road (XSKM, 2017).



Figure 5.16. Location of the Second Ring Road in Kunming

(Map captured from Google Earth, 2017)



Figure 5.17. Street View of the Second Ring Road in Kunming

(Source: Author, 2017)

5.3.1 Partially-acquired Village in the City- Xiaotun Village



Figure 5.18. The Satellite Map of Xiaotun Village

(Map captured from Google Earth, 2017)

Background:

Xiaotun Village belongs to the Puji community, Wuhua district and is located near the Second Ring Road of Kunming. It is now one of the partially-acquired VICs within the Second Ring Road (see Figure 5.18), with further information regarding Xiaotun Village included in Table 5.3. Among the residents, 57% of them are temporary residents who rent their properties; the remaining 43% of residents are owners and live in their own home(WHKM, 2016). The temporary residents migrated from other towns and cities of either Yunnan or other provinces. Residents in Xiaotun Village are average low-income to middle-income earners. The monthly average household income for this VIC is CNY ¥4,500 (AUD\$900). The average education level is secondary school level (WHKM, 2016).

Table 5.3. Basic Information of Xiaotun Village

(Data retrieved from WHKM, 2016)

Total Area (ha)	Housing Area (ha)	Cultivated Land (ha)	Number of Buildings	Floor Area Ratio	Number of Residents
1.74	1.74	2.04	488	1.39	14640



Figure 5.19. Street View and Building Style of Xiaotun Village

(Source: Author, 2017)

The buildings in Xiaotun Village are on average 4-7 storeys in height, constructed with bricks and decorated with white tiles (see Figure 5.19). A single household owns each building in this VIC, with the owner usually occupying the top floors of the buildings while the remainder are rented to temporary residents. Prior to 2002, there were 4.91 hectares of cultivated land in Xiaotun Village, double than that of today (WHKM, 2016). In order to accommodate the area's growing urban population, the development of Xiaotun Village caused more than half of the cultivated land to be transformed into housing sites. By 2016, only 2.04 hectares of cultivated land remain in Xiaotun Village, which 72 households have access to (WHKM, 2016).

Expressions of UA:

In Xiaotun Village, there was a total of 202 UA practices in both public and private spaces (see Figure 5.20), with a density of 12.82 practices per hectare.

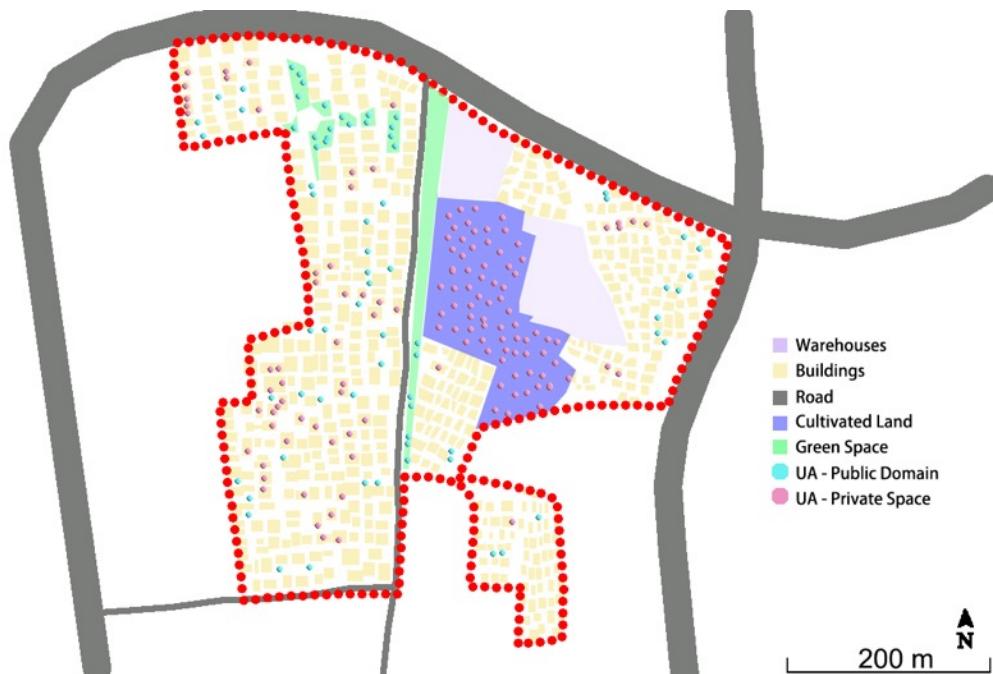


Figure 5.20. Distribution of UA Practices in Xiaotun Village

For this research, 25 people were randomly chosen in Xiaotun Village as household and community committee representatives to complete the questionnaires and semi-structured interviews. According to the results of the questionnaires and interviews, 56% of the participants had experience undertaking UA practices; the remaining 44% reported no UA experience. Of the 14 participants who reported undertaking UA practices, the main motivator for their activities was their prior connection to agricultural production (86%). Additionally, the households who still had access to cultivated land indicated their UA production was grown for profit (29%) (see Figure 5.21).

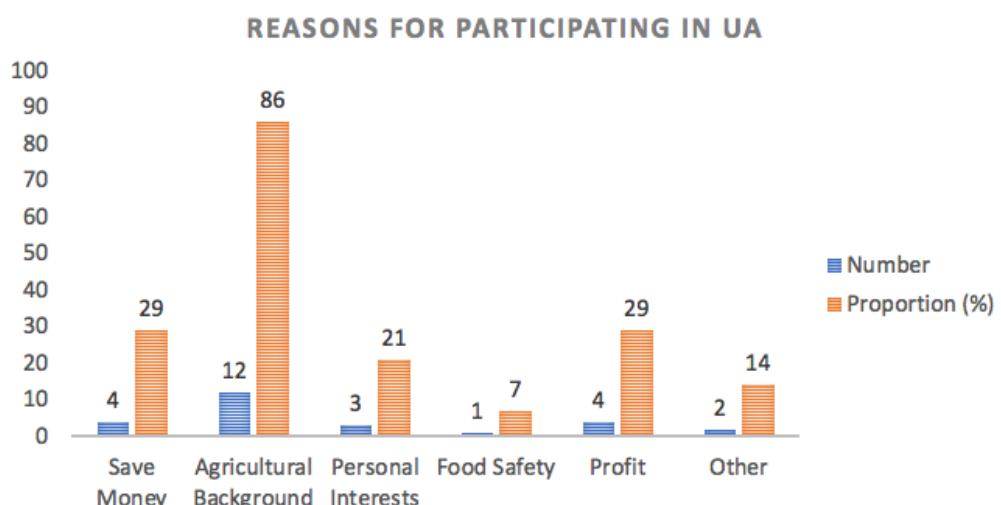


Figure 5.21. Reasons for Participating in UA in Xiaotun Village

In the questionnaires and interviews, the 11 participants who did not participate in UA activities were questioned further to confirm the reason for this choice. The primary response given was space limitation (56%) (see Figure 5.22).

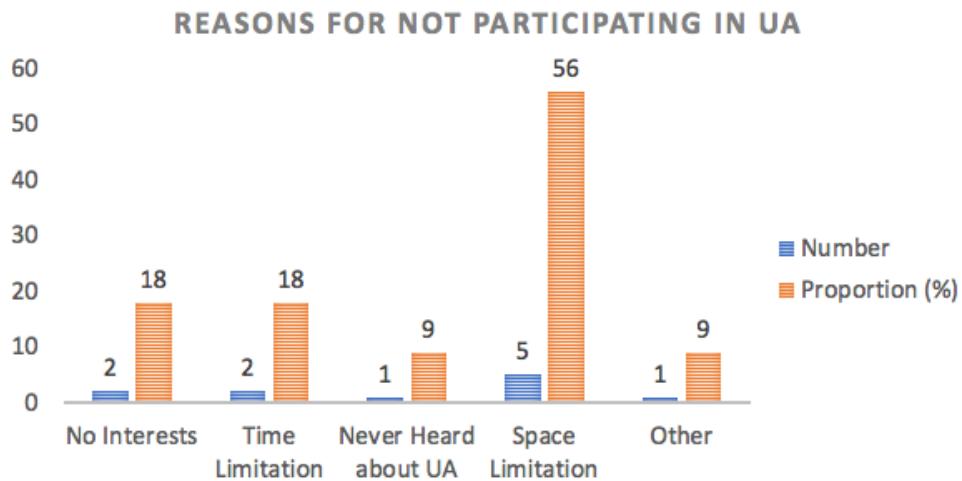


Figure 5.22. Reasons for not Participating in UA in Xiaotun Village

Function:

According to the investigation, all participants in Xiaotun village performed UA practices for their family consumption. Those participants who still had access to cultivated land (29%), produce was additionally grown to sell at the local market for profit in order to supplement their household income. On average, these households collected CNY ¥400-¥ 700 (AUD\$80-\$140) in produce sales per month. For those participants whose UA produce usage was limited to consumption within their households, the dominant reason for this restriction was space limitation (50%) (see Figure 5.23).

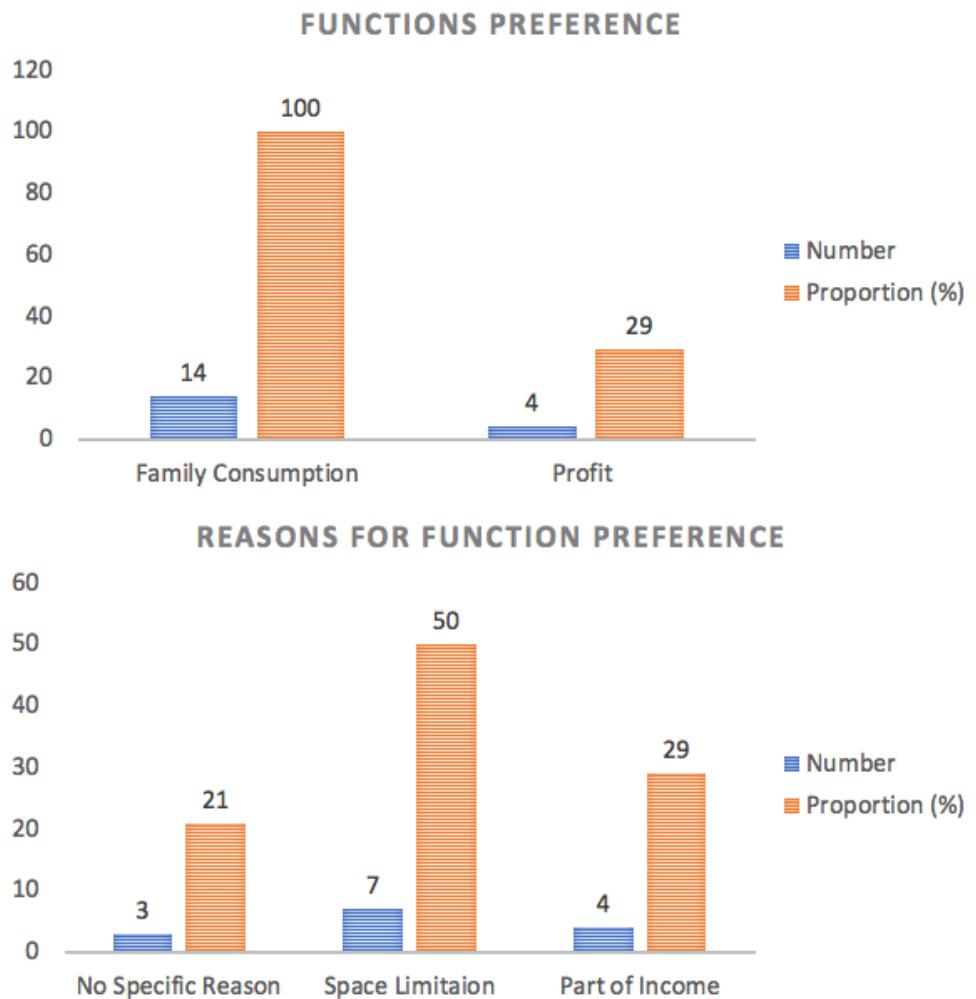


Figure 5.23. Function Preferences of UA in Xiaotun Village

Space Type:

UA practices were found in both private and public spaces in Xiaotun Village (see Figures 5.24 & 5.25). 65% of UA practices were found occurring in private spaces, and the remaining 35% was observed in the public domain. In private spaces, 36% of the practices existed in the cultivated land areas. The participants also used pots or boxes on their windowsills (17%). In the public domain, 22% of UA practices were observed on the sidewalks of the primary road, in small alleyways between buildings, and situated near building entrances (see Figure 5.26). Also, unlike the villages in Beihegeng, Xiaotun Village also had public green spaces, providing additional areas for households to utilise for UA planting.



Figure 5.24. UA Practices in Xiaotun Village- Private Space

(Source: Author, 2017)



Figure 5.25. UA Practices in Xiaotun Village- Public Domain

(Source: Author, 2017)

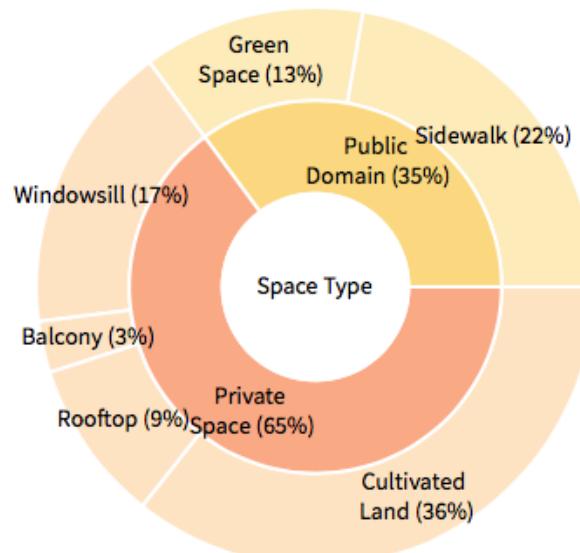


Figure 5.26. Space Type Preference of UA in Xiaotun Village

According to the 14 participants with UA experiences in Xiaotun Village, the primary reason considered when selecting spaces for UA practices was whether or not the location has access to sunlight (43%). 29% of the participants who had undertaken UA practices in their private space reported their reasoning was to utilise access to existing cultivated land (see Figure 5.27).

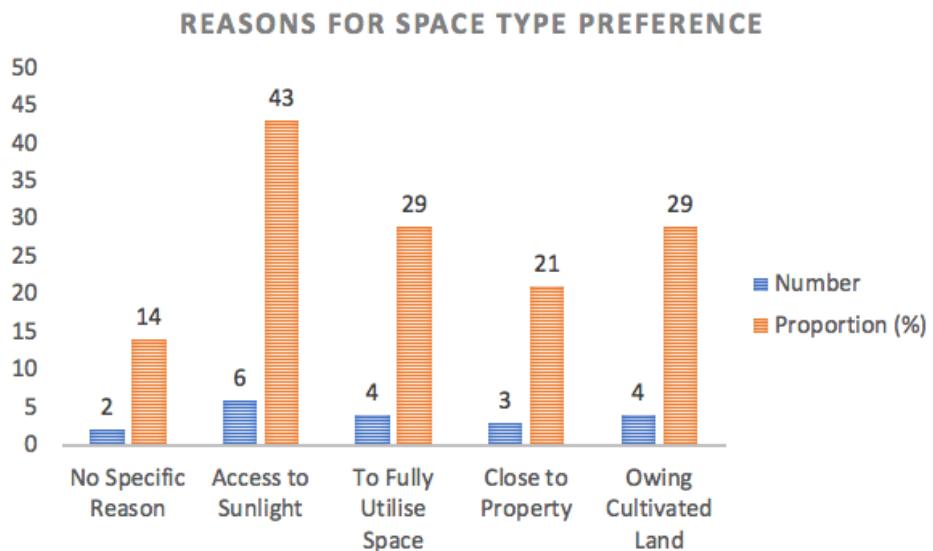


Figure 5.27. Reasons for Space type Preferences for UA in Xiaotun Village

Physical Form:

The dominant geometric shapes of UA practices from the plan view included rectangle/square (43%), circle/ellipse (30%), and curved (27%). For the residents who did not have access to the cultivated land spaces, movable containers were used to grow produce, including recycled containers (40%) and gardening-specific containers (28%), as well as planting produce directly into the ground (31%). The recycled containers were collected from daily life, such as foam boxes (32%), plastic boxes (4%), and metal buckets (4%). The gardening-specific containers included both clay and plastic flowerpots. When growing directly on the ground, the boundaries were determined by the edges of the green space, pathways in the cultivated land, or the fencing. Vegetables (58%), in particular bok choy (44%), and spices (41%), including shallots (33%) were the two most popular species types grown by local households (see Figure 5.28).

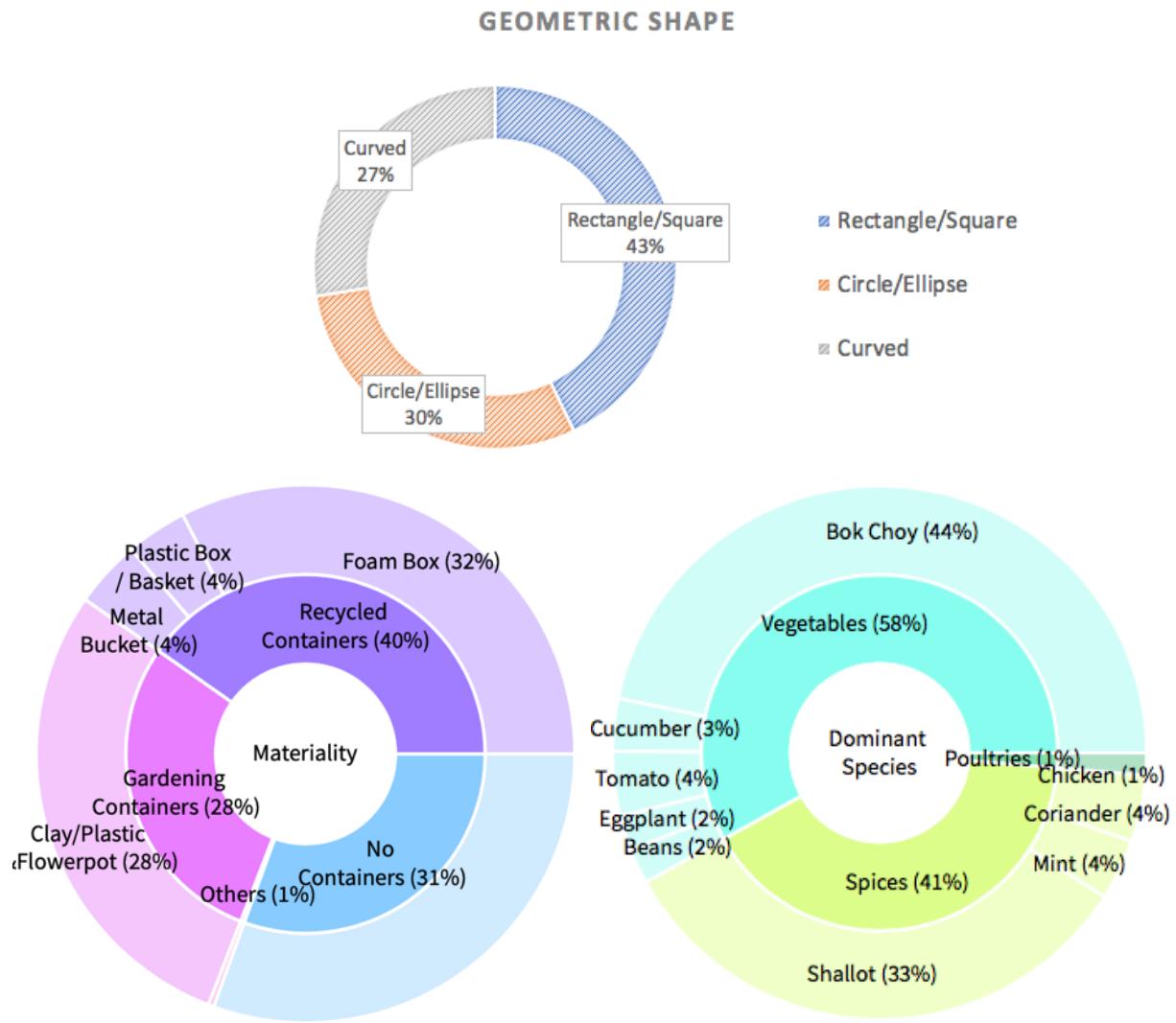


Figure 5.28. Physical Form of UA in Xiaotun Village

Rules and Regulations

There are no strict rules and regulations regarding UA behaviour. The local community considered that UA practices in public domain were acceptable as long as public facilities remain intact and unaffected. In private spaces especially in housing areas, the residents were not required to adhere to specific cultivation techniques or species selection for their UA practices. As the cultivated land in Xiaotun Village is connected to private space, the central government policies regarding cultivated land protection were applicable (PRC, 2004). These policies aim to ensure the function of cultivated land is restricted to growing crops; the law prohibits and construction work to take place there.

5.4 Urban Agricultural Practices within the Third Ring Road

The Third Ring Road in Kunming consists of the north-western Third Ring Road, southern Third Ring Road, and eastern Third Ring Road (see Figures 5.29 & 5.30). The total length of Third Ring Road is 45.94 km. By the end of 2010, all construction work for the Third Ring Road was finished. As of mid-2017, there were 29 fully-acquired VICs, 25 partially-acquired VICs, and 17 developing VICs between the Second Ring Road and the Third Ring Road (XSKM, 2017).

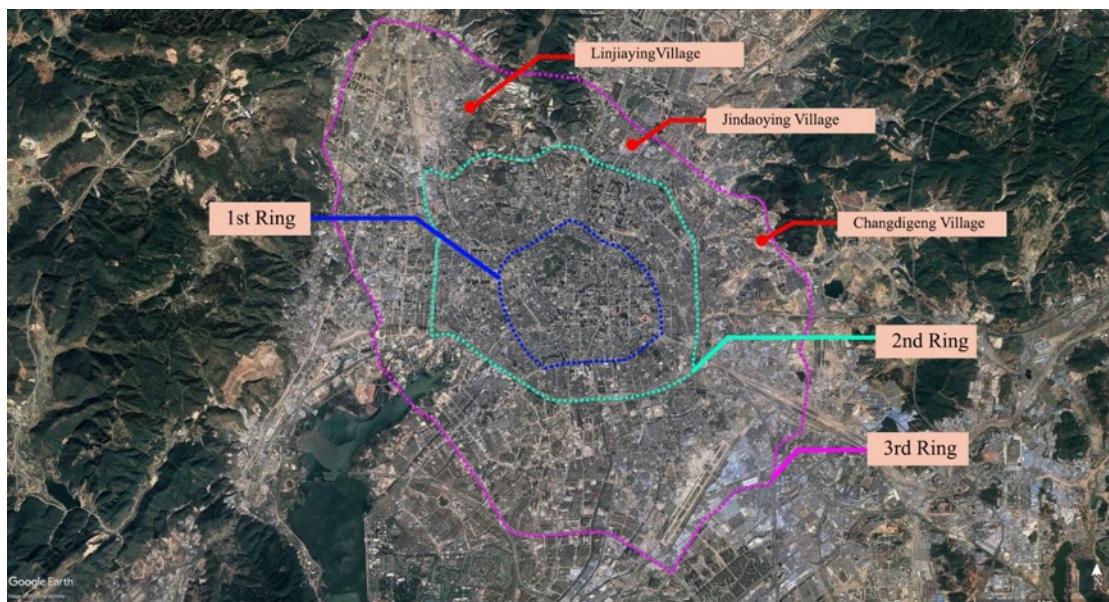


Figure 5.29. Location of the Third Ring Road in Kunming

(Map captured from Google Earth, 2017)



Figure 5.30. Street View of the Third Ring in Kunming

(Source: Author, 2017)

5.4.1 Developing Village in the City- Linjiayuan Village

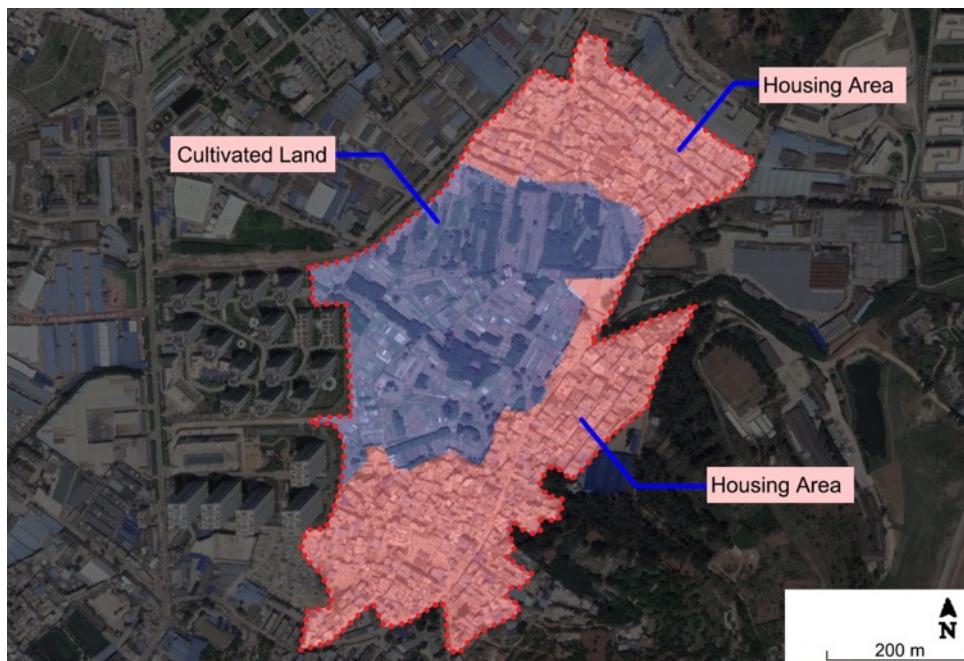


Figure 5.31. The Satellite Map of Linjiayuan Village

(Map captured from Google Earth, 2017)

Background:

Linjiayuan Village belongs to the Puji community, Wuhua district and is located between the Second Ring Road and Third Ring Road. It is now a developing VIC in Kunming (see Figure 5.31). Basic information regarding Linjiayuan Village can be found in Table 5.4. Among the residents, 50% are permanent home owners and the remaining 50% are temporary tenants (WHKM, 2016). The residents in Linjiayuan Village are average middle-income earners, with the monthly average household income in this VIC being CNY ¥5,500 (AUD\$1,100). The average education of residents is secondary school level (WHKM, 2016).

Table 5.4. Basic Information of Linjiayuan Village

(Data retrieved from WHKM, 2016)

Total Area (ha)	Housing Area (ha)	Cultivated Land (ha)	Number of Buildings	Floor Area Ratio	Number of Residents
31.3	15.59	15.71	634	1.3	12680

The housing site of Linjiayuan Village has been divided into northern and southern parts by the cultivated land in the centre. There are 634 buildings with an average of 3-4 storeys in

height in this VIC. The buildings are decorated by white tiles (see Figure 5.32). Compared to other VICs in Kunming, Linjiayuan Village has relatively low building density and the floor area ratio is 1.3. As a developing VIC, Linjiayuan Village has 15.71 hectares of cultivated land attached to housing sites as of 2016 (WHKM, 2016).

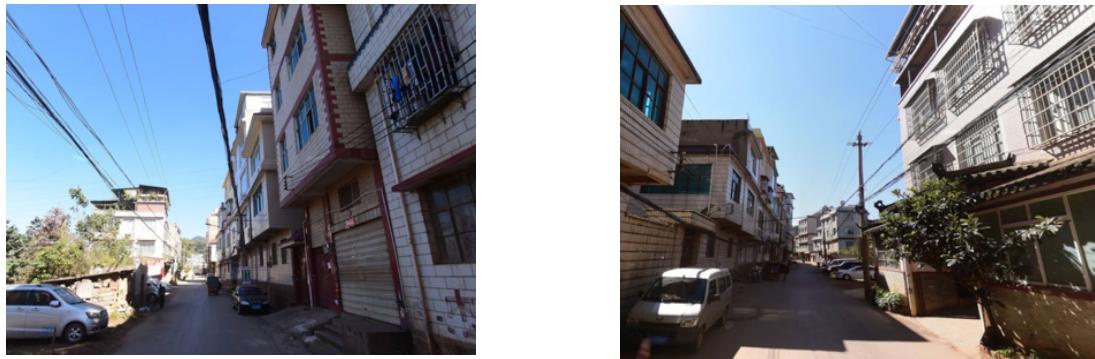


Figure 5.32. Street View and Building Style of Linjiayuan Village

(Source: Author, 2017)

Expressions of UA:

In Linjiayuan Village, there were 213 UA practices in both public and private spaces (see Figure 5.33), with a density of 13.66 practices per hectare.

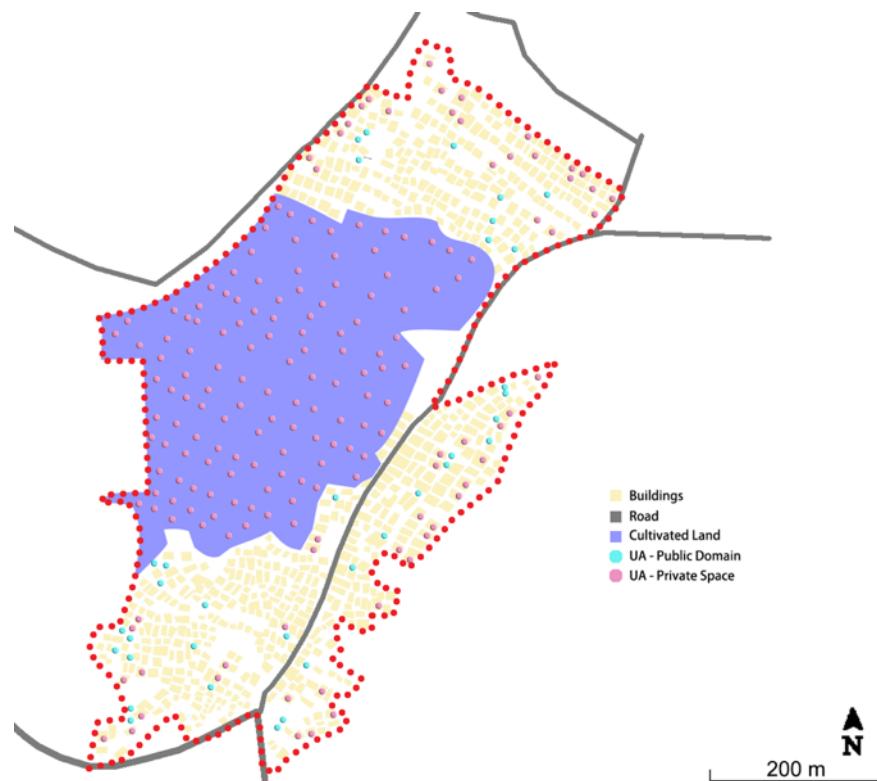


Figure 5.33. Distribution of UA Practices in Linjiayuan Village

During the investigation, 25 people were randomly chosen as household and community committee representatives in order to complete the questionnaires or semi-structured interviews. According to the results of the questionnaires and interviews, 88% of the participants had experience undertaking UA practices; the remaining 12% reported having no UA experience.

For the participants, the dominant reason provided for participating in UA practices in Linjiayuan Village was in relation to their previous background in agriculture (68%) (see Figure 5.34). 45% of households reported undertaking UA practices with the intention of profiting from subsequent produce sales. For respondents who did not undertake UA practices in this VIC, the main reason cited was due to space limitation (67%). Linjiayuan Village retains a large proportion of households which do not have the right to use the nearby cultivated land.

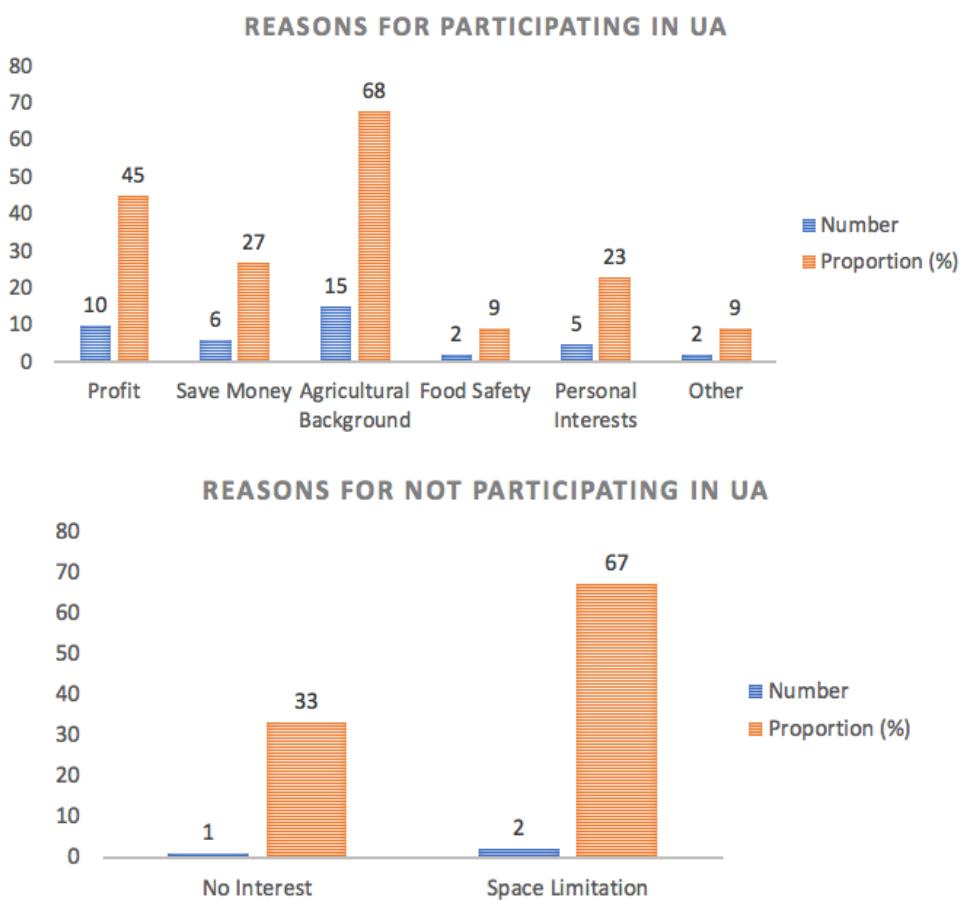


Figure 5.34. Reasons for Participating or not Participating in UA in Linjiayuan Village

Function:

According to the results of questionnaires and interviews, all participants preferred using their UA produce in their households. 45% of the participants also reported undertaking UA practices for profit in addition to their use for family consumption. 45% of the participants reported undertaking UA practices for profit to supplement their household income, in addition to using produce for family consumption. However, space limitation was the dominant reason provided by 41% of the households who did not undertake UA practices for profit (see Figure 5.35).

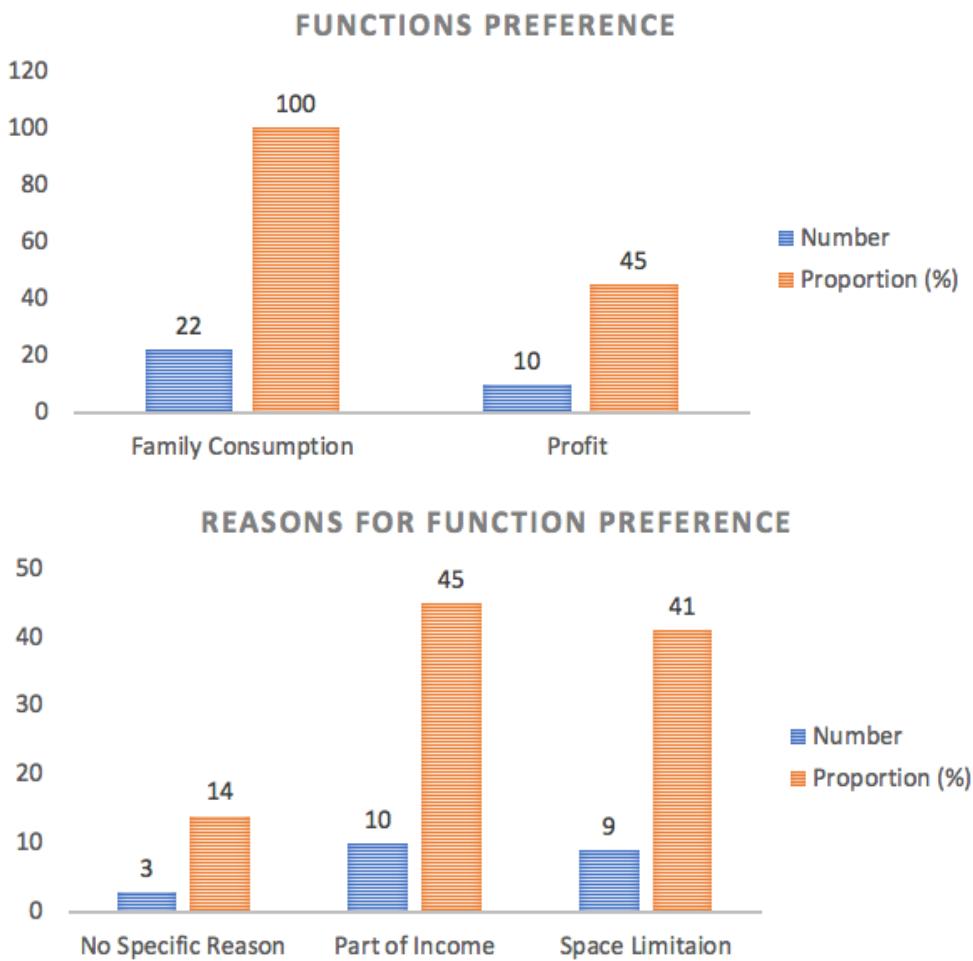


Figure 5.35. The Functions of UA and Reasons in Linjiayuan Village

Space Type:

When choosing the space for undertaking UA practices, the dominant space used by residents was private space (84%) and the public domain (16%) (see Figures 5.36 & 5.37). In private spaces, the households preferred planting in the cultivated land (57%), on windowsills (16%), and rooftops (10%). The primary reason provided by participants on selecting the above spaces was that the households owned the cultivated land (45%), providing better soil quality and increased space for plants. Also, for some of the households, their planting behaviour was explained as their desire to fully utilise the space available for UA practices (36%). In other words, for the households who own the cultivated land, respondents saw no reason to leave the land vacant if it could be used for growing edible plants. In the public domain, UA practices were observed along the sidewalks or alleyways between the buildings (16%) (see Figure 5.38).



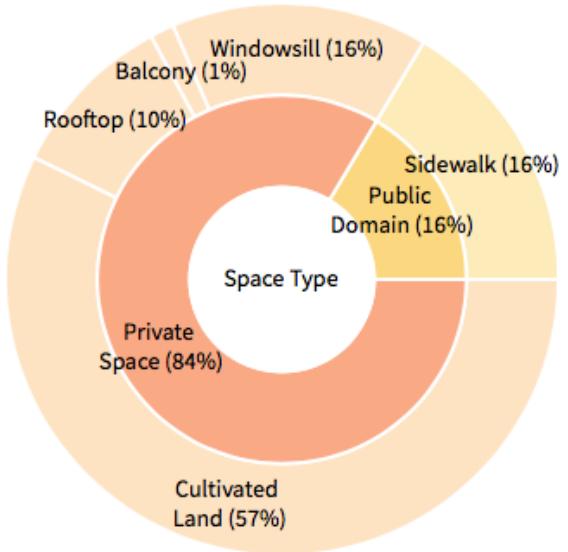
Figure 5.36. UA Practices in Linjiayuan Village- Private Space

(Source: Author, 2017)



Figure 5.37. UA Practices in Linjiayuan Village - Public Domain

(Source: Author, 2017)



REASONS FOR SPACE TYPE PREFERENCE

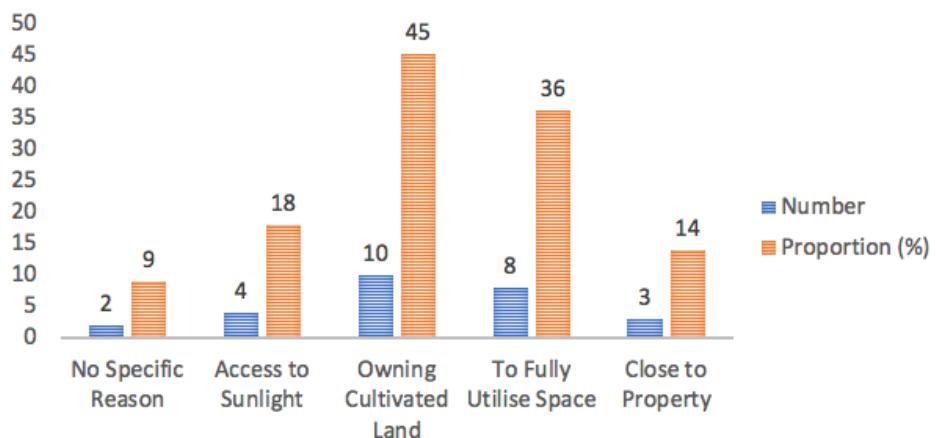


Figure 5.38. The Space Type Preference and Reasons of UA in Linjiayuan Village

Physical Form:

The geometric shape of the UA practices from the plan view included rectangle/square (48%) as the dominant shapes, followed by curved (28%), and circle/ellipse (24%). The majority of households of Linjiayuan Village preferred growing UA plants directly in the soil of cultivated land (41%). Followed by that, recycled containers (31%), including foam boxes (25%), were also a popular choice. With access to a larger area of cultivated land compared to fully-acquired VICs, the households in Linjiayuan Village were able to grow diverse and large-size UA plants, mainly vegetables (65%) such as bok choy (54%), as well as spices (33%) (see Figure 5.39).

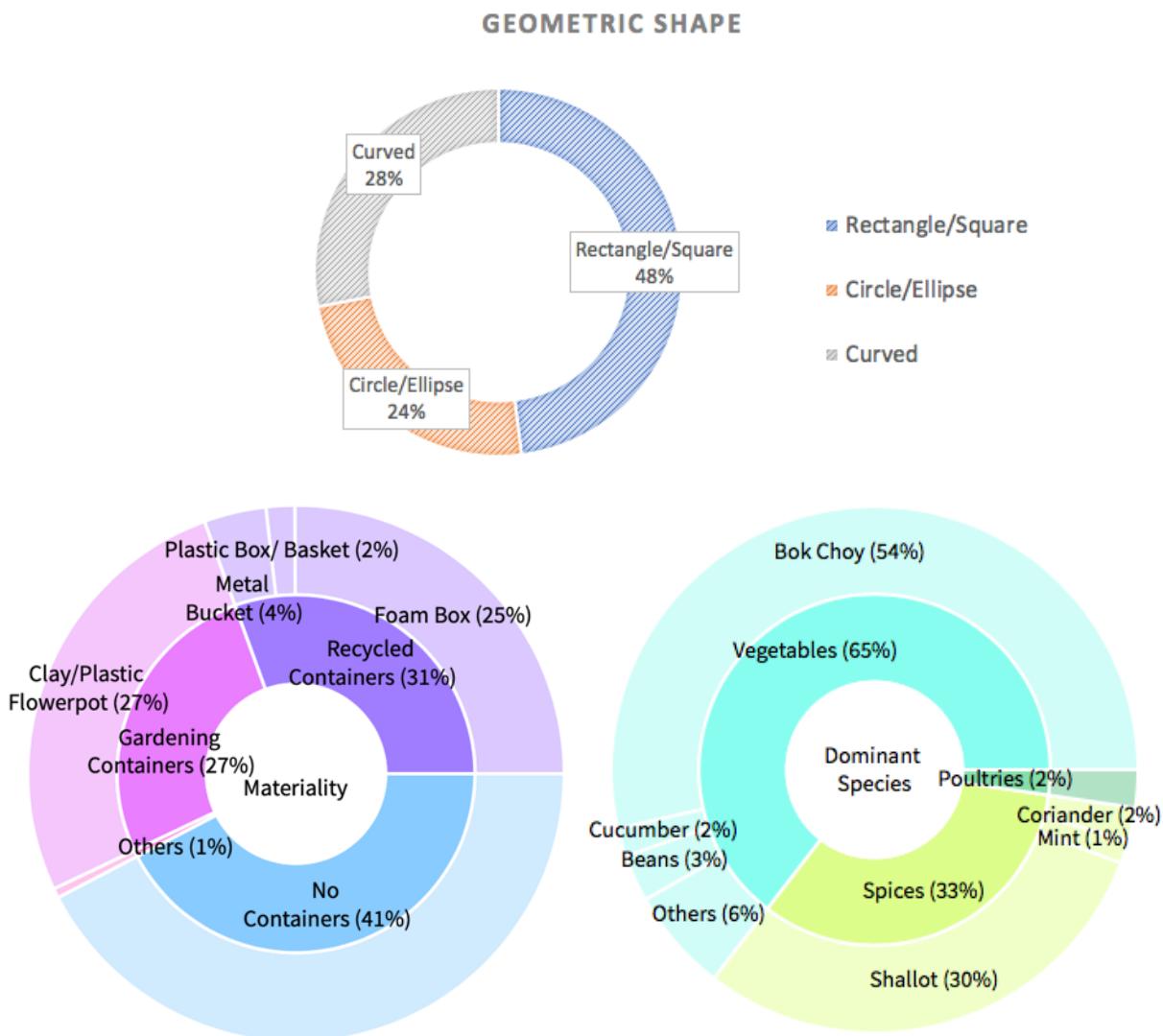


Figure 5.39. Physical Form of UA in Linjiayuan Village

Rules and Regulations

Similar to the above villages, there were no strict rules and regulations regarding UA behaviours identified. The local community accepted UA practices in public domain with the expectation that public facilities were not to be adversely affected. In private spaces, especially in the housing areas, the residents did not have any specific rules for UA practices regarding cultivation techniques and species selection. As the cultivated land belongs to private spaces, the central government has policies to ensure land use is for crop production only (PRC, 2004). Any construction work undertaken in cultivated land is against the law.

5.5 Urban Agricultural Practices Outside the Third Ring Road

The areas outside the Third Ring Road is the peri-urban area of Kunming (see Figure 5.40). In the peri-urban area, there are 28 fully-acquired VICs, 43 partially-acquired VICs, and 51 developing VICs. The housing space and public domain areas in these VICs are larger than those VICs situated in inner rings. Additionally, a new UA type emerged in these areas.

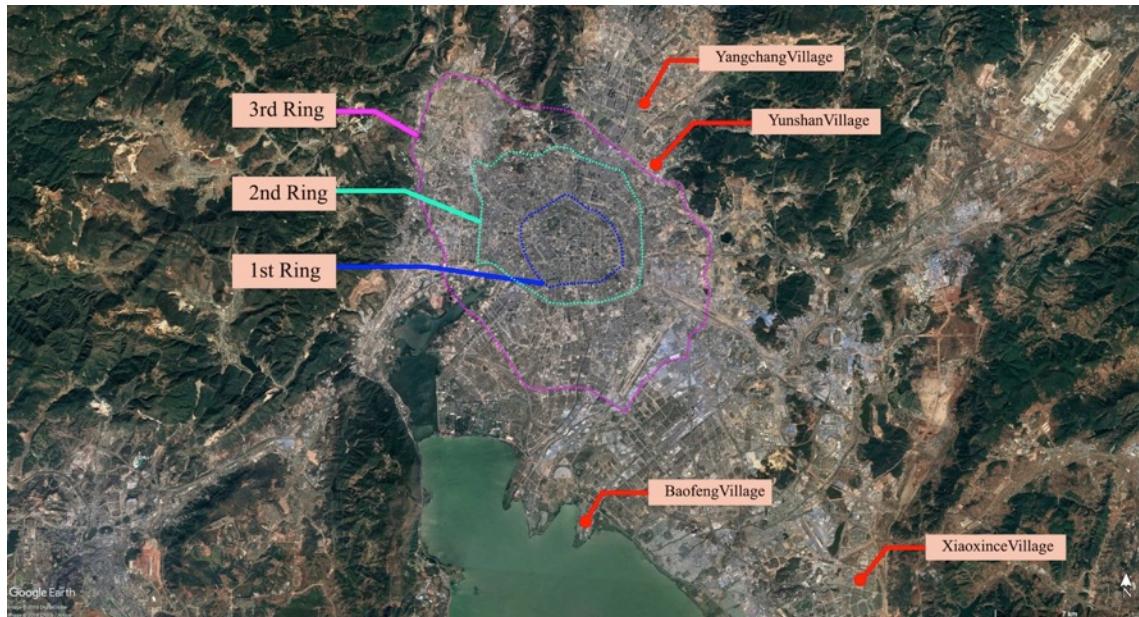


Figure 5.40. Location of the Peri-urban Areas outside the Third Ring Road in Kunming

(Map captured from Google Earth, 2017)

5.5.1 Fully-acquired Village in the City- Yunshan Village

Background:

Yunshan Village belongs to the Qinglong community, in the Panlong district. It is one of the fully-acquired VICs outside the Third Ring Road in Kunming. Basic information related to Yunshan Village can be found in Table 5.5.

Table 5.5. Basic Information of Yunshan Village

(Data retrieved from PLKM, 2016a)

Total Area (ha)	Housing Area (ha)	Warehouse	Number of Buildings	Floor Area Ratio	Number of Residents
16.85	14.71	2.14	486	1.24	12150

The population in Yunshan Village is around 12150 persons; 10% of whom are permanent residents and the remaining 90% being temporary residents. Permanent residents are the owners of each building; they rent their spare rooms to those who have migrated from other towns and cities in either Yunnan or other provinces. The residents here are low-income to middle-income level earners, and the monthly average household income is around CNY ¥4,000 (AUD \$800). The average education of residents is secondary school level.

At the end of 1999, there were 4.95 hectares of cultivated land in the southwest area of Yunshan Village. Starting from 2002, the cultivated land was developed by the Yunshan Village collective, transferring it into housing areas in order to accommodate more residents (see Figure 5.41).

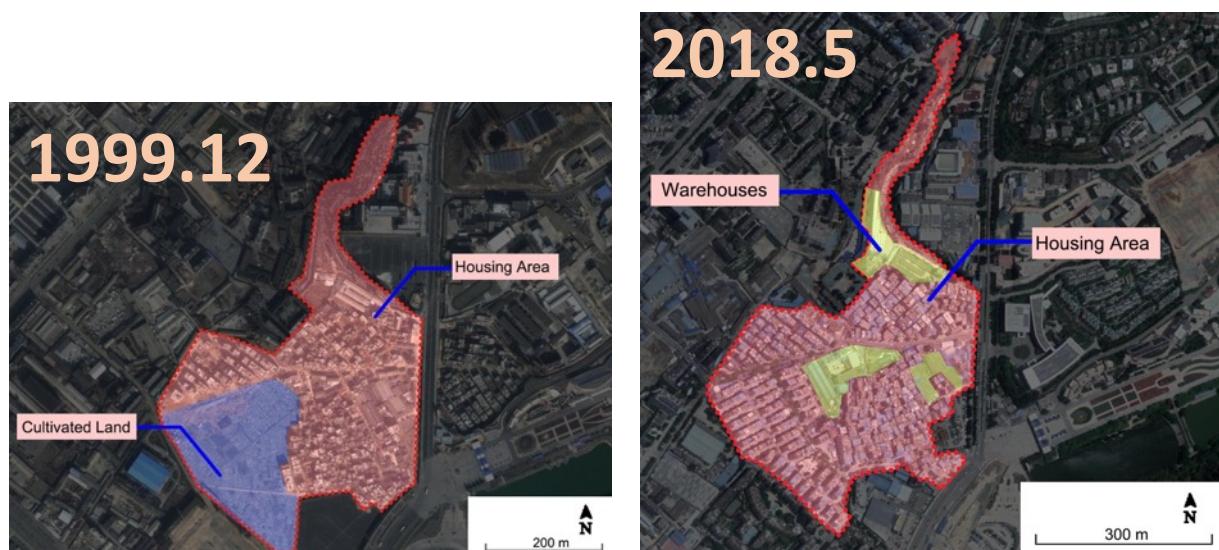


Figure 5.41. Satellite Map of Yunshan Village

(Map captured from Google Earth, 2017)

In Yunshan Village, the buildings are 4-7 storeys in height and the exterior walls were decorated by tiles (see Figure 5.42). Compared with the eastern part, the buildings in the southwestern part of Yunshan Village are distributed in the linear grid. The building density in southwestern part is lower than the rest of this VIC. Also, there are several green spaces in southwestern area and located between the buildings.



Figure 5.42. Street View and Building Style of Yunshan Village

(Source: Author, 2017)

Expressions of UA:

In Yunshan Village, there were 99 UA practices identified in both public and private spaces (see Figure 5.43), with a density of 6.73 practices per hectare. A large proportion of UA practices were located in an unused vacant plot located in the northern section of Yunshan Village.



Figure 5.43. Distribution of UA Practices in Yunshan Village

During the investigation, 25 people were randomly chosen as household and community committee representatives to complete the questionnaires or semi-structured interviews. According to the results of the questionnaires and interviews, 52% of the participants had experience in undertaking UA practices, while the remaining 48% reported having no UA experience. The 13 participants of Yunshan Village who had experience in UA practices reported their primary motivation for participation was due to their previous agricultural background (77%) (see Figure 5.44). Prior the transformation of cultivated land into housing sites, these households accessed that land for crop cultivation. After the cultivated land was no longer available, the demand and interest in continuing to grow their own food persisted among the households. Among the participants who did not undertake UA practices, the primary reason was limited space (58%). 90% of the population in this VIC are temporary residents who rent their rooms from building owners. The average living area of these rooms range from 15m² to 30m², minimising options for those who wish to pursue UA practices.

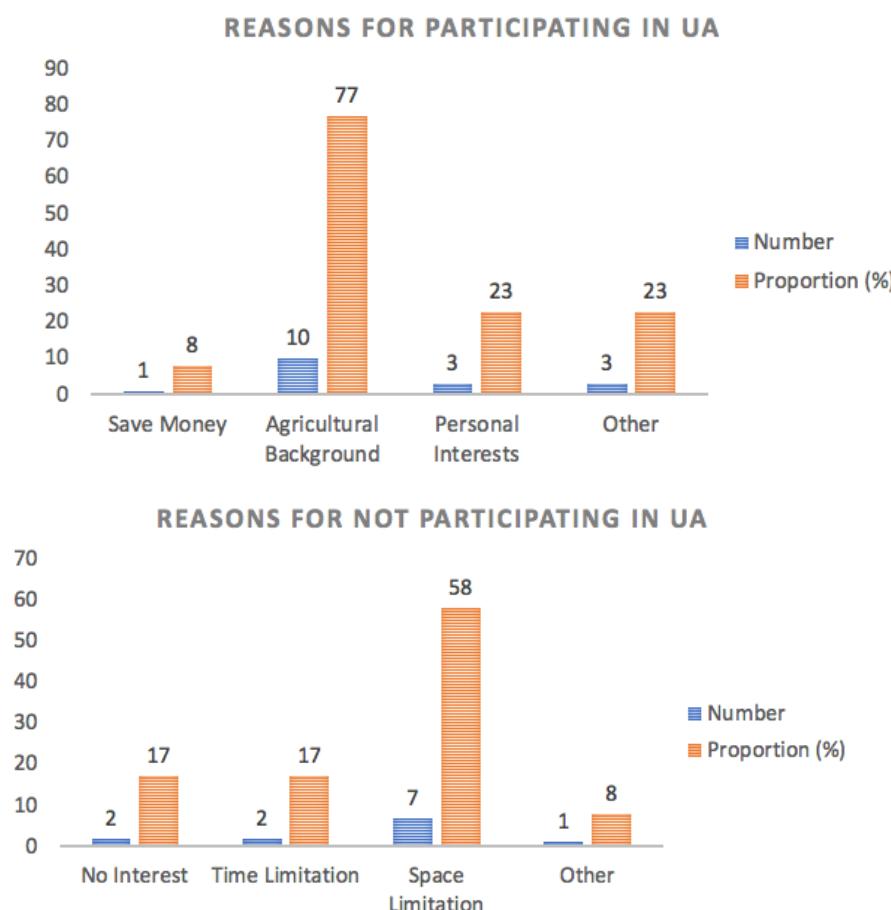


Figure 5.44. Reasons for Participating or not Participating in UA in Yunshan Village

Function:

Results of the interviews indicated that all households tended to undertake UA practices only for household consumption. The 13 participants with UA experience all responded that consumption was restricted to personal use because both indoor and outdoor space was limited in this VIC (see Figure 5.45). The small yield of produce each week was insufficient for daily demands, requiring participants to continue purchasing more from markets to meet their needs.

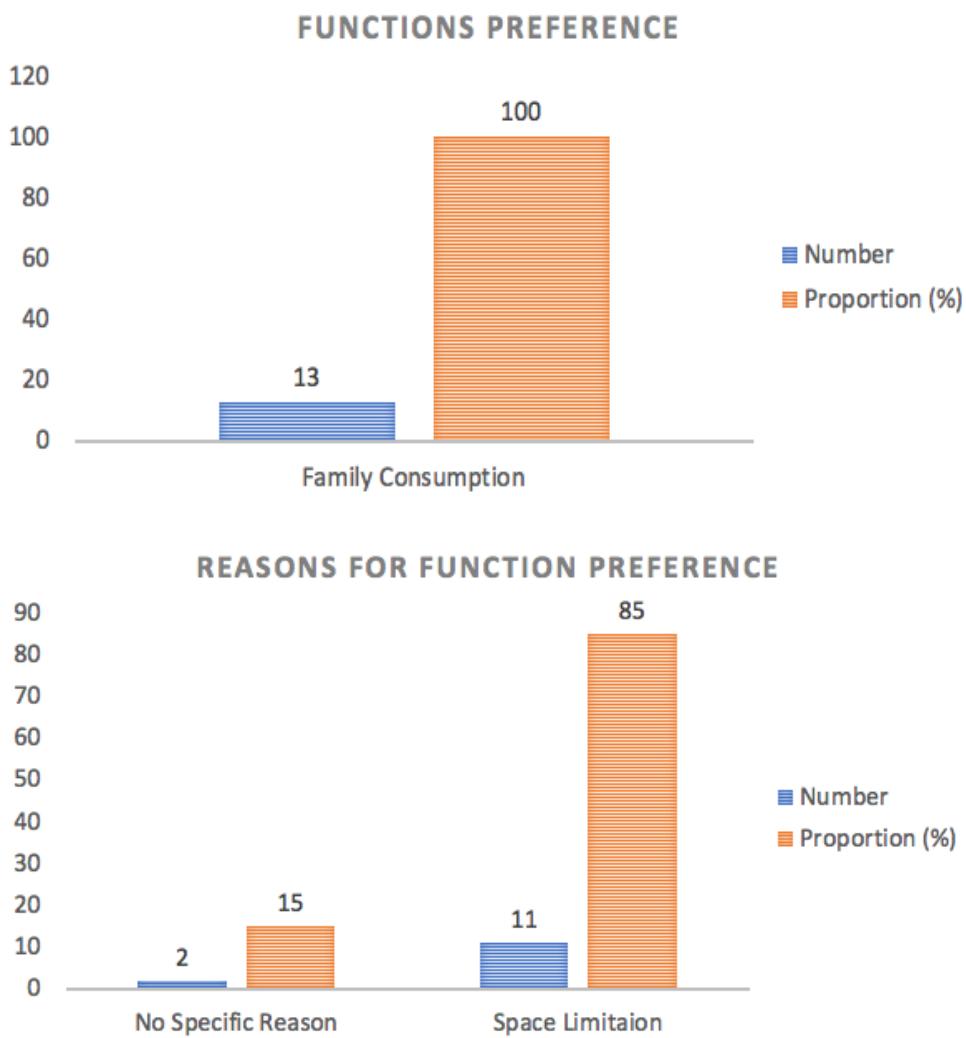


Figure 5.45. Function Preference of UA in Yunshan Village

Space Type:

UA practices were found in both private spaces and the public domain in Yunshan Village (see Figures 5.46 & 5.47). Unlike VICs discussed above, the households in Yunshan Village preferred undertaking UA practices in the public domain (73%) rather than in private spaces (27%) (see Figure 5.48). Public domain sites for UA practices included the vacant plot located in the northern section of the village and the green spaces in the southwestern housing. Households primarily utilised their windowsills (19%) to conduct UA practices in private spaces. Households primarily utilised their windowsills (19%) to conduct UA practices in private spaces. Proximity to their property (38%) was the major factor participants considered when selecting where to grow their UA plants.



Figure 5.46. UA Practices in Yunshan Village- Private Space

(Source: Author, 2017)



Figure 5.47. UA Practices in Yunshan Village- Public Domain

(Source: Author, 2017)

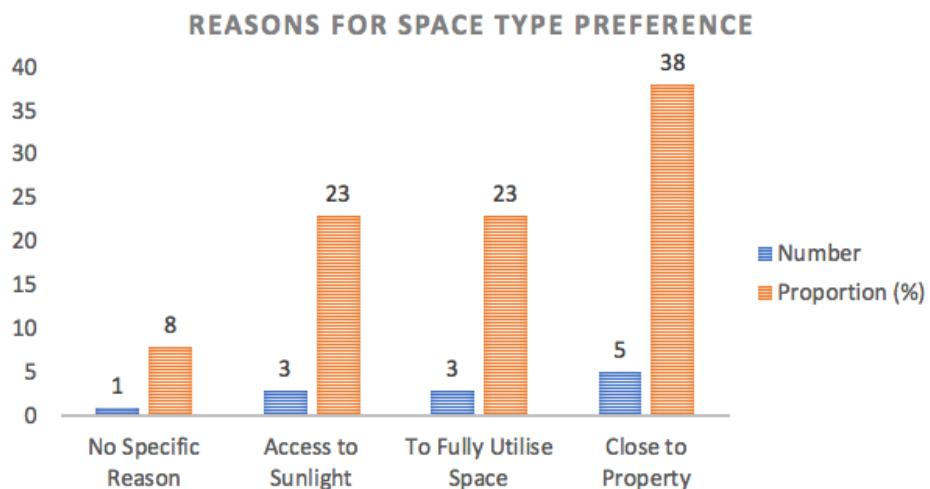
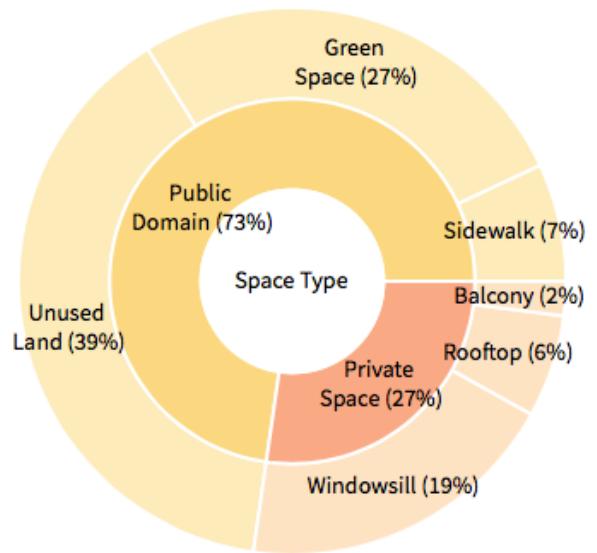


Figure 5.48. Space Type Preference of UA in Yunshan Village

Physical Form:

The dominant geometric shapes of the UA practices from a plan view were rectangle/square (61%) and circle/ellipse (30%) (see Figure 5.49). The households in Yunshan Village preferred growing UA plants directly in the ground (37%) to utilise the vacant plot and other green spaces. Recycled containers (34%) and gardening-specific containers (28%) were also chosen by households for their UA practices. Vegetables (70%) including bok choy (45%), and various types of spices (22%) were the favoured species for cultivation by the residents. A small number of households also raised poultry (8%), such as chickens, in the public domain.

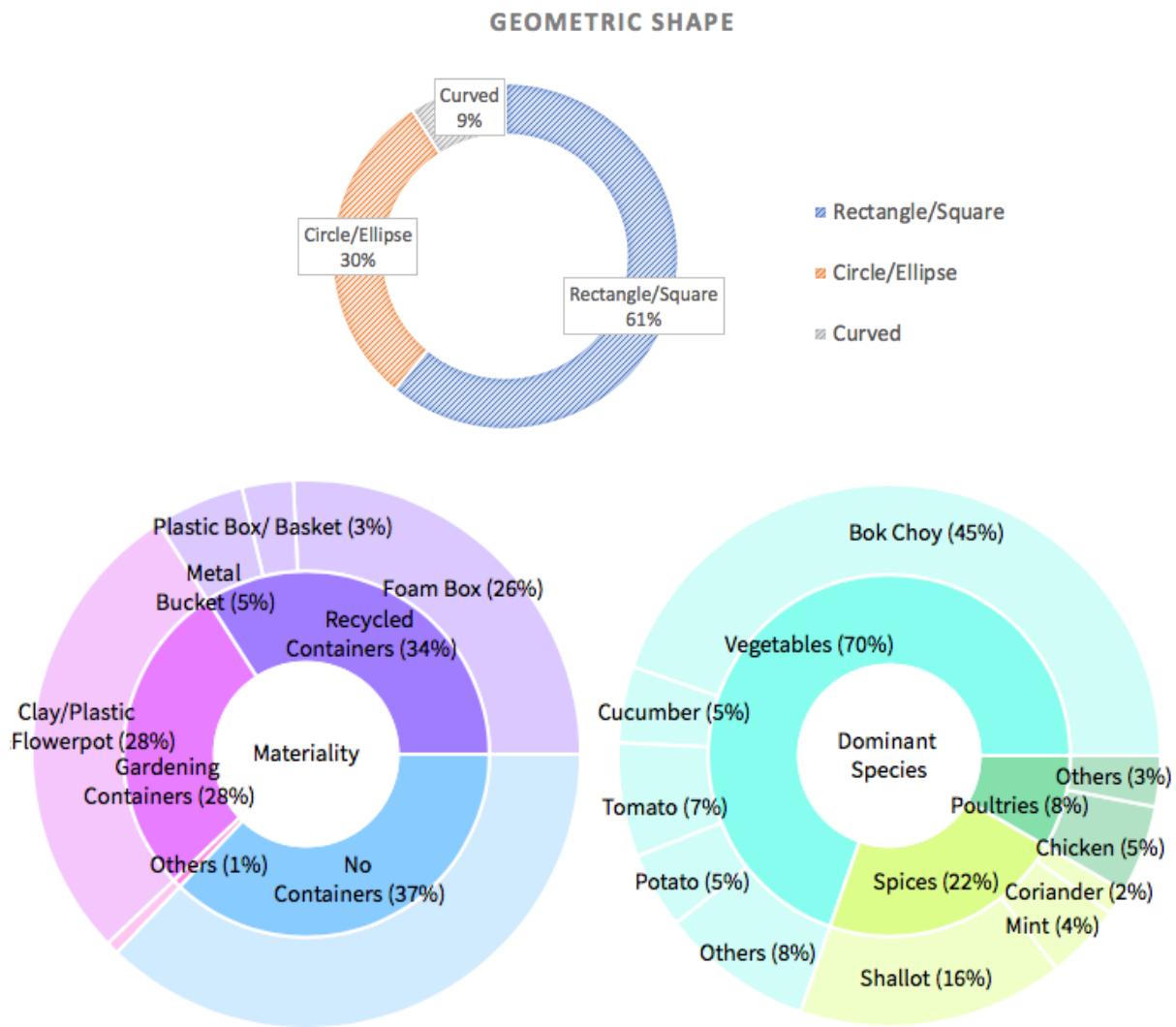


Figure 5.49. Physical Form of UA in Yunshan Village

Rules and Regulations

There were no strict rules and regulations identified for UA behaviours in Yunshan Village. The local community asserted that UA practices in the public domain were acceptable provided that public facilities were maintained, and it did not create connectivity issues for local transport. In regards to private space, the residents did not report any specific rules for UA practices, such as cultivation techniques or planted species requirements. When claiming space in the public domain for UA practices, all households followed the principle of 'first-come-first-serve'.

5.5.2 Developing Village in the City- Xiaoxince Village

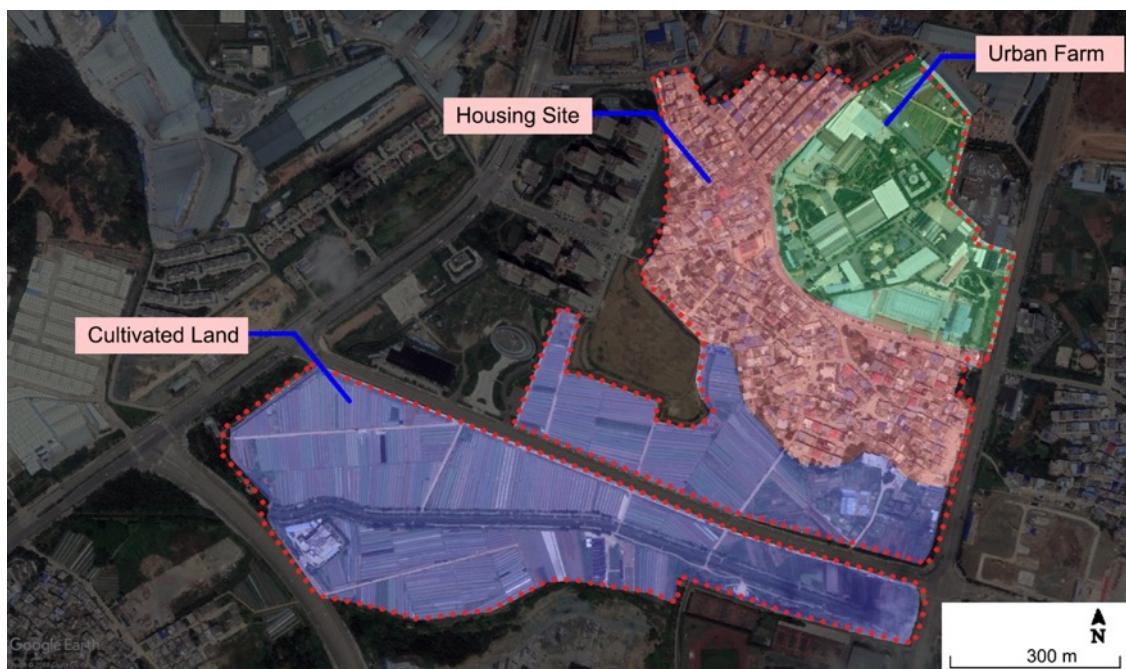


Figure 5.50. Satellite Map of Xiaoxince Village

(Map captured from Google Earth, 2017)

Background:

Xiaoxince Village belongs to the Chenggong district and is located outside of the Third Ring Road. It is classified as a developing VIC in Kunming (see Figure 5.50). Basic information regarding Xiaoxince Village can be found in Table 5.6. The population is approximately 10,840 (CGKM, 2016); 32% of whom are temporary residents renting properties from building owners, and 68% are residents who own and live in their own homes. The temporary residents migrated from other towns and cities of Yunnan Province, or other provinces. The residents in Xiaoxince Village are average middle-income earners, with the monthly average household income being CNY ¥ 6,000 (AUD\$1,200). The average education of residents is secondary school level (CGKM, 2016).

Table 5.6. Basic Information of Xiaoxince Village

(Data retrieved from CGKM, 2016)

Total Area (ha)	Housing Area (ha)	Cultivated Land (ha)	Urban Farm (ha)	Number of Buildings	Floor Area Ratio	Number of Residents
81.49	21.96	30.29	29.24	542	1.05	10840

In comparison to the VICs discussed above, Xiaoxince Village has a low building density. The buildings in Xiaoxince Village average 3-6 storeys in height and are constructed with bricks and decorated externally with white tiles (see Figure 5.51). The cultivated land of this VIC is located in the southern area, together with a multifunctional urban farm constructed by the Chennong Group in 2009 (see Figure 5.52).



Figure 5.51. Street View and Building Style of Xiaoxince Village

(Source: Author, 2017)



Figure 5.52. Cultivated Land in Xiaoxince Village

(Source: Author, 2017)

Expressions of UA:

There were approximately 220 UA practices identified in Xiaoxince Village, with a density of 10.02 practices per hectare across both public and private spaces (see Figure 5.53). These practices were not only employed by the households, but (unlike previous VICs discussed) also included commercial operators. The UA practices performed by the households were distributed across residential sites and in cultivated land areas of Xiaoxince Village, whereas those operated by commercial stakeholders was only located in the southern section.

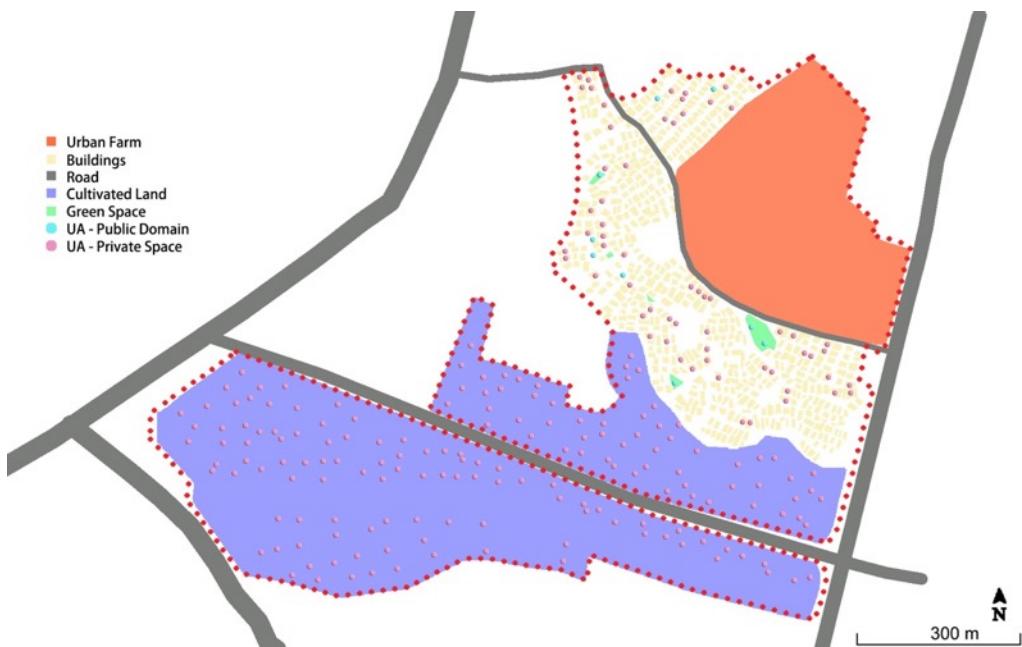


Figure 5.53. Distribution of UA Practices in Xiaoxince Village (Households)

For this investigation, 25 people were randomly chosen as household and community committee representatives to complete the questionnaires or semi-structured interviews. The results of the questionnaires and interviews identified 96% of participants having experience in undertaking UA practices, with the remaining 4% of the participants having no UA experience. An additional 5 people from Chennong Group also attended the semi-structured interviews to express their perspectives of UA practices.

When questioned about their reason for participating in UA practices, the dominant two answers from the households provided were due to having a previous background in agriculture (79%) and for profit (46%) (see Figure 5.54). There were also 37% of households who had been hired by the Chennong Group who were currently working as staff in the urban farm. For some of the temporary residents who migrated to Kunming for better living conditions, they had engaged in agricultural production prior to moving. Continuing UA practices in Xiaoxince Village helped them to create a ‘sense of belonging’ when living far away from their hometown. Furthermore, for those permanent residents who had access to cultivated land areas, UA practices contributed to their income resources. As for the participants with no experience in UA practices, the dominant reason was an overall lack of interest.

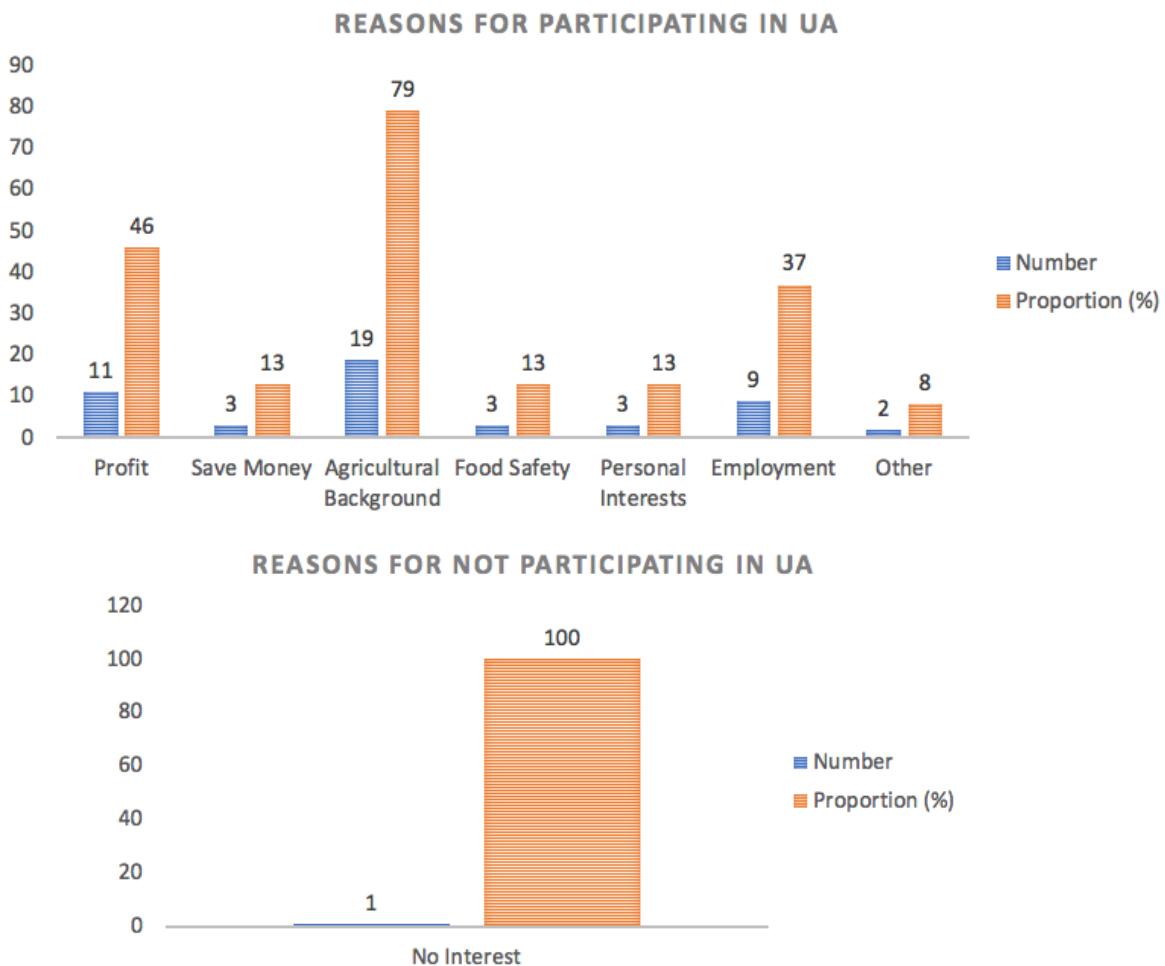


Figure 5.54. Reasons for Participating or not Participating in UA in Xiaoxince Village – Households

Function:

All households in Xiaoxince Village used the produce from their UA activities for family consumption. For the households who had access to cultivated land, some grew food and sold a portion of the produce to local markets to supplement their household income (see Figure 5.55). On average, the households can collect CNY ¥300-¥700 (AUD\$60-\$140) per month from these sales. The amount of cultivated land owned by households has decreased following the (urban) transformation of Xiaoxince Village. With less land available for large-scale agricultural production, land-owning households were forced to reduce their produce consumption to family only. Similarly restricted by limited planting space, households without access to cultivated land also maintained consumption of UA produce to personal use, unable to generate enough yield for surplus to sell at a profit.

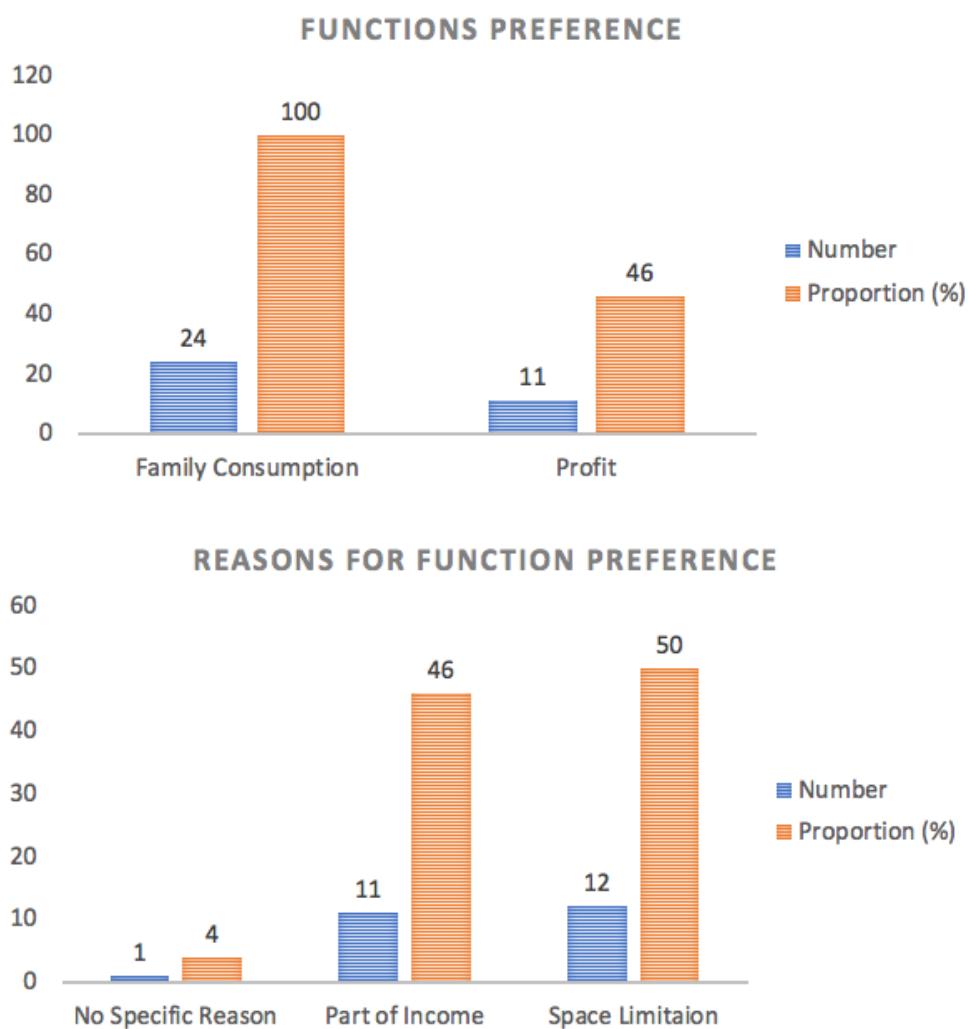


Figure 5.55. Functions of UA in Xiaoxince Village – Households

Among all the urban farms in Kunming, Chennong Urban Farm is one of the biggest and most successful cases. The space accommodates a variety of functions, such as agricultural tourism, displays for agricultural history and science education, leisure activities, food and beverage venues, banquet receptions, conferences, accommodation, providing farming experience, development training, and a scenic location for wedding photography (see Figure 5.56). Admission to the Chennong Urban Farm is free for those who live in general dwellings in or around Kunming.



Restaurant



Agricultural Experience



Sightseeing



Accommodation



Conferences/Function



Demonstration of High-tech Agriculture

Figure 5.56. Functions of Chennong Urban Farm - Commercial Operators

(Source: Author, 2017)

According to the operating data of Chennong Urban Farm in Table 5.7, the number of total visitors steadily increased from 500,000 persons in 2014 to 850,000 persons in 2017. Among the total visitors, 14%-19% were short-stay visitors who only explored the urban farm area for sightseeing without making additional purchases. The number of short-stay visitors doubled from 80,000 persons in 2014 to 160,000 persons in 2017. In contrast, the number of total employees and the size of the plantation area were in decline since 2014. Staff numbers at Chennong Urban Farm totaled 145 in 2014; 100 were restaurant staff, while the remaining 45 held various maintenance and management positions. In 2017, the

total number of employees fell to 88 persons, 50 of whom were restaurant staff. Data included in Table 6.7 illustrates that during the period of 2014-2017, more than 57% of total staff was comprised of employees working in the restaurant. The remaining 43% of employees worked in roles such as safety guards, gardeners, cleaners, and administrators. The size of the planting areas also declined from 10.12 hectares in 2014 to 7.28 hectares in 2017. Allocation of land from the planting areas was transferred to provide space for construction of accommodation and conference rooms. From the operating data, it can be determined that the dominant function of Chennong Urban Farm is to provide a restaurant to the visitors.

Table 5.7. Operating Data of Chennong Urban Farm
(Data collected from Chennong Group)

	2014	2015	2016	2017
Number of Total Employees	145 persons	115 persons	102 persons	88 persons
Number of Restaurant Staff	100 persons	70 persons	60 persons	50 persons
Plant Area	10.12 hectares	7.28 hectares	7.28 hectares	7.28 hectares
Number of Short-stay Visitors*	80,000 persons	100,000 persons	150,000 persons	160,000 persons
Total Number of Visitors**	500,000 persons	700,000 persons	800,000 persons	850,000 persons
Total Profit	1,600,000 CNY	2,400,000 CNY	3,000,000 CNY	3,500,000 CNY

*Short-stay visitors refer to those who only walk around the urban farm site without making any purchases.

** Total number of visitors includes the number of short-stay visitors, as well as those who attend for dining experiences, conferences, or accommodation.

Space Type:

UA practices were found in both private spaces and the public domain in Xiaoxince Village (see Figures 5.57 & 5.58). There was an estimated 96% of households undertaking UA practices in their private spaces, including cultivated land (62%), rooftops (22%), windowsills (9%) and balconies (3%) (see Figure 5.59). Only 4% of practices were observed in the public domain, such as in public green spaces or the alleyways between buildings. The dominant reason for choosing private space as the primary option for planting in

Xiaoxince Village was attributed to there being a significant number of households with access to private cultivated land. The land developed by commercial operators for the establishment of an urban farm was rented from the Xiaoxince Village collective, who retains ownership of the land itself. Hence, the UA practices performed by the commercial operators in this VIC were classified as occurring in a private space.



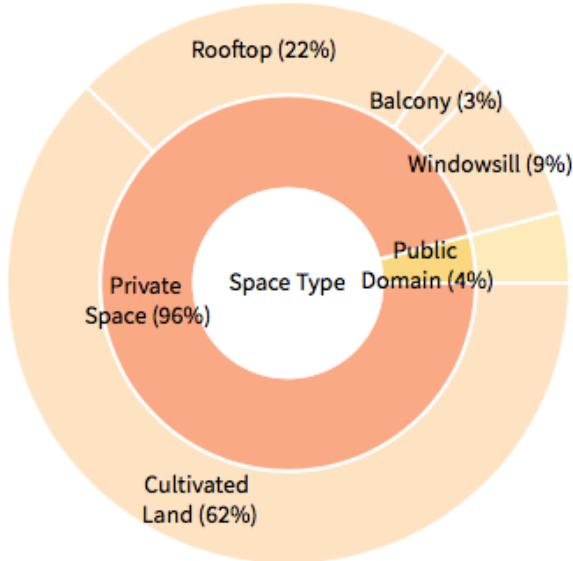
Figure 5.57. UA Practices in Xiaoxince Village- Private Space – Households

(Source: Author, 2017)



Figure 5.58. UA Practices in Xiaoxince Village- Public Domain – Households

(Source: Author, 2017)



REASONS FOR SPACE TYPE PREFERENCE

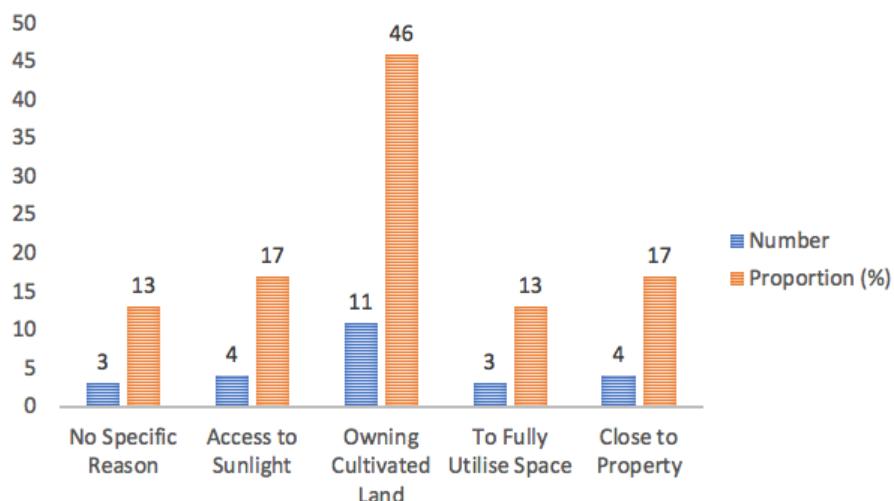


Figure 5.59. Space Type Preferences and Reasons of UA in Xiaoxince Village – Households

Physical Form:

The dominant geometric shape of the practices carried out by the households from the plan view was the rectangle/square (56%) (see Figure 5.60). Approximately 74% of UA products were directly sown into the soil of cultivated land or public green spaces, removing the need for households to use planting containers. When planting containers were used, recycled containers (17%) such as foam boxes were the main choice for

respondents. Households were able to utilise cultivated land to grow multiple and larger-sized UA plants, predominantly vegetables (57%) and various spices (34%).

Commercial operators preferred to employ a combination of geometric shapes to serve different functions. For example, curved and irregular shapes were used for creating natural landscapes, while rectangular and square shapes were used for growing ornamental vegetable crops. Furthermore, the materials of containers varied in accordance to their function. On Chennong Urban Farm, a variety of species of vegetables, spices, and ornamental plants were planted to serve the food needs of farm visitors.

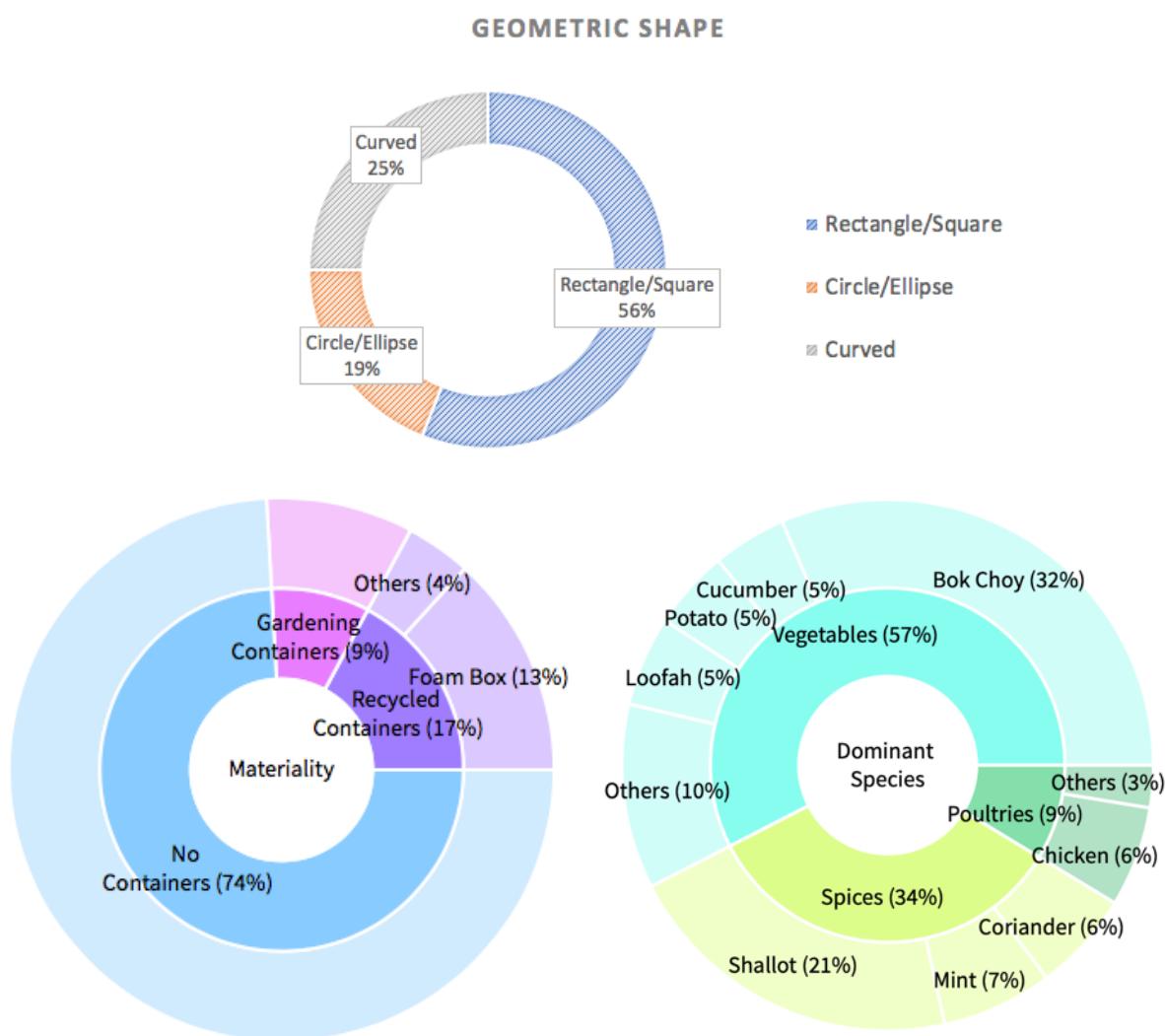


Figure 5.60. Physical Form of UA in Xiaoxince Village -Households

Rules and Regulations

There were no strict rules in terms of UA practices in the public domain areas of Xiaoxince Village. In private spaces, especially in the residential area, households did not have any specific rules for the UA practices, including cultivation techniques and planting species selection. The cultivated lands were part of private household spaces, which are protected by policies of the central government. These policies aim to ensure the function of cultivated land is limited to growing crops and any construction work in cultivated land is against the law (PRC, 2004). There were also several rules for the commercial operators to follow in regards to developing and managing the urban farm (KM, 2012a, 2012b).

5.6 Summary

According to the results of the questionnaires, semi-structured interviews, and observations from the ten VICs, there were various similarities and differences that emerged amongst all UA practices. The following Tables in this section display the dominant functions, space types, and physical forms in each VIC type within each ring road. There was a total of 260 samples collected via questionnaires and semi-structured interviews with households, community groups, and commercial operators in the ten VICs, as shown in Table 5.8.

Table 5.8. Total Amount of Questionnaires and Semi-structured Interviews for VIC

Stakeholders	Questionnaires	Semi-structured Interviews
Households & Community Groups (250)	200	50
Commercial Operators (10)	/	10
Total (260)	200	60

Through the analysis of different spatial rings, it was demonstrated that the area of land dedicated to UA practices in the outer rings was larger than the inner rings (see Table 5.9). In terms of different VIC types, there were more UA practices observed in the partially-acquired VICs and developing VICs compared to the fully-acquired VICs. This trend could be explained by the fact that the area of space available for UA activities in the outer rings and developing VICs was larger than those in the inner rings and fully-acquired VICs, where there was a higher building density and fewer public domain areas.

Table 5.9. Summary of Amount and Density of UA Practices – Households

Location	VIC type	Village Name	Number of UA Practices Observed in VICs	Density of UA Practices (per hectare)
<First Ring	Fully-acquired	Beihegeng Village	23	13.2
<Second Ring	Fully-acquired	Dashuying Village	184	10.89
	Partially-acquired	Xiaotun Village	202	12.82
<Third Ring	Fully-acquired	Jindaoying Village	153	9.11
	Partially-acquired	Changdigeng Village	95	23.61
	Developing	Linjiayuan Village	213	13.66
>Third Ring	Fully-acquired	Yunshan Village	99	6.73
	Partially-acquired	Yangchang Village	105	11.52
	Developing	Baofeng Village	226	11.15
	Developing	Xiaoxince Village	220	10.02

Function:

All responses shared a similar rationale in the use of UA in regards to function. The dominant function of the UA practices was to grow produce for family consumption, with only approximately 28% of households growing UA plants for profit. 'The ability of households to grow crops to sell at markets was often dictated by the size of land they had access to for UA practices. Land scarcity and high living density were common issues in VICs. 'As such, limitations to accessible arable land could explain the large proportion of

households which consumed the UA produce only within their family, rather than seeking sales for additional income.

There were several differences regarding functions can be identified in the partially-acquired VICs and developing VICs in outer rings. From observations of data regarding areas in the inner ring to the outer ring, a pattern emerged where the households in the outer ring had more opportunities to sell surplus UA produce rather than only having enough for household use. Compared to the fully-acquired VICs, some of the households in partially-acquired VICs and developing VICs still retained access to cultivated land. These households with more cultivated land access were more likely to sell their produce to the local market within the VIC, as well as to consume within their household. It was more likely to find UA activities run by commercial operators in the outer rings, especially in the developing VICs outside the Third Ring Road. Tables 5.10 and 5.11 provide a summary of household functional preferences categorised by spatial rings and VIC types. As mentioned above, the dominant function for UA practices is household consumption.

Table 5.10. Summary of Functions – Households

Location	VIC type	Village Name	Dominant Function	Main Reason for constraining UA Function
<First Ring	Fully-acquired	Beihegeng Village	100% Household consumption	Space Limitation
<Second Ring	Fully-acquired	Dashuying Village	100% Household consumption	Space Limitation
	Partially-acquired	Xiaotun Village	100% Household consumption 29% For sale	Space Limitation
<Third Ring	Fully-acquired	Jindaoying Village	100% Household consumption	Space Limitation
	Partially-acquired	Changdigeng Village	100% Household consumption 39% For sale	Space Limitation
	Developing	Linjiayuan Village	100% Household consumption 45% For sale	Part of Income
>Third Ring	Fully-acquired	Yunshan Village	100% Household consumption	Space Limitation
	Partially-acquired	Yangchang Village	100% Household consumption 50% For sale	Part of Income
	Developing	Baofeng Village	100% Household consumption 52% For sale	Part of Income
	Developing	Xiaoxince Village	100% Household consumption 46% For sale	Space Limitation
VICs Average			100% Household consumption 33% For sale	Space Limitation

Table 5.11. UA Examples by Dominant Functions

Function (Stakeholders)	Examples
Family Consumption (Households)	  
For Profit (Households)	  
Commercial Functions (Commercial Operators)	  

Space Type:

Both private space and the public domain were chosen for use in UA activities (see Tables 5.12 & 5.13). The main similarity identified between VICS in all locations was that the dominant space type for UA was private spaces. In the inner rings, there was reduction of public domain areas that could be used for UA activities. The households in these areas chose to grow their UA produce within their private spaces, including on rooftops, windowsills, and balconies. In the outer rings, there were large amounts of private cultivated land attached to housing areas, providing more opportunities for the participants to undertake UA. Also, there were some vacant plots in many VICs that were available for use in UA planting. There were some exceptions to these patterns within and outside the Third Ring Road, where the UA practices in the public domain were prevalent due to a larger amount of the public domain areas being available, such as sidewalks, roadsides, and unused curbs. Table 5.12 provides a summary of space type by spatial rings and VIC types.

Table 5.12. Summary of Space Type - Households

Location	VIC type	Village Name	Dominant Space Type	Main Reason for Utilising Space Type
<First Ring	Fully-acquired	Beihegeng Village	78% Private Space 22% Public Domain	Access to Sunlight
<Second Ring	Fully-acquired	Dashuying Village	83% Private Space 17% Public Domain	To Fully Utilise of Space/ Close to Property
	Partially-acquired	Xiaotun Village	65% Private Space 35% Public Domain	Access to Sunlight
<Third Ring	Fully-acquired	Jindaoying Village	76% Private Space 24% Public Domain	To Fully Utilise of Space
	Partially-acquired	Changdigen Village	29% Private Space 71% Public Domain	Close to Property
	Developing	Linjiayuan Village	84% Private Space 16% Public Domain	Owning Cultivated Land
>Third Ring	Fully-acquired	Yunshan Village	27% Private Space 73% Public Domain	Close to Property
	Partially-acquired	Yangchang Village	54% Private Space 46% Public Domain	Owning Cultivated Land
	Developing	Baofeng Village	87% Private Space 13% Public Domain	Owning Cultivated Land
	Developing	Xiaoxince	96% Private Space 4% Public Domain	Owning Cultivated Land
VICs Average			73% Private Space 27% Public Domain	Owning Cultivated Land

Table 5.13. UA Examples by Dominant Space Types

Space Type	Examples		
Private Space			
Public Domain			

Physical Form:

Among all the UA practices across the investigated VICs, whether fixed or movable, and on or above ground level, the dominant shape used for UA practices as seen from the plan view was rectangle/square (see Tables 5.14-5.17). In the inner rings, and in fully-acquired VICs and partially-acquired VICs, households preferred using containers to undertake UA practices. The containers used, whether gardening-specific or recycled containers, were all mass-produced containers with regular shapes. Also, the dominant species of produce shared a similar expression of small-sized vegetables, such as bok choy, which was easy to grow in the small containers. The households in the outer rings tended not to use containers, as there were more areas of adequate land available for UA practices.

Table 5.14. Summary of Physical Form and Species Type – Households

Location	VIC type	Village Name	Geometric Shape	Materiality	Dominant Species
<First Ring	Fully-acquired	Beihegeng Village	53% Rectangle/Square	59% Recycled Containers	61% Spices
<Second Ring	Fully-acquired	Dashuying Village	56% Rectangle/Square	55% Recycled Containers	51% Vegetable
	Partially-acquired	Xiaotun Village	42% Rectangle/Square	40% Recycled Containers	58% Vegetable
<Third Ring	Fully-acquired	Jindaoying Village	56% Rectangle/Square	47% Recycled Containers	50% Vegetable
	Partially-acquired	Changdigeng Village	58% Rectangle/Square	46% Recycled Containers	67% Vegetable
	Developing	Linjiayuan Village	48% Rectangle/Square	42% No Containers	65% Vegetable
>Third Ring	Fully-acquired	Yunshan Village	61% Rectangle/Square	37% No Containers	70% Vegetable
	Partially-acquired	Yangchang Village	55% Rectangle/Square	42% Recycled Containers	69% Vegetable
	Developing	Baofeng Village	43% Rectangle/Square	46% No Containers	57% Vegetable
	Developing	Xiaoxince Village	56% Rectangle/Square	74% No Containers	58% Vegetable
VICs Average			51% Rectangle/Square	36% Recycled Containers	59% Vegetable

Table 5.15. UA Examples by Dominant Geometric Shape (Plan View)

Geometric Shape	Examples		
Rectangle/ Square			
Circle/ Ellipse			
Curved			

Table 5.16. UA Examples by Dominant Materiality

Materiality	Examples		
Gardening Specific Containers			
Recycled Containers			
No Containers (In Ground)			

Table 5.17. UA Examples by Dominant Species

Species	Examples
Vegetables (bok choy, loofah, beans, etc.)	
Spices (shallot, mint, coriander, etc.)	
Poultries (chicken, duck and goose)	

Rules and Regulations:

The Kunming Municipal Government recognises VICs as areas awaiting ‘formal’ development works. Therefore, the government and local community groups continued to tolerate UA practices in the public domains of VICs without enforcing any specific rules or regulations regarding the ‘informal’ initiatives undertaken by residents. However, there are strict rules regarding the use of private cultivated land, namely the restriction of using cultivated land for agricultural production only rather than for construction works (PRC, 2004). In order to further improve the development of agriculture in Kunming, the Kunming Municipal Government has issued policies encouraging the establishment of multifunctional urban farms by using the cultivated land in VICs (KM, 2012a).

Conclusion:

In conclusion, for the households in VICs, the results of the above show the following key patterns across development types and spatial rings:

- All participants in VICs used some or all of their UA produce for family consumption.
- The dominant space types were private space (73%), followed by public domain areas (27%).
- The dominant geometric shape in relation to the plan view was rectangle/square (51%), followed by circle/ellipse (28%).
- The dominant species for UA cultivation were vegetables (59%).
- The dominant containers for UA practices were recycled containers (36%), primarily foam boxes.
- The containers for all UA practices were mass produced rather than hand-made.
- Apart from the laws to protect the cultivated land from use as urban development sites, there were no strict rules regarding UA in VICs due to the tolerance and acceptance of practices by both local community groups and the government.

In the context of VICs, the results of the above data demonstrate the following key patterns by each development type and spatial ring:

- The species of the plants cultivated in UA became more diverse in the outer rings and developing VICs.
- The size of the cultivated plants and containers increased in the outer rings and developing VICs.
- Compared to the inner rings, there was more land available in the outer rings for UA use, both in the private space and public domain due to larger plot sizes.
- UA practices in inner rings generally used movable containers for planting, while those in outer rings utilised more fixed or permanent containers.
- There was a higher rate of residents' participation in UA in the outer rings compared with the inner rings due to the increase of permanent residents in VICs. As a general

rule, temporary residents demonstrated a reduced participation rate while permanent residents had a higher participation rate.

- It was more likely to find the UA activities run by commercial operators in the outer ring areas due to government policy support and encouragement on increasing UA practices in developing VICs.

The phenomena of UA, especially the residents-led UA practices, was strong in VICs in Kunming. A high proportion of households in VICs demonstrated a clear initiative among residents for planting and harvesting food for their own consumption. Households in Kunming VICs actively planted food within their property boundaries or in adjoining private spaces, as well as further adapting vacant land plots or planned green spaces for UA uses in the public domain. In other words, the UA practices occurring in the public domain were "informal" practices which could be either permanent or temporary fixtures in VIC areas. When considering the environmental effect and potential security issues, the "informal" UA practices were not meant to appear in the public domain, but are have been tolerated and accepted by the governments and local communities respectively. There is no enforcement to align with government-led rules. In the VICs outside of the Third Ring Road in the peri-urban area, the Kunming Municipal Government encourages and supports the development of UA practices operated by commercial operators. These "formal" and regular UA practices obey related rules and regulations and provide multifunction areas integrating cultivation, education, trading, and dining, as well as other uses.

6 Urban Agricultural Practices in the Non-village Areas of the City

6.1 Introduction

This chapter examines UA practices in the non-village areas of the city. Unlike VICs, these non-village areas are developed and the land is owned by the state. As in Chapter 5, the analysis and discussions on UA practices in non-village areas will use the ring roads as a mode of classification to better understand the factors that affect the expression of UA practices, as the city expands and intensifies. In this chapter, the four variables, as used for understanding UA expressions in VICs, including function, space type, physical form, and rules and regulations will also be used to describe the patterns and differences of UA in the fully-developed areas in Kunming. The following is the framework of this chapter (see Figure 6.1):

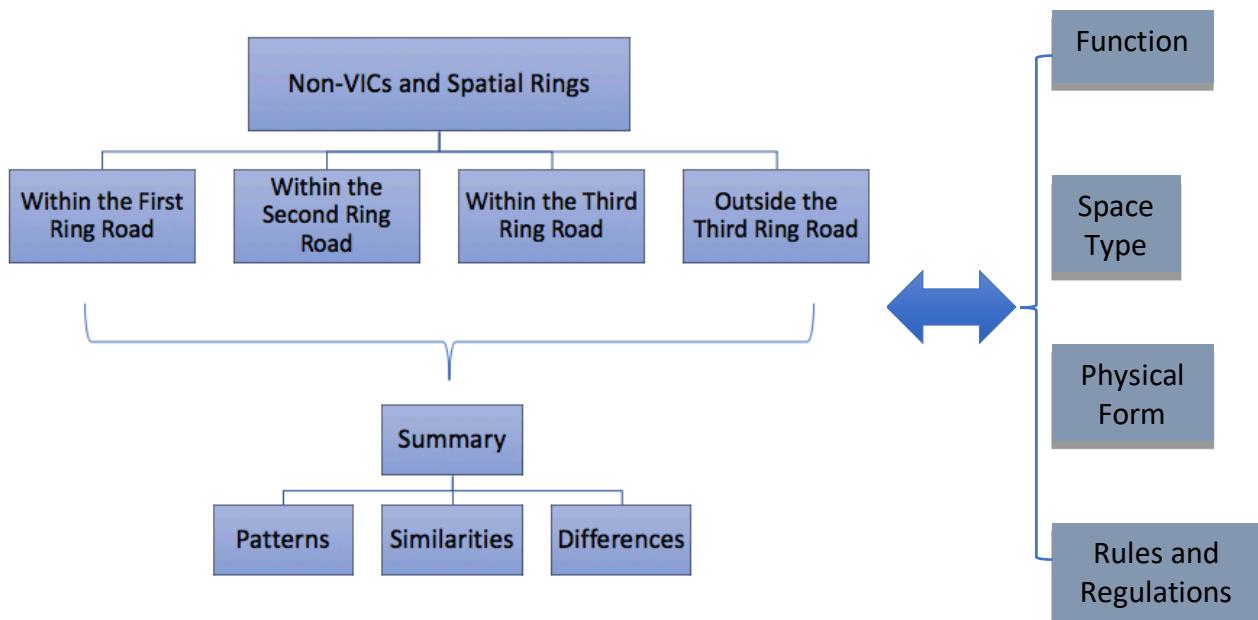


Figure 6.1. Framework of Chapter 6

The sample of UA practices considered include the following five non-village areas:

- Within the First Ring Road:
 - Fully-developed area - Milesi (Low-income community)
- Within the Second Ring Road:
 - Fully-developed area - Jiangan Xiaoqu (Low-income community)

- Within the Third Ring Road:
 - Fully-developed area - Southwest Forestry University Eastern Campus (Institution)
- Outside the Third Ring Road:
 - Fully-developed area – Jiangdong Huacheng (Middle-income community)
 - Fully-developed area – Qiangshui Muhua (High-income community)

6.2 Urban Agricultural Practices within the First Ring Road

6.2.1 Fully-developed Area – Milesi

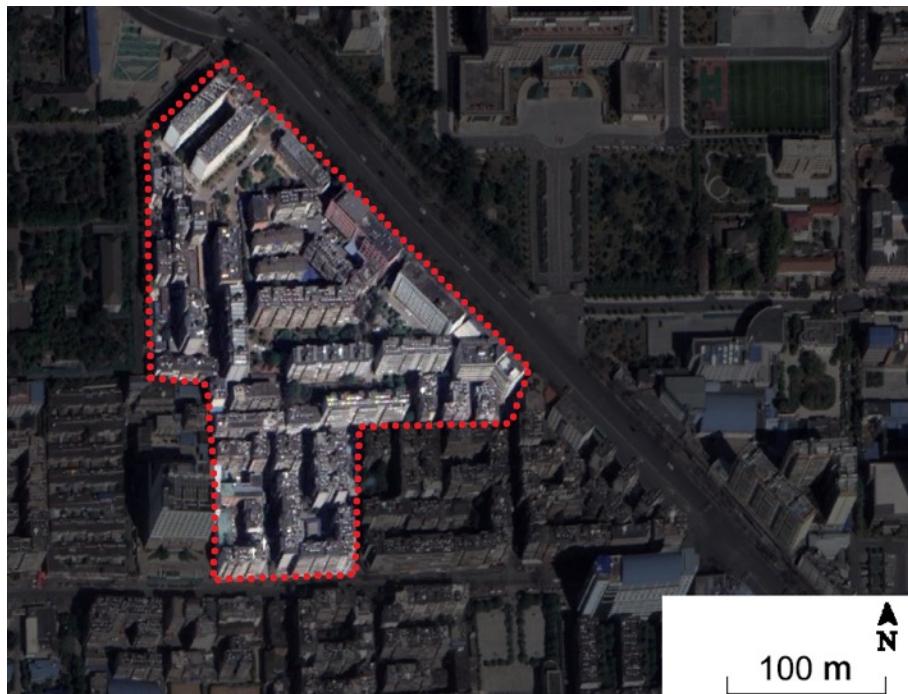


Figure 6.2. The Satellite Map of Milesi

(Map captured from Google Earth, 2017)

Background:

Milesi is located within the First Ring Road of Kunming (see Figure 6.2). This low-income community was constructed prior to the 1990s and belongs to the Xishan District. A summary of the basic information about Milesi is provided in Table 6.1. The population of this residential area is approximately 2,070 persons and 75% are temporary residents (XSKM, 2016). The residents in Milesi are low-income level earners, with the monthly

average household income in this fully-developed area being CNY ¥4,000 (AUD\$800). The average education of community residents is secondary school level (XSKM, 2016).

Table 6.1. Basic Information of Milesi

(Data retrieved from XSKM, 2016)

Total Area (ha)	Number of Buildings	Floor Area Ratio	Number of Residents	Green Space Ratio
7.71	46	1.49	2070	28%

Milesi is a gated community with buildings averaging 5-7 storeys in height and have been constructed using reinforced concrete (see Figure 6.3). The ground level spaces of street-facing buildings are used for commercial functions, such as grocery stores, restaurants, utility services, banks, laundromats, and so on. For safety, almost all households in Milesi have installed burglary-resistant bars on windows and general entry points. Planned public green space has also been included in areas between buildings.



Figure 6.3. Building Style and Green Spaces in Milesi

(Source: Author, 2017)

Expressions of UA:

In Milesi, there were 69 UA practices recorded in both the public and private spaces (see Figure 6.4), with a density of 8.94 practices per hectare.



Figure 6.4. Distribution of UA Practices in Milesi

During this research investigation, 25 people were randomly chosen to be participants and complete either a questionnaire or semi-structured interview (see Table 6.2). According to the results of the questionnaires and interviews, 36% of the participants had experience undertaking UA practices, and the remaining 64% reported having no UA experience.

Table 6.2. Mix of Questionnaires and Interviews Collected in Milesi

	Questionnaires	Semi-structured Interviews
Households	15	4
Community committee*	5	1

*‘Community committee’ refers to an autonomous resident-run organisation that manages a variety of affairs related to local residents.
*The participants of questionnaires and interviews are different people.

Within the 9 households who had experience undertaking UA practices, the primary reason provided for UA engagement was pursuing personal interests (see Figure 6.5). The remaining 16 households with no experience undertaking UA practices stated being unable to find adequate space for planting was the main reason preventing their involvement.

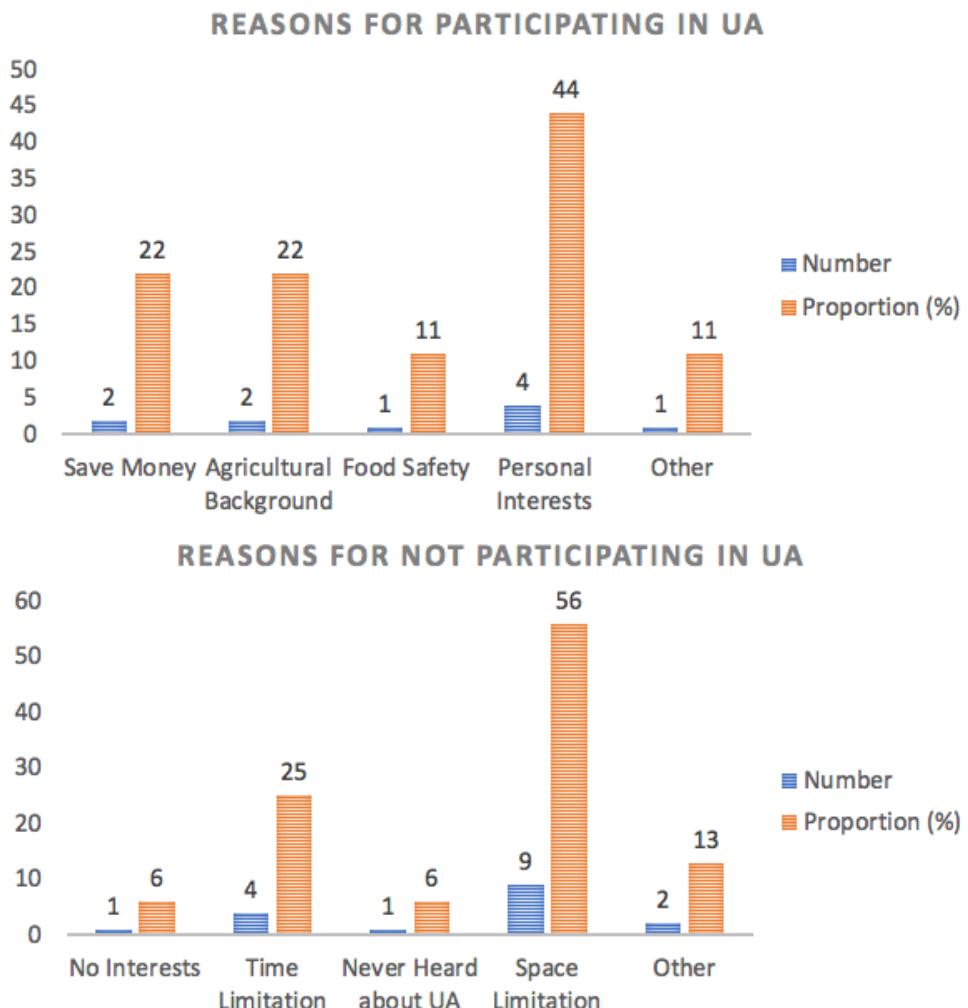


Figure 6.5. Reasons for Participating or not Participating in UA in Milesi

Function:

Interview results of all 9 households with UA experience revealed that participants chose to grow produce for their household consumption (see Figure 6.6.). All participants provided identical responses when questioned about why their produce was only used for family consumption, citing limited space both indoors and outdoors inhibited the

expansion of their UA activities. Thus, the amount of produce generated by the participants was insufficient for profitable sale.

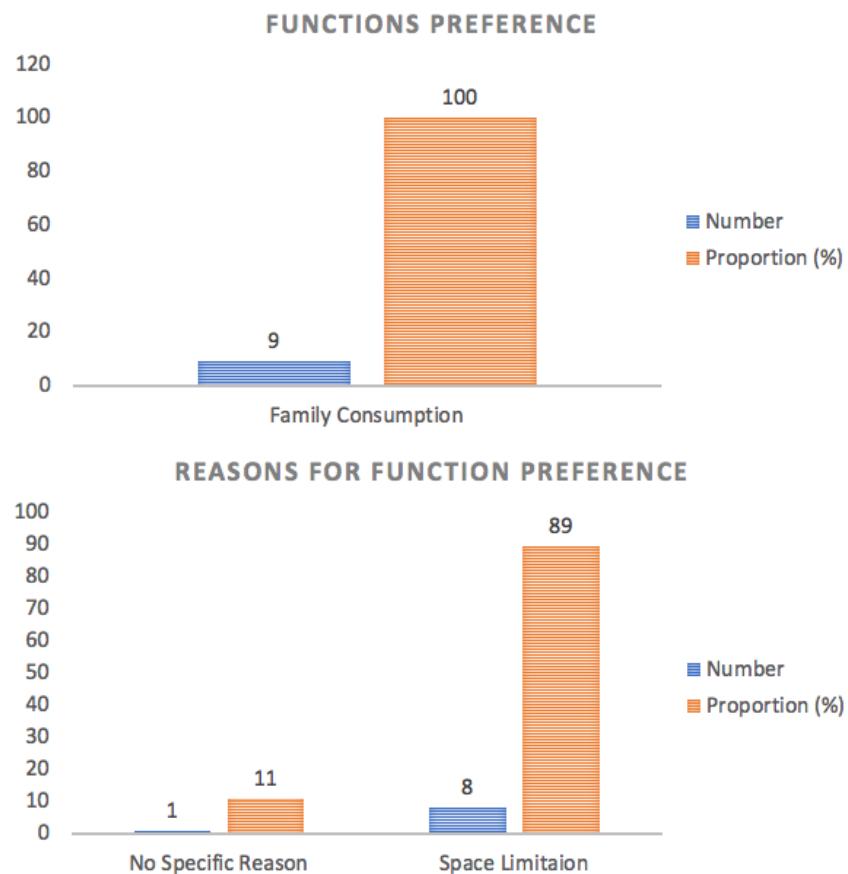


Figure 6.6. Function Preferences of UA in Milesi

Space Type:

UA practices were found both in the private spaces and public domain areas of Milesi, as shown in Figures 6.7 & 6.8. 83% of UA practices occurred in private spaces, where residents tended to grow plants on their windowsills and balconies (see Figure 6.9). A further 17% of UA practices were found in the public domain, often being hidden within the planned public green spaces and on the sidewalks. UA planting locations, such as windowsills, balconies, or along pathways, were chosen by participants predominantly for their access to direct sunlight (33%). Some participants, especially those who chose to conduct UA practices in the public domain, also believed that vacant or unused spaces should be fully utilised for functional efficiency (33%).



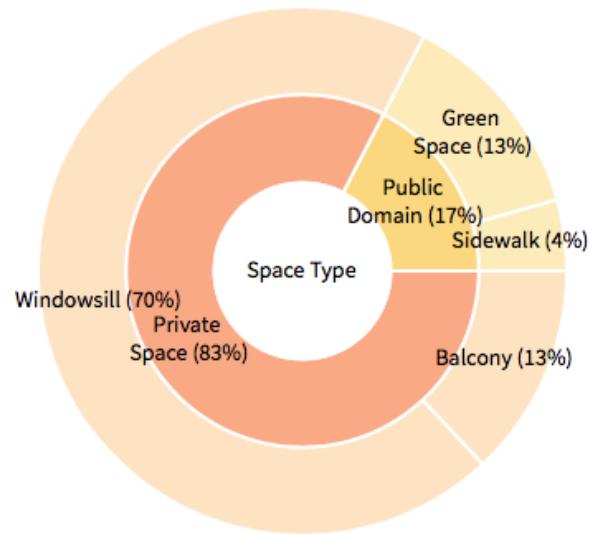
Figure 6.7. UA Practices in Milesi- Private Space

(Source: Author, 2017)



Figure 6.8. UA Practices in Milesi- Public Domain

(Source: Author, 2017)



REASONS FOR SPACE TYPE PREFERENCE

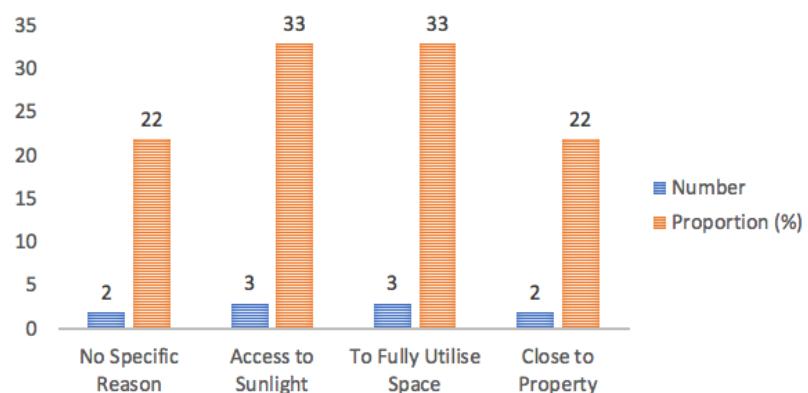


Figure 6.9. Space Type Preferences of UA in Milesi

Physical Form:

Observation of the geometric shape of the practices from a plan view revealed rectangle/square (55%) and circle/ellipse (31%) were the dominant shapes for UA use (see Figure 6.10). In both private and public spaces, the households preferred using recycled containers (54%) for planting, primarily foam boxes (46%) acquired from daily life. Gardening-specific containers, such as clay or plastic flowerpots (31%), were also used often for UA practices. Spices were the dominant species grown in this non-village area, accounting for 76% of UA crops. Small amounts of vegetables (24%) such as bok choy and eggplants were observed being cultivated in this area.

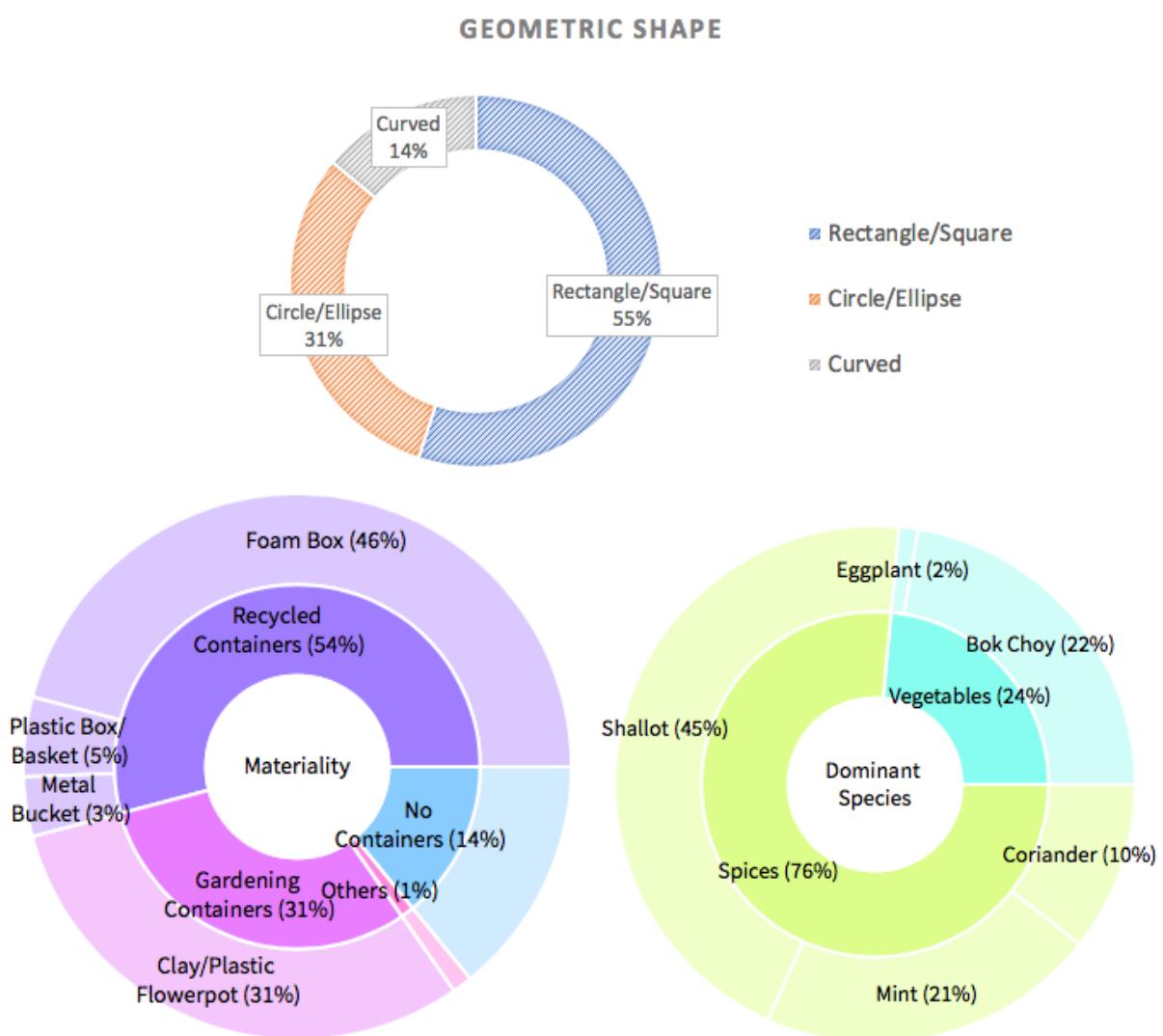


Figure 6.10. Physical Form of UA in Milesi (Geometric Form)

Rules and Regulations

This low-income residential area was managed by a local community committee. According to the management rules of the community committee, individuals are prohibited from adapting public green space for private use (KMPC, 2012). However, because of the ‘loose’ management situation, the community committee preferred to tolerate UA practices in the public domain despite the rules. There were no specific rules regarding space selection or physical form preferences applying to households undertaking UA practices.

6.3 Urban Agricultural Practices within the Second Ring Road

6.3.1 Fully-developed Area – Jiangan Xiaoqu



Figure 6.11. Satellite Map of Jiangan Xiaoqu

(Map captured from Google Earth, 2017)

Background:

Jiangan Xiaoqu is located within the Second Ring Road of Kunming and belongs to the Wuhua District (see Figure 6.11). It was built in late 1996 and the land area is approximately 5.39 hectares (WHKM, 2015). Within the overall population, 60% of residents live in their

own properties, while the remaining 40% are tenants. The residents of Jiangan Xiaoqu are low-income earners; the monthly average household income for this living area is CNY ¥ 4,500 (AUD\$900). The average education of residents is secondary school level (KBS, 2016). Basic information of Jiangan Xiaoqu has been summarised in Table 6.3 below.

Table 6.3. Basic Information of Jiangan Xiaoqu

(Data retrieved from WHKM, 2015)

Total Area (ha)	Number of Buildings	Floor Area Ratio	Number of Residents	Green Space Ratio
5.39	51	2.37	2295	33%

As a gated community, Jiangan Xiaoqu has 51 buildings and most are 6 storeys in height (see Figure 6.12). In addition to brick and iron fencing, street-facing buildings act as an additional fence for the whole residential area. The ground levels of the buildings near street boundaries are used for commercial functions, including grocery stores, restaurants, utility services, banks, laundromats, and so on. Jiangan Xiaoqu also has planned public green spaces in between the residential buildings.

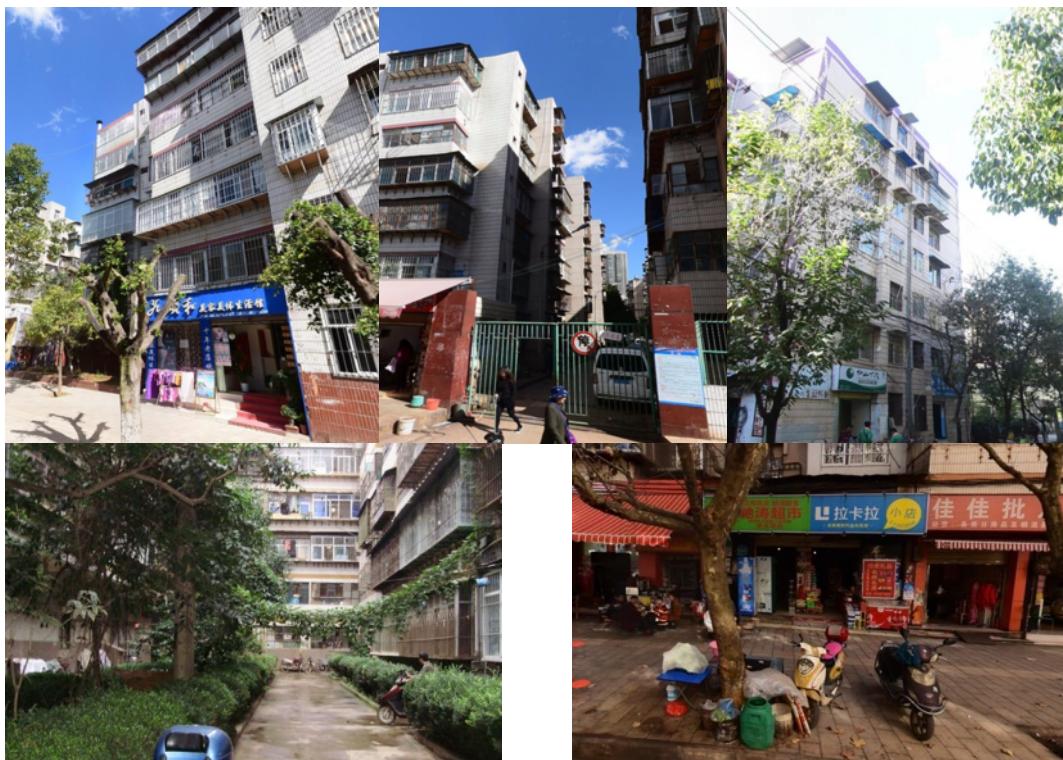


Figure 6.12. Street View and Building Style of Jiangan Xiaoqu

(Source: Author, 2017)

Expressions of UA:

In Jiangan Xiaoqu, there were 90 UA practices observed in both private and public spaces, with a density of 16.7 practices occurring per hectare (see Figure 6.13).



Figure 6.13. Distribution of UA Practices in Jiangan Xiaoqu

For the research investigation, 25 people in Jiangan Xiaoqu were randomly selected as participants to complete the questionnaires or semi-structured interviews. The results of the questionnaires and interviews revealed that 28% of the participants had experience undertaking UA practices. The remaining 72% expressed they had no UA experience. The 7 participants with UA experience reported the principal reason for engaging in individual UA activities was for their own personal interests (71%) (see Figure 6.14). For the remaining 18 participants who did not have experience undertaking UA practices, the primary reason provided was they were unable to locate adequate space to grow plants (see Figure 6.15).

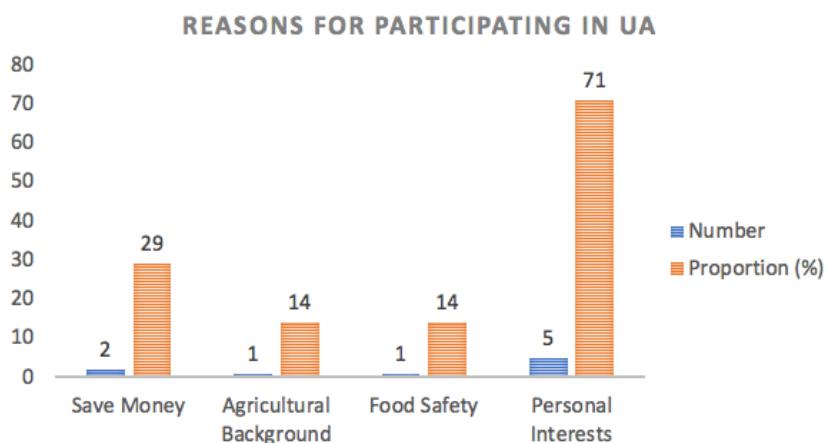


Figure 6.14. Reasons for Participating in UA in Jiangan Xiaoqu

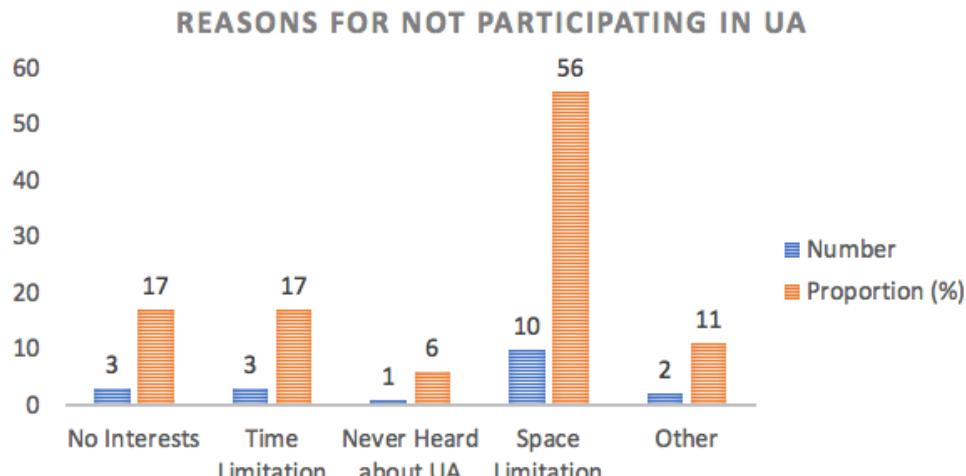


Figure 6.15. Reasons for not Participating in UA in Jiangan Xiaoqu

Function:

The results of the interviews revealed the 7 household participants with UA experience of UA chose to grow UA produce for their household consumption (see Figure 6.16). Similar to respondents in Milesi, all participants explained that cultivation space was limited both indoors and outdoors in this low-income community, restricting the scale of UA activities they could perform (see Figure 6.17).

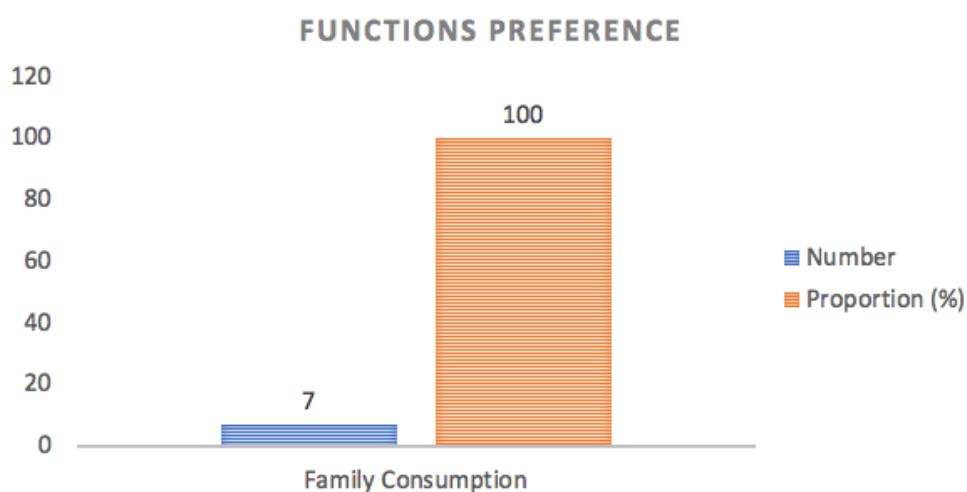


Figure 6.16. Function Preference of UA in Jiangan Xiaoqu

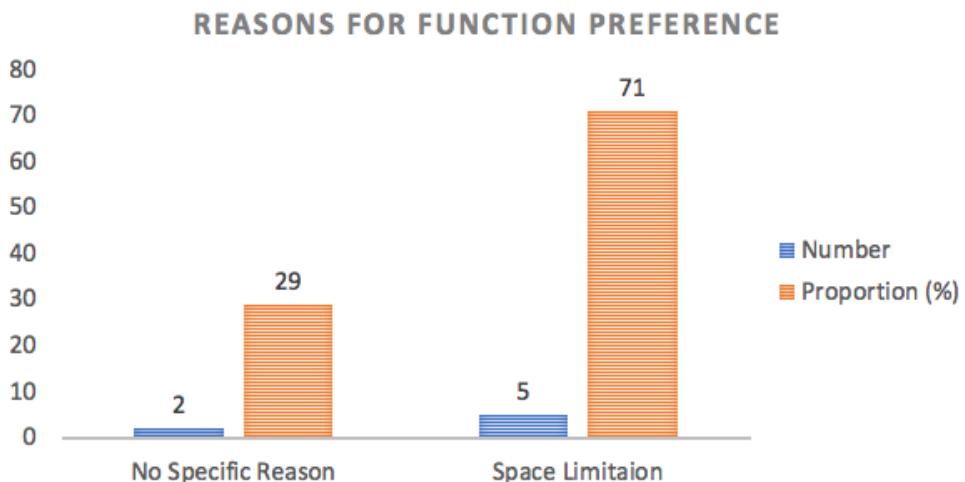


Figure 6.17. Reasons for the Specific Function of UA in Jiangan Xiaoqu

Space Type:

UA practices were found both in private spaces and the public domain areas of Jiangan Xiaoqu, as shown in Figures 6.18 & 6.19. 81% of UA practices occurred in private spaces, where residents usually opted to grow plants on windowsills and balconies (see Figure 6.20). The remaining 19% of UA practices were located in the public domain, often hidden within the planned public green spaces and near the sidewalks. The main criteria for UA space selection shared by participants was seeking locations where plants could access direct sunlight to promote steady growth. A proportion of participants, particularly those who conducted UA activities in the public domain, shared the opinion that vacant or unused spaces should be fully utilised for practical use, and selected planting locations with this consideration in mind.



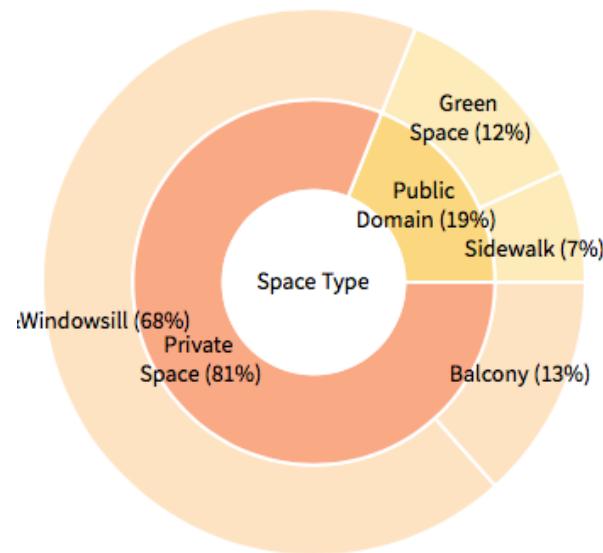
Figure 6.18. UA Practices in Jiangan Xiaoqu- Private Space

(Source: Author, 2017)



Figure 6.19. UA Practices in Jiangan Xiaoqu- Public Domain

(Source: Author, 2017)



REASONS FOR SPACE TYPE PREFERENCE

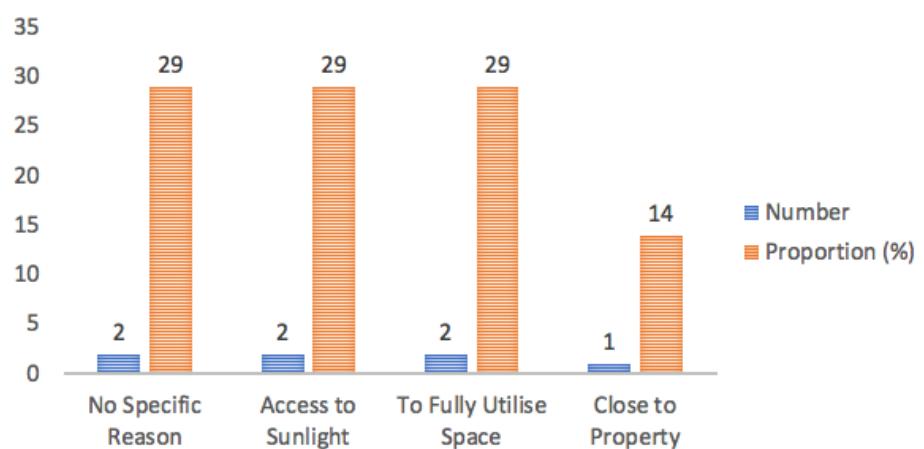


Figure 6.20. Space Type Preferences of UA in Jiangan Xiaoqu

Physical Form:

Following a plan view of UA activities in Jiangan Xiaoqu highlighted the dominant geometric shape for UA practices was the rectangle/square (66%) type (see Figure 6.21). Many households preferred to use recycled containers (57%) for planting, such as foam boxes. In Jiangan Xiaoqu, the dominant species chosen for UA produce were various spices (72%).

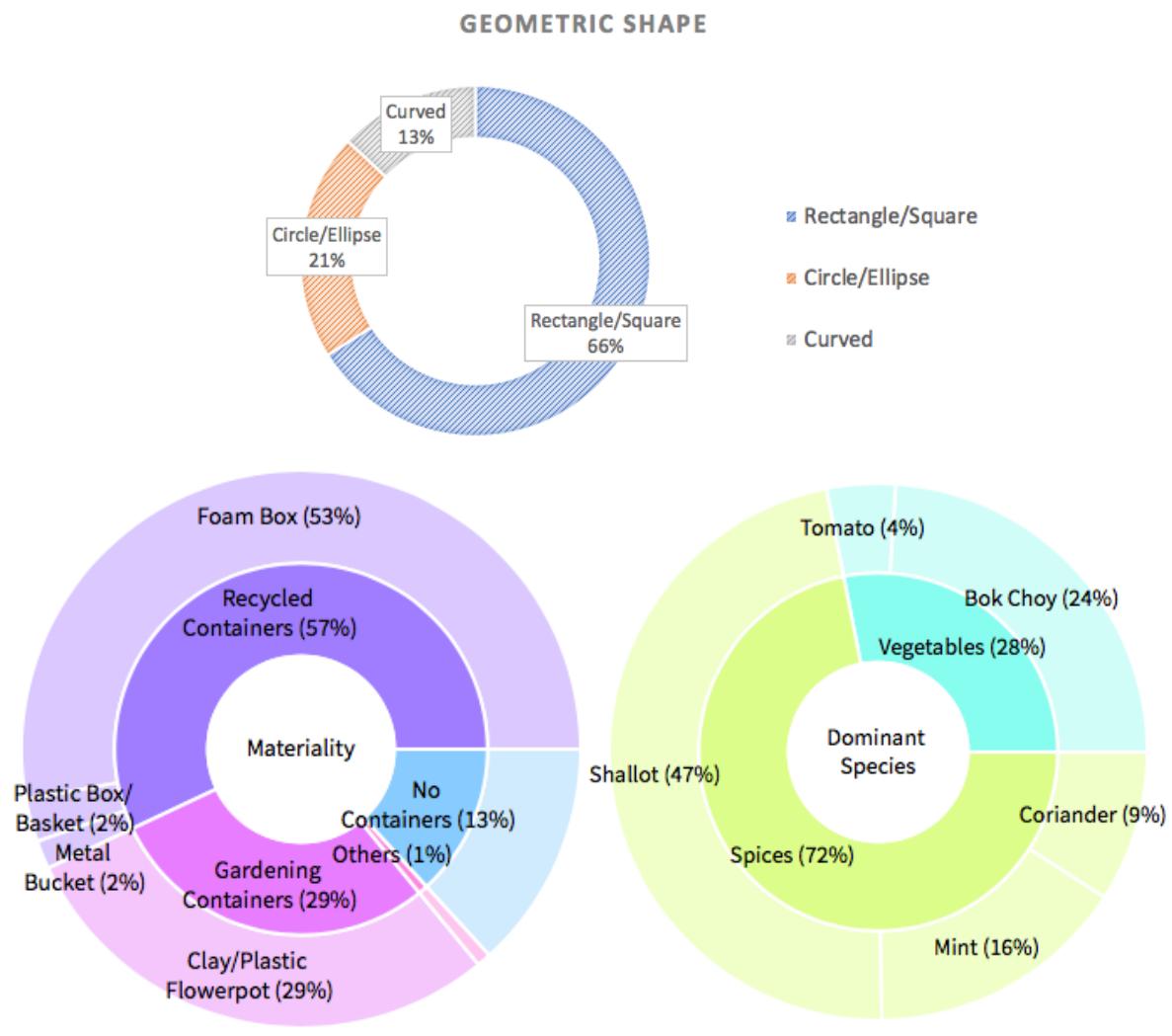


Figure 6.21. Physical Form of UA in Jiangan Xiaoqu

Rules and Regulations

This low-income residential area was managed by a local community committee. According to the management rules of the community committee, individuals were prohibited from adapting public green spaces for private uses (KMPC, 2012).

6.4 Urban Agricultural Practices within the Third Ring Road

6.4.1 Fully-developed Area – Southwest Forestry University Eastern Campus



Figure 6.22. The Satellite Map of SWFU Eastern Campus

(Map captured from Google Earth, 2017)

Background:

The Eastern Campus of Southwest Forestry University (SWFU) is located outside of the Third Ring Road of Kunming (see Figure 6.22). As one of three campuses of SWFU, Eastern Campus comprises the buildings of the Faculty of Arts and several residential buildings for university teachers and staff (see Figure 6.23). The total area of this campus is measured at approximately 6.75 hectares.



Figure 6.23. The Faculty of Arts building (left) and Residential Buildings in Eastern Campus (right) of SWFU

(Source: Author, 2017)

There was a large amount of public green space observed near all buildings (see Figure 6.24). Additionally, on the north-eastern side of this campus was 0.87 hectares of unused land (see Figure 6.24).



Figure 6.24. Public Green Space (left) and Unused Plot (right) in Eastern Campus of SWFU

(Source: Author, 2017)

Expressions of UA:

On the Eastern Campus of SWFU, there were 56 UA practices observed in both public and private spaces (see Figure 6.25), with a density of 8.3 practices per hectare. The practices were mainly distributed near the residential buildings in the south-eastern corner of the campus, as well as several UA practices observed in the unused vacant plot.



Figure 6.25. Distribution of UA Practices in SWFU (Eastern Campus)

For the purpose of this research, 25 people were randomly selected as participants to complete the questionnaires or semi-structured interviews. According to the results of the questionnaires and interviews, 56% of the participants reported having experience undertaking UA practices, with the remaining 44% reporting no UA experience (see Figure 6.26). When asked about their reason for pursuing UA practices, the dominant response from UA experienced participants was that it was a personal interest (43%). 55% of respondents without UA experience reported the reason for their lack of participation was due to limited access to adequate space for cultivation, both in indoor and outdoor areas.

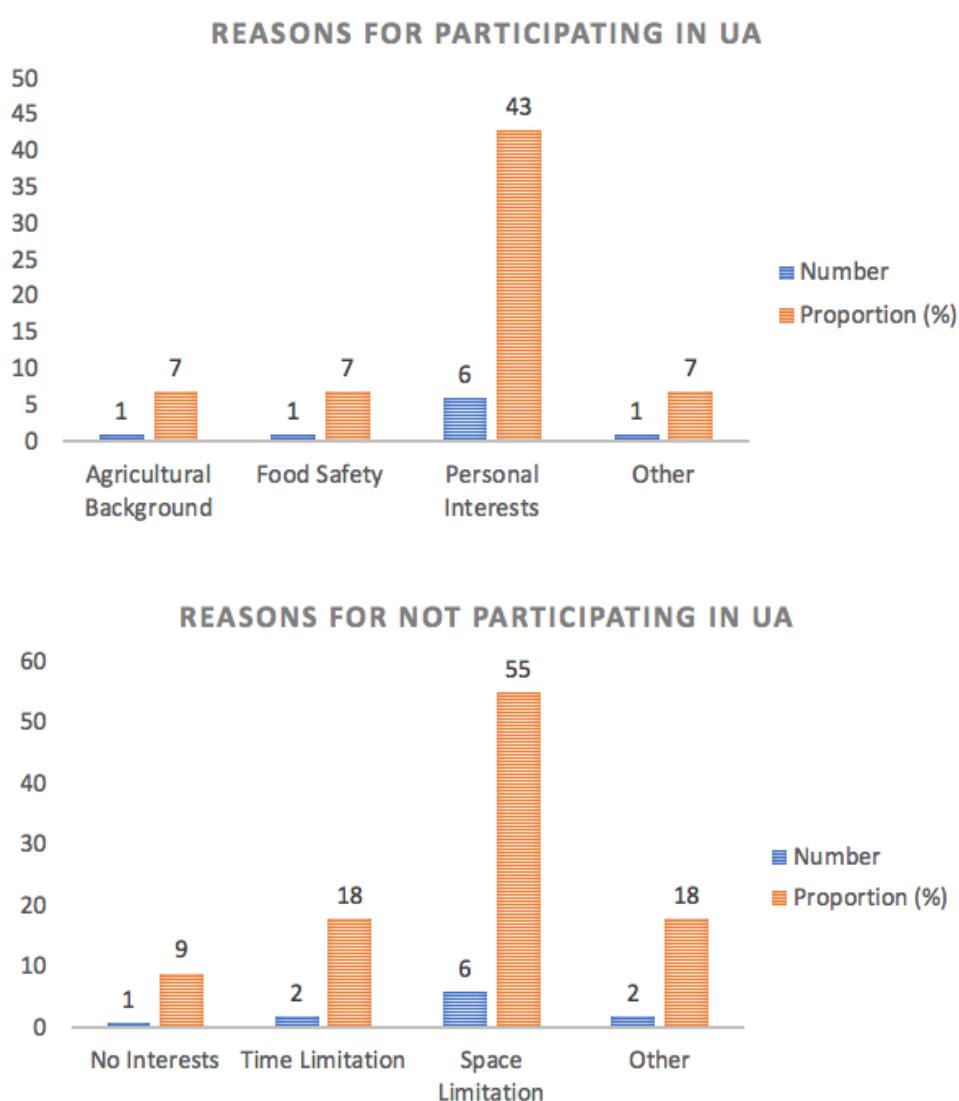


Figure 6.26. Reasons for Participating or not Participating in UA in the Eastern Campus of SWFU

Function:

Eastern Campus participants reported that their UA practices were restricted to growing food solely for domestic consumption because space availability for plant cultivation on campus was limited (see Figure 6.27).



Figure 6.27. The Functions of UA and Reasons in the Eastern Campus of SWFU

Space Type:

UA practices were found both in private spaces and in the public domain at the Eastern Campus of SWFU (see Figures 6.28 & 6.29). Public domain areas were the dominant space type preferred by the participants (73%) (see Figure 6.30). In the public domain, UA

practices were observed in the public green spaces near some roads, in communal areas, near the teaching facilities, as well as in the vacant plot. The primary reason for UA activities in the public spaces due to participants were seeking to take advantage of any land to use for UA practices. The building density of this campus was relatively low compared to the low-income communities discussed above, which allowed the participants to privatise more space for their UA activities. Furthermore, the large areas of public green space provided natural soil for cultivation. Thus, UA practices in the public domain on this campus were more prevalent than those in private spaces, which accounted for only 27% of activities. In private spaces, the participants would place plant pots or containers on windowsills (23%) and balconies (4%).



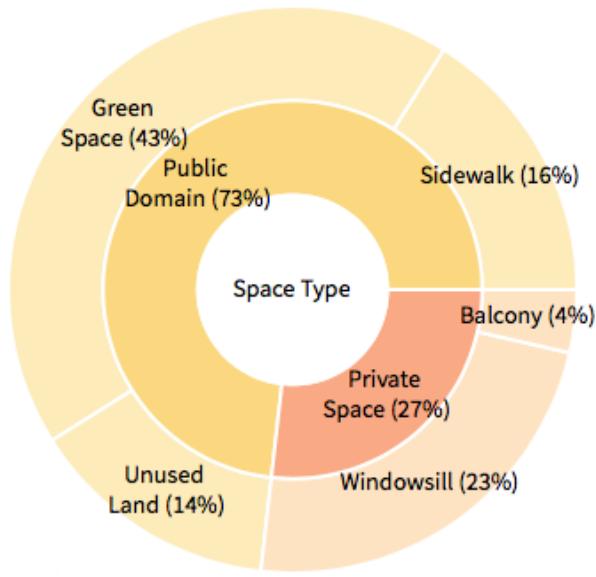
Figure 6.28. UA Practices in the Eastern Campus of SWFU - Private Space

(Source: Author, 2017)



Figure 6.29. UA Practices in the Eastern Campus of SWFU - Public Domain

(Source: Author, 2017)



REASONS FOR SPACE TYPE PREFERENCE

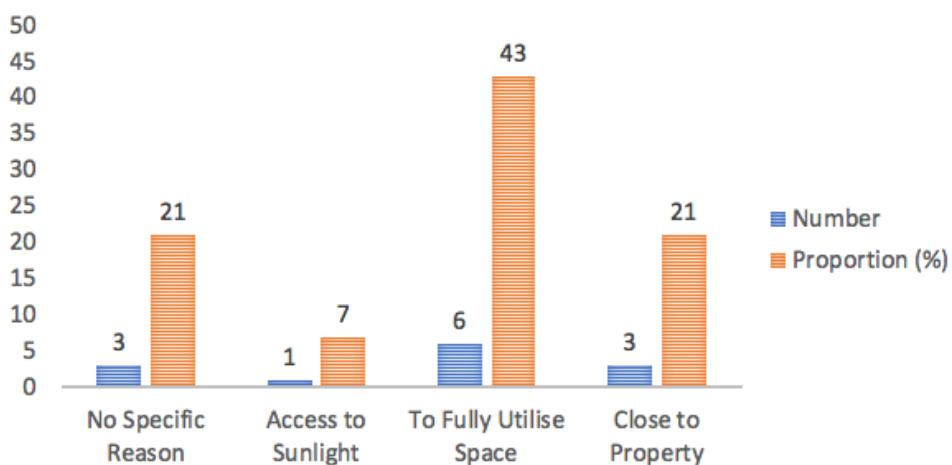


Figure 6.30. The Space Type Preference and Reasons of UA in the Eastern Campus of SWFU

Physical Form:

Observation of the geometric shape of UA practices from a plan view determined rectangle/square (58%) to be the dominant shape (see Figure 6.31). The participants in this campus preferred planting in recycled containers (51%), such as foam boxes. The dominant species for planting chosen by the participants were spices, which accounted for approximately 60% of UA crops, including shallots (39%), mint (11%), and coriander (10%). The remaining 40% of UA crop species selected for cultivation were vegetables, including bok choy (28%), tomatoes (8%), and beans (4%).

GEOMETRIC SHAPE

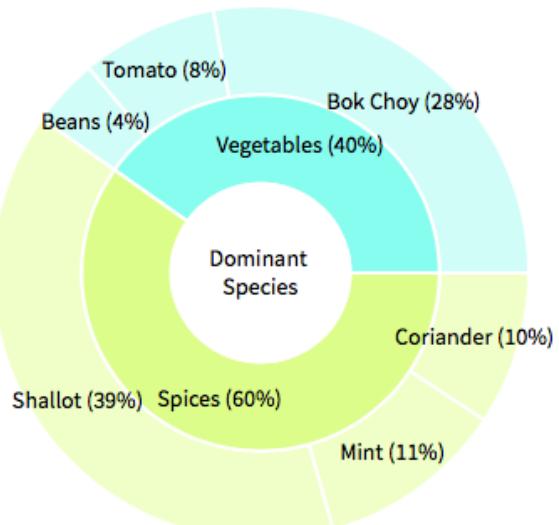
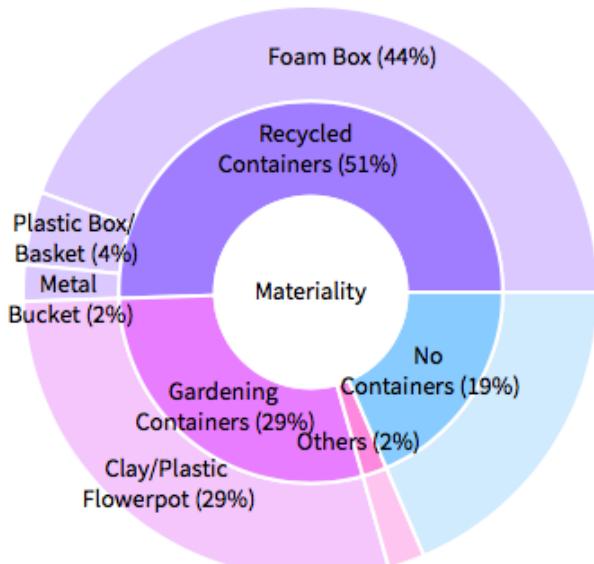
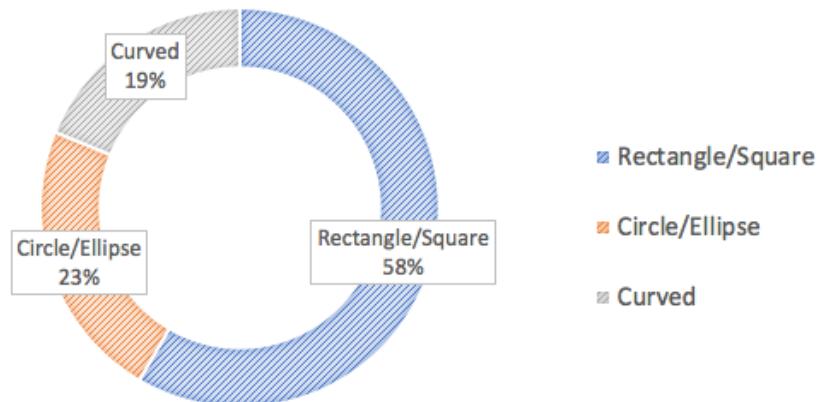


Figure 6.31. Physical Form of UA in the Eastern Campus of SWFU

Rules and Regulations

This campus was managed by the campus management department. Management enforcement of rules regarding restrictions of UA practice was loose, and the existing practices in the public domain were tolerated without issue.

6.5 Urban Agricultural Practices Outside the Third Ring Road

6.5.1 Fully-developed Area – Jiangdong Huacheng

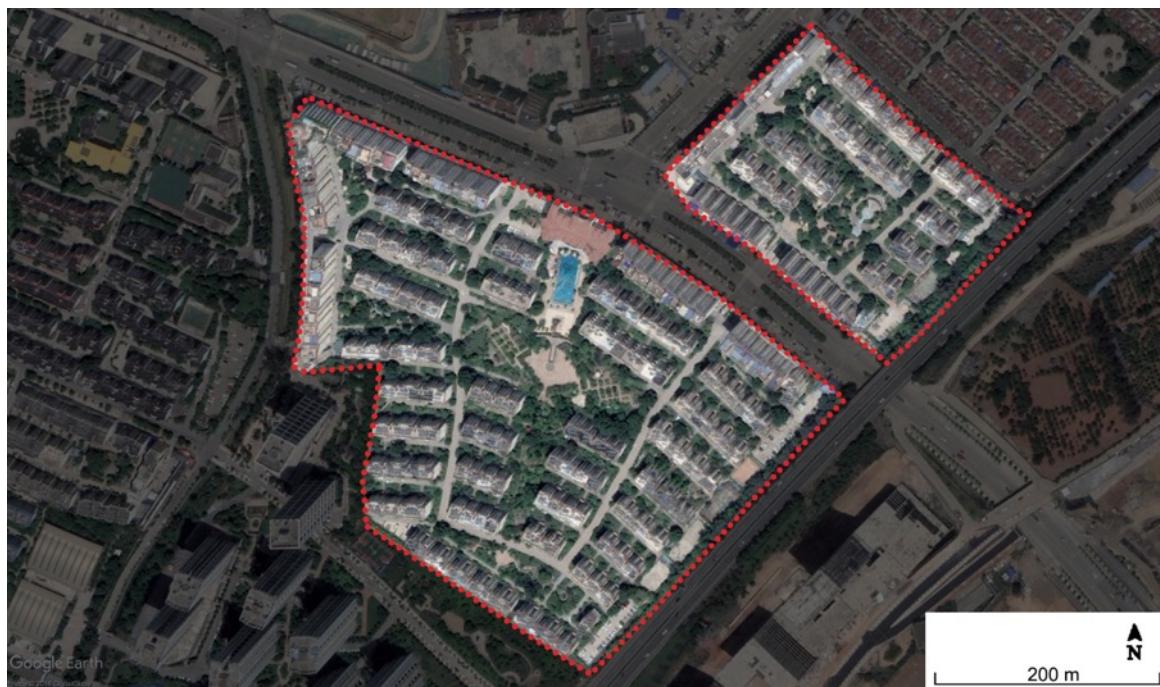


Figure 6.32. The Satellite Map of Jiangdong Huacheng

(Map captured from Google Earth, 2017)

Background:

Jiangdong Huacheng is located outside the Third Ring Road of Kunming and belongs to the Jinchen community, in the Panlong District (see Figure 6.32). It is a middle-income community and was built in 2002. Among the resident population of 5,376, 28% are temporary residents who rent their properties and the remaining 72% of residents are home owners who live in their owned building (PLKM, 2016b). The residents in Jiangdong Huacheng are average middle-income earners; the monthly average household income for this area is CNY ¥8,000 (AUD\$1,600). The average education of residents is tertiary school level. The basic information of Jiangdong Huacheng has been summarised in Table 6.4.

Table 6.4. Basic Information of Jiangdong Huacheng

(Data retrieved from PLKM, 2016b)

Total Area (ha)	Number of Buildings	Floor Area Ratio	Number of Residents	Green Space Ratio
18.28	48	0.98	5376	45%

In comparison to the other residential areas investigated in this research, Jiangdong Huacheng has a low floor area ratio in addition to a high green space ratio. Hence, the large areas of public green spaces fulfil the recreational needs of local residents (see Figure 6.33). As a gated community, Jiangdong Huacheng has 5 entrances, including 2 entrances for the northern section and 3 entrances for the southern section. The 10 buildings located near the entrances are high-rise towers ranging from 10-14 storeys in height. The remaining buildings are low-rise, usually up to 6 storeys in height. Households situated in low-rise buildings on the ground floors have private back yards with sizes ranging between 20-30m². In high-rise buildings, the households who live on the top floors have access to a private rooftop with an area ranging between 80-150m².



Figure 6.33. The Street Level View (left) and Private Back Yard (right) in Jiangdong Huacheng

(Source: Author, 2017)

Expressions of UA:

In Jiangdong Huacheng, there were 277 UA practices observed in both private spaces and public domain areas (see Figure 6.34), with a density of 15.15 practices per hectare.



Figure 6.34. Distribution of UA Practices in Jiangdong Huacheng

During this research investigation, 25 people from Jiangdong Huacheng were randomly selected as the participants to complete the questionnaires or semi-structured interviews. The results of the questionnaires and interviews determined 68% of the participants had experience undertaking UA practices; the remaining 32% expressed having no UA experience (see Figure 6.35). When participants were questioned for their motivation for participating in UA practices, the dominant answer given was they commenced UA activities to serve for their personal interests (65%). Households without experience in UA activities were also questioned why they did not undertake UA practices. Limited space to grow plants (50%) was the primary reason provided by households who did not have access to private backyards or rooftops.

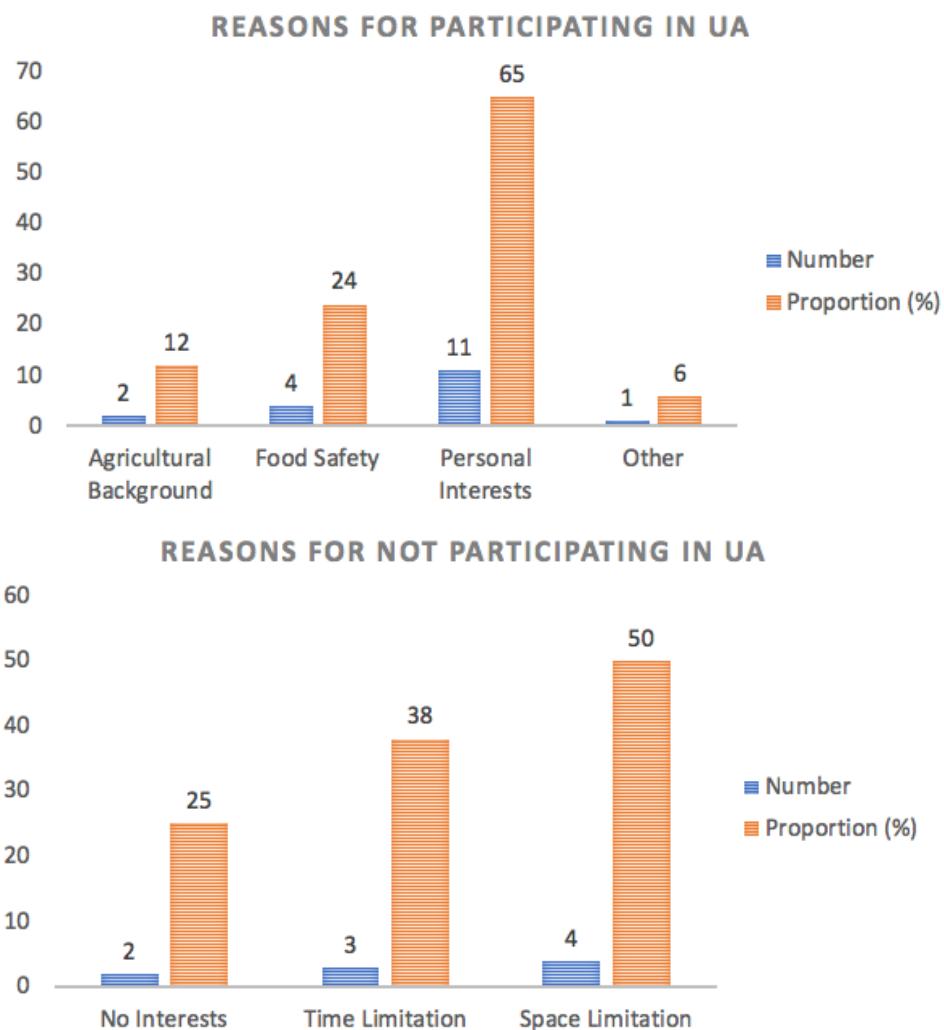


Figure 6.35. Reasons for not participating in UA in Jiangdong Huacheng

Function:

According to the investigation results, the participants were restricted to growing only enough produce for their household consumption because space capable of agricultural use remained limited in this middle-income community. Even for those with access to private back yards or rooftops spaces, the yield of UA produce in these areas was adequate for family consumption, but not high enough for sale at local markets for profit (see Figure 6.36).

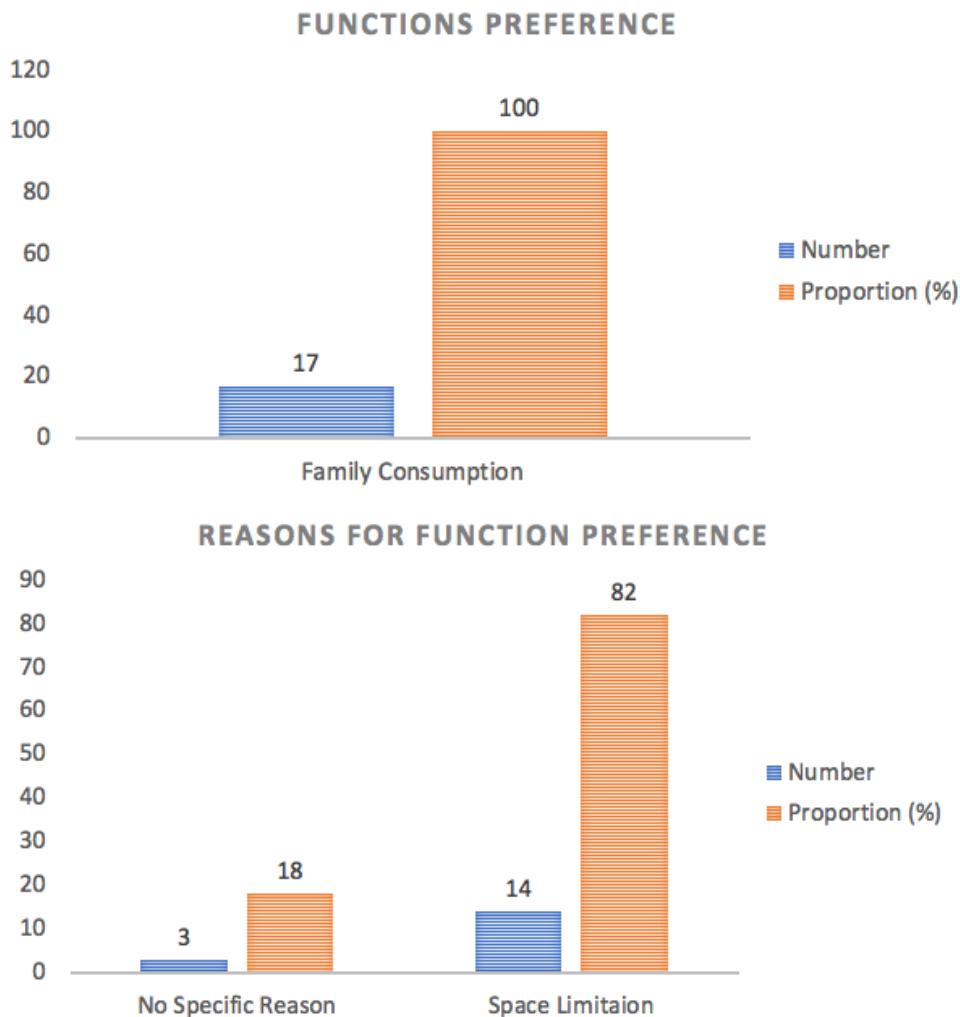


Figure 6.36. The Functions of UA and Reasons in Jiangdong Huacheng

Space Type:

UA practices can be found both in private spaces and the public domain areas of Jiangdong Huacheng (see Figures 6.37 & 6.38). Private space is the dominant space type preferred by the participants (65%) (see Figure 6.39). In private spaces, households preferred planting in their private back yards (22%) and balconies (21%). In the public domain, UA activities were observed both in the public green spaces near some of the road and in the communal green areas. From these observations, it is clear that households sought opportunities to maximise efficient use of outdoor space in or around their properties to undertake UA activities, regardless of whether the spaces were public or private (see Figure 6.40).

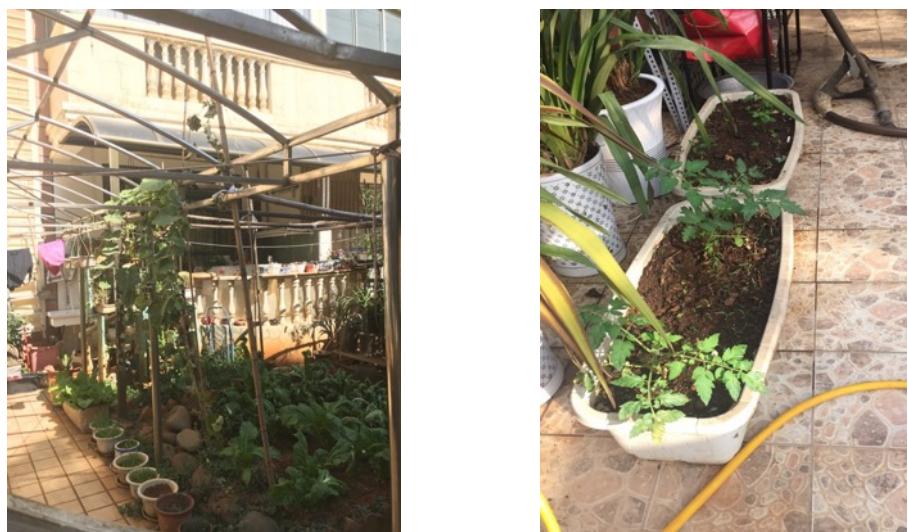


Figure 6.38. UA Practices in Jiangdong Huacheng – Private Space

(Source: Author, 2017)



Figure 6.39. UA Practices in Jiangdong Huacheng- Public Domain

(Source: Author, 2017)

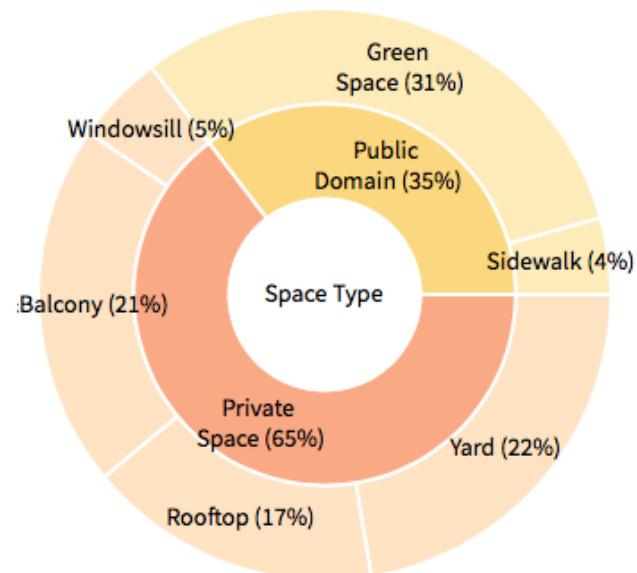


Figure 6.37. Space Type Preferences of UA in Jiangdong Huacheng

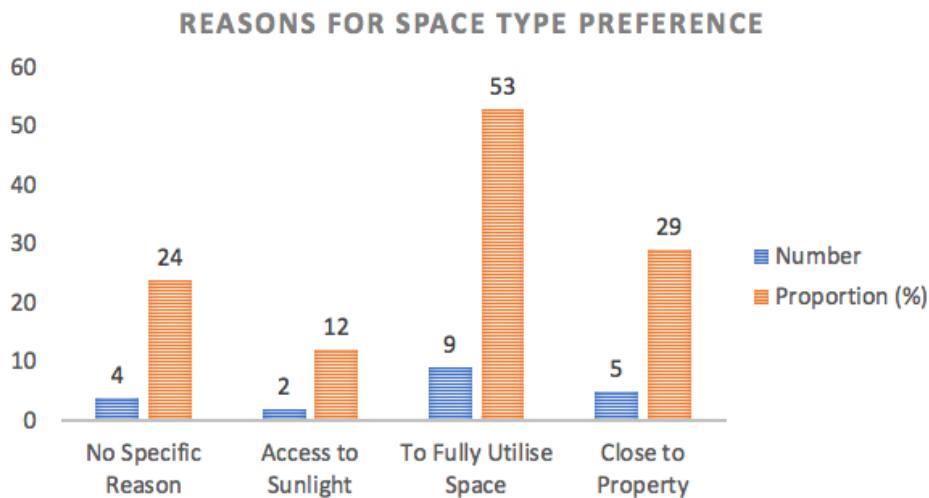


Figure 6.40. The Space Type Preference and Reasons of UA in Jiangdong Huacheng

Physical Form:

Rectangle/square (42%) and curved (32%) were the dominant geometric shapes of UA practices from a plan view perspective (see Figure 6.41). Households preferred planting produce in recycled containers (39%), especially foam boxes (see Figure 6.42). Also, it was observed that a large proportion of UA practices were planted directly in the ground without any containers (32%). The crop species selected for UA activities in Jiangdong Huacheng was more diverse than the non-village areas investigated. Both spices (49%) and vegetables (48%) were found in private and public domains. In addition to crops, some households raised chickens and ducks in their yards and rooftops, as well as in public green spaces (3%).

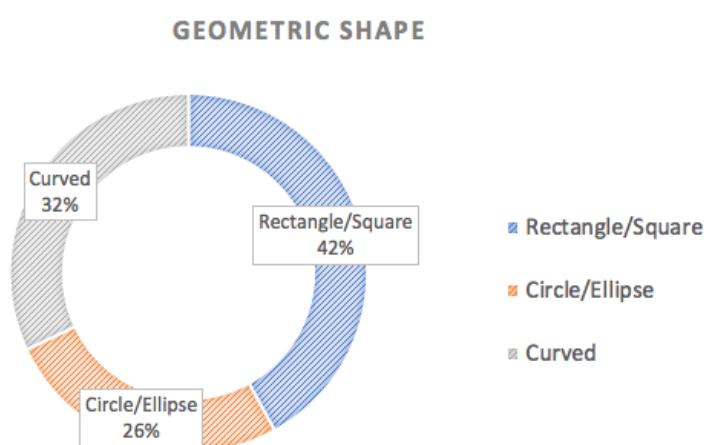


Figure 6.41. Physical Form of UA in Jiangdong Huacheng – Geometric Shape

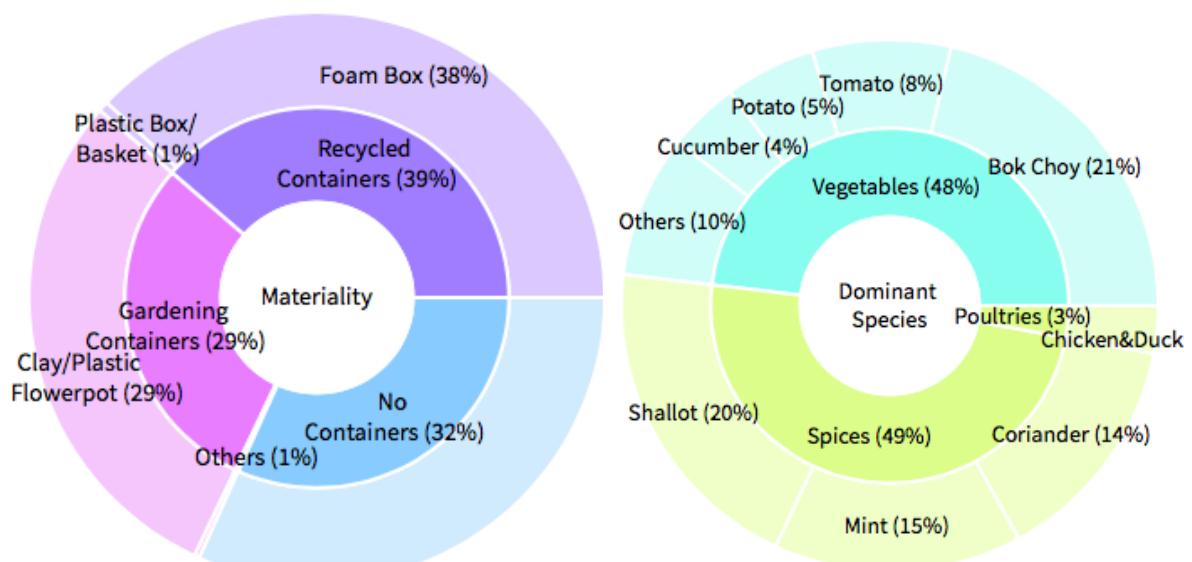


Figure 6.42. Physical Form of UA in Jiangdong Huacheng – Materiality and Dominant Species

Rules and Regulations

This middle-income residential area was managed by a professional management company. According to the management rules, individuals are not allowed to adapt public green space for private use (KMPC, 2012). In spite of these rules, some UA practices were observed to exist in the public domain without detriment to the established functions of the space. Often these UA activities were hidden behind the original shrubs growing in public green spaces. According to the interviews, the management force in Jiangdong Huacheng has demonstrated a tolerant attitude towards UA practices undertaken in the public domain.

6.5.2 Fully-developed Area – Qingshui Muhua



Figure 6.43. The Satellite Map of Qingshui Muhua

(Map captured from Google Earth, 2017)

Background:

Qingshui Muhua is located outside the Third Ring Road of Kunming and belongs to the Panlong District. It is a high-income community (see Figure 6.43). Among the residents, 7% are temporary residents who rent their properties and 93% of residents are homeowners and live in their own home (PLKM, 2016b). The residents in Qingshui Muhua are average middle-income to high-income earners. The monthly average household income for this high-income residential area is CNY ¥20,000 (AUD\$4,000) and the average education of residents is tertiary school level (PLKM, 2016b). The basic information of Qingshui Muhua has been summarised in Table 6.5.

Table 6.5. Basic Information of Qingshui Muhua

(Data retrieved from PLKM, 2016b)

Total Area (ha)	Number of Buildings	Floor Area Ratio	Number of Residents	Green Space Ratio
21.61	222	0.92	2664	55%

This high-income community comprises 222 buildings, which includes detached and semi-detached houses with an average height of 3-4 storeys (see Figure 6.44). Each house belongs to a single household and every household has a private yard in the range of 50-150 m² in size. This residential area features low building density, low-rise buildings and a high green space ratio. The largest public green space is located in the centre of Qingshui Muhua, providing residents with an area for recreational activities and social gatherings.



Figure 6.44. Street View and Building Style of Qingshui Muhua

(Source: Author, 2017)

Expressions of UA:

In Qingshui Muhua, there were 244 UA practices identified in both private spaces and public domain areas with a density of 11.29 practices per hectare (see Figure 6.45).



Figure 6.45. Distribution of UA Practices in Qingshui Muhua

For the purpose of this investigation, 25 people were randomly selected as the representatives of households and community groups to complete the questionnaires or semi-structured interviews. According to the results of the questionnaires and interviews, 88% of the participants reported having experience in undertaking UA practices. The remaining 12% of participants had no UA experiences (see Figure 6.46). When asked about the reason for participating in UA practices, the dominant two answers from participants were personal interests (77%) and the need for healthier food (41%). The participants who had no experience in UA practices responded that lack of interest and space limitations were the reasons for their non-participation.

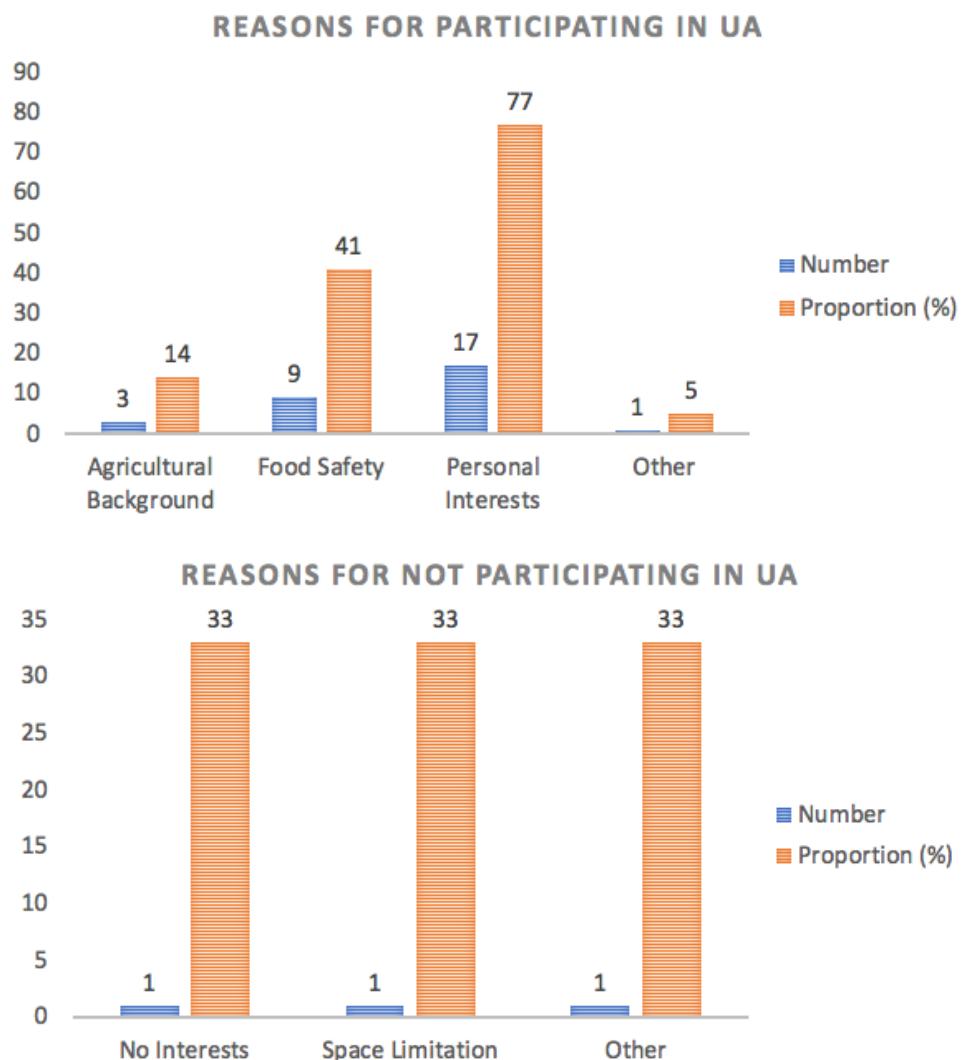


Figure 6.46. Reasons for Participating/ not Participating in UA in Qingshui Muhua

Function:

The households surveyed in Qinshui Muhua reported self-grown food was used for personal household consumption only. The main reason provided for the limited scope of UA activity was due to insufficient access to land that was available for large-scale agricultural production. As such, the UA products generated from private yards were enough for family consumption rather than for sale at local markets for profit (see Figure 6.47).

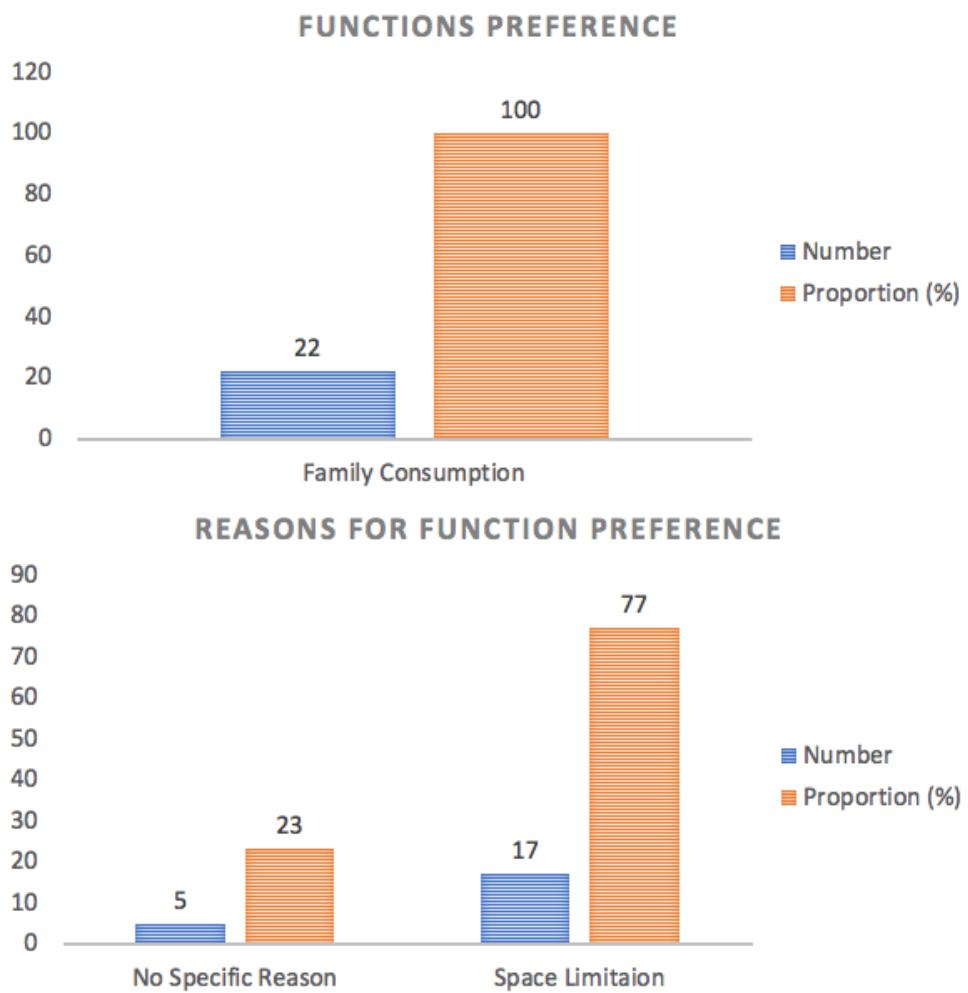


Figure 6.47. The Functions Preferences of UA in Qingshui Muhua

Space Type:

UA practices were found both in the private spaces and public domain areas of Qingshui Muhua (see Figures 6.48 & 6.49). Private space was the dominant space type preferred by households, accounting for approximately 95% of respondents (see Figure 6.50). Private yards were the most popular space chosen by households to grow crops (92%) due to ease of access since the land is attached to their properties. Some of the households used fences to protect their yards and UA products from outsiders. In the public domain areas, UA practices were mainly observed in the public green spaces near some of the roads or next to private yards.



Figure 6.48. UA Practices in Qingshui Muhua- Private Space

(Source: Author, 2017)



Figure 6.49. UA Practices in Qingshui Muhua- Public Domain

(Source: Author, 2017)

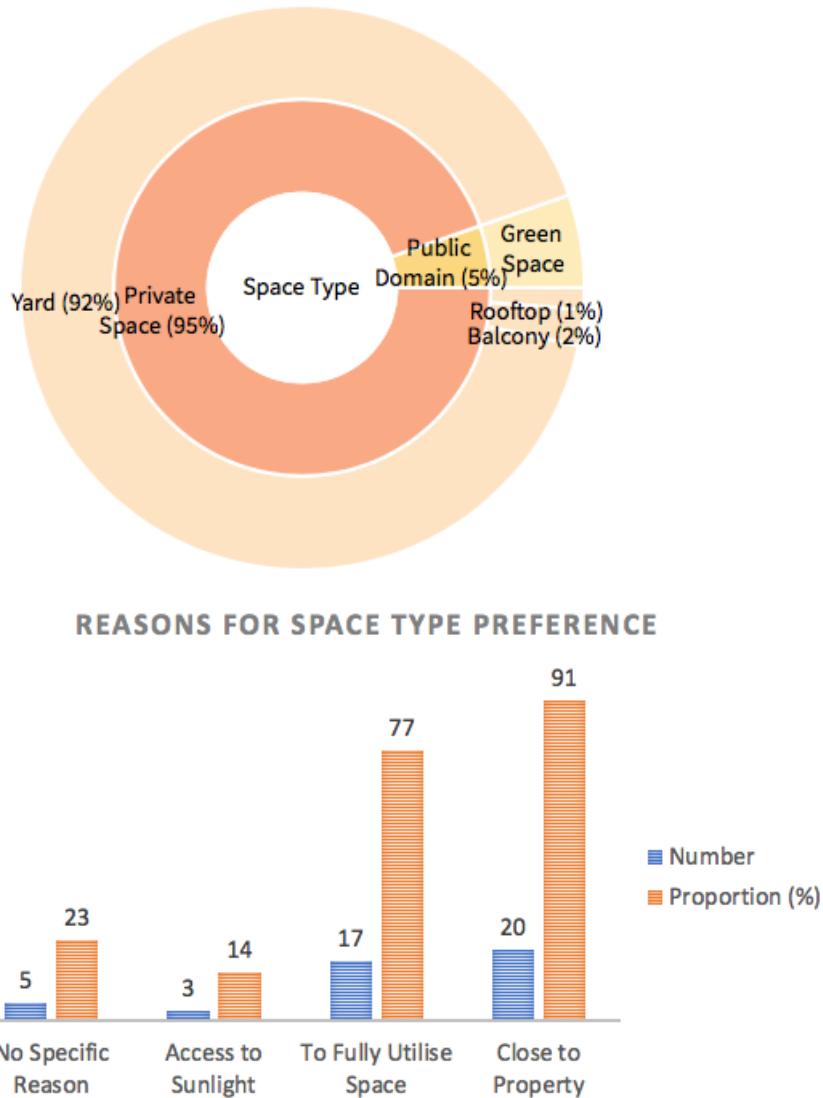


Figure 6.50. Space Type Preferences and the Reasons of UA in Qingshui Muhua

Physical Form:

Observation revealed the dominant geometric shape of UA practices from a plan view was rectangle/square (50%), followed by curved (26%) (see Figure 6.51). The households preferred planting in recycled containers (45%) and gardening-specific containers (29%). Many households used bricks, tiles, or flagstones to pave the courtyard to facilitate parking space, leaving a small part of the plot with soil exposed. In some cases, the entire courtyard had been paved. Under these circumstances, households preferred using containers for planting rather than growing directly in ground. The dominant plant species grown by the households in Qingshui Muhua were vegetables (54%), followed by spices (41%).

GEOMETRIC SHAPE

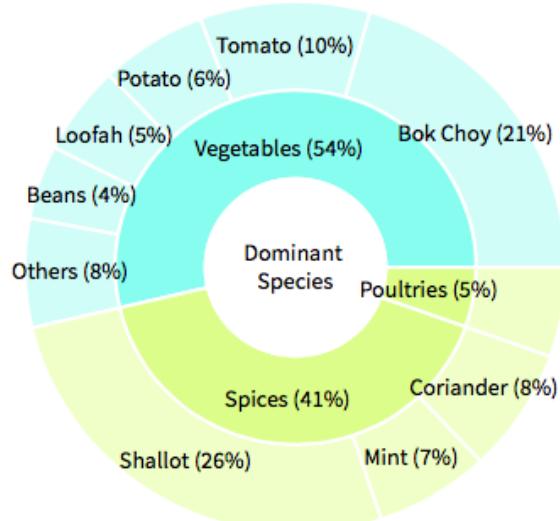
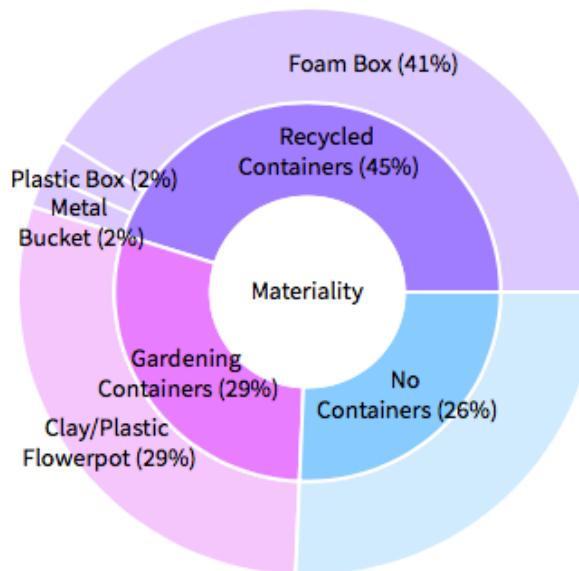
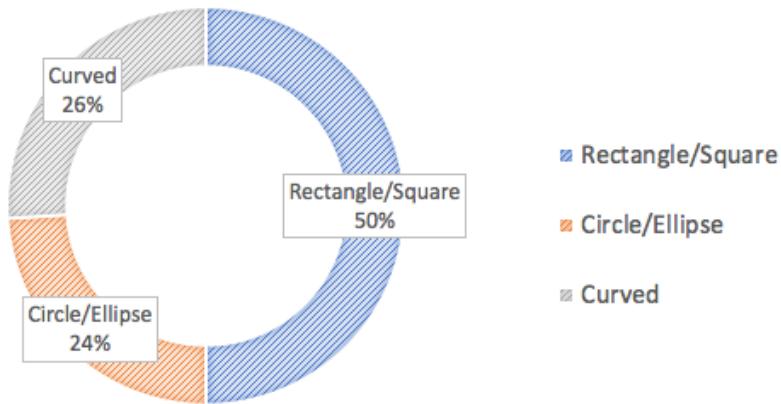


Figure 6.51. Physical Form of UA in Qingshui Muhua

Rules and Regulations

A professional management company supervised this high-income residential area. According to the management rules, individuals cannot adapt any public green spaces for private use (KMPC, 2012). There were no specific rules for households in regards to choosing spaces or the physical form of UA practices.

6.6 Summary

According to the results of the questionnaires, interviews, and observations, there were similarities and differences among all the UA practices in the non-VIC areas. The following Tables display the dominant functions, space types, and physical forms in each space type. The investigation results of different area types in various locations suggests there were more UA practices occurring in the areas located in the outer rings than the inner rings (see Table 6.6).

Table 6.6. Summary of Amount and Density of UA Practices - Households

Spatial Feature		Non-village Area Name	Number of UA Practices Observed in Non-VICs	Density of UA Practices (per hectare)
Within First Ring Road	Low-income Community	Milesi	69	8.94
Within Second Ring Road	Low-income Community	Jiangan Xiaoqu	90	16.7
Within Third Ring Road	Institution Plot	SWFU (Eastern Campus)	56	8.3
Outside Third Ring Road	Middle-income Community	Jiangdong Huacheng	277	15.15
	High-income Community	Qingshui Muhua	244	11.29

Function:

All responses had a similar rationale in the use of UA with respect to function. The dominant function of the UA practices was for domestic consumption (see Table 6.7). This trend can be explained by the limited scale and small size of UA practices undertaken by household members. Thus, the cultivation of UA produce was prioritised to fulfil the immediate consumer needs within households rather than sell the products for profit.

Table 6.7. UA Examples by Dominant Functions

	Examples
Household Consumption	

Space Type:

In all investigated non-VIC areas, both private space and public domain areas were selected for UA activities (see Tables 6.8 & 6.9). A similarity discovered across all areas was the dominant space utilised for UA activities was households' private spaces. The main motivation for this trend is that the participants sought to fully utilise the space within their private properties.

Table 6.8. Summary of Space Type

Spatial Feature		Name	Dominant Space Type	Main Reason for the Space Type
Within First Ring Road	Low-income Community	Milesi	83% Private Space 17% Public Domain	Fully Utilise of Space/ Access to Sunlight
Within Second Ring Road	Low-income Community	Jiangan Xiaoqu	81% Private Space 19% Public Domain	Fully Utilise of Space/ Access to Sunlight
Within Third Ring Road	Institution Plot	SWFU (Eastern Campus)	27% Private Space 73% Public Domain	Fully Utilise of Space
Outside Third Ring Road	Middle-income Community	Jiangdong Huacheng	65% Private Space 35% Public Domain	Fully Utilise of Space
	High-income Community	Qingshui Muhua	95% Private Space 5% Public Domain	Close to Property
Non-village Areas Average			75% Private Space 25% Public Domain	Fully Utilise of Space

Table 6.9. UA Examples by Dominant Space Type

	Examples
Private Space	
Public Domain	

Physical Form:

Among all the UA practices, whether fixed or movable, the dominant geometric shapes as observed from a plan view was the rectangle/square (see Tables 6.10 & 6.11). The most preferred material for planting containers were the recycled containers, primarily the foam boxes sourced from items used in daily life (see Table 6.12). The containers used by the households, including gardening-specific or recycled containers, were mass produced containers with a regular shape. The preferred characteristics of species for UA produce was shared across all areas – namely, small-sized plants such as spices and low-growing vegetables like bok choy (see Table 6.13). These species were easy for households to cultivate in the containers and thus demonstrates a strong correlation between function and the physical form of UA.

Table 6.10. Summary of Physical Form and Species Type

Spatial Feature		Name	Geometric Shape	Materiality	Dominant Species of Produce
Within First Ring Road	Low-income Community	Milesi	55% Rectangle/Square	54% Recycled Containers: Foam Box	76% Spices: Shallots
Within Second Ring Road	Low-income Community	Jiangan Xiaoqu	65% Rectangle/Square	57% Recycled Containers: Foam Box	72% Spices: Shallots
Within Third Ring Road	Institution Plot	SWFU (Eastern Campus)	59% Rectangle/Square	51% Recycled Containers: Foam Box	60% Spices: Shallots
Outside Third Ring Road	Middle-income Community	Jiangdong Huacheng	42% Rectangle/Square	39% Recycled Containers: Foam Box	49% Spices: Shallots
	High-income Community	Qingshui Muhua	50% Rectangle/Square	45% Recycled Containers: Foam Box	54% Vegetable: Bok choy

Table 6.11. UA Examples by Dominant Geometric Shape (Plan View)

Geometric Shape	Examples			
Rectangle/ Square				
Circle/ Ellipse				
Curved				

Table 6.12. UA Examples by Materiality

Materiality	Examples
Gardening-Specific Containers	
Recycled Containers	
No Containers (In Ground)	

Table 6.13. UA Examples by Dominant Species

Species	Examples
Spices (Shallots, mint, coriander, etc.)	
Vegetables (Bok choy, eggplant, tomatoes, etc.)	
Poultry (Chickens, ducks, and geese)	

Rules and Regulations:

According to Kunming Greening Regulations (KMPC, 2012), all individuals and groups are prohibited from privatising or altering the original function of public green spaces, including undertaking UA practices in the public domain. For those middle-income and high-income communities under management from professional management companies, rules and regulations disallowed residents from adapting public areas for private UA uses. However, some of the residential sites were observed to have UA activities occurring in public domain areas without causing any severe problems. These activities were often tolerated by the company management teams in spite of the existing rules.

Conclusion:

The results of the above investigation showed/highlighted the following key patterns emerging within non-VIC residential areas:

- The dominant function of UA was household consumption (100%).
- The dominant space type was private space (75%), followed by public domain areas (25%).
- The dominant geometric shape as observed from the plan view was rectangle/square (51%), followed by circle/ellipse (25%) and curved (25%).
- The dominant containers used were recycled containers (45%), such as foam boxes.
- The dominant species were spices (52%) and vegetables (45%).
- The containers for all UA practices were mass-produced rather than handmade.
- There were rules regarding the adaptation of public space for private use.
- There are more UA practices can be observed in the outer rings compared with the inner rings because there is more space available for private adaptive in new development in the outer rings. For example, in high-income communities outside the Third Ring Road, the design of buildings provides a private yard for each household, which can be utilised for UA.

7 Understanding the Motives of Stakeholders involved in Urban Agriculture in Village in the City and Non-Village Areas

7.1 Introduction

In Chapters 5 and 6, the expressions of UA in VICs and non-village areas in different spatial rings were analysed and compared from the perspective of the four key variables, namely, function, space type, physical form, and rules and regulations. This chapter will discuss the perspectives of stakeholders to gain a deeper understanding of their roles and motivations in UA practices in VICs, non-village areas, and in the city overall (both VICs and non-village areas).

This Chapter collectively reviews the results obtained from the questionnaires and semi-structured interviews. The range of stakeholders involved in UA practices includes households, community groups, commercial operators, and government and related departments. It should be noted that the variables as discussed before primarily focused on UA undertaken by households and community groups. In respect of the other stakeholder groups like commercial operators and governments and related departments, the focus is primarily on understanding their attitude toward UA, and the negotiation of ‘formal’ rules and regulations of UA.

7.2 Household Motivation

Individuals and households involved in UA practices refers to the residents living in VICs and non-village areas in Kunming undertaking UA, either on their own or with other members of their households. In VICs and non-village areas dominated by low-income communities, the residential areas are managed and controlled by the community committees formed by local residents under the authority of the Municipal Government. In this context, some of the residents are also members of the local community committees which are voluntarily formed. As such, the classification based on household participants and community groups may overlap in this setting. A total of 375 households and

community groups completed the questionnaires and interviews, of which 250 persons lived in the VICs and the remaining 125 persons lived in non-village areas (see Table 7.1).

Table 7.1. Research Participants by Living Areas – Household & Community Groups

Area	Questionnaires	Semi-structured Interviews
VIC (250)	200	50
Non-village Area (125)	100	25
Total (375)	300	75

*The participants of questionnaires and interviews are different people.

7.2.1 Experience in Undertaking UA Practices

According to the results of questionnaires and semi-structured interviews for both VICs and non-village areas, 60% of household participants had experience in UA practices, while the remaining 40% households had never participated in UA. In VICs specifically, there were 65% individual or household participants who had experience in UA practices; the remaining 35% reported having no UA experience. In non-village areas, the households who had experience in UA practices was approximately 55% and those who had no UA experience was approximately 45%.

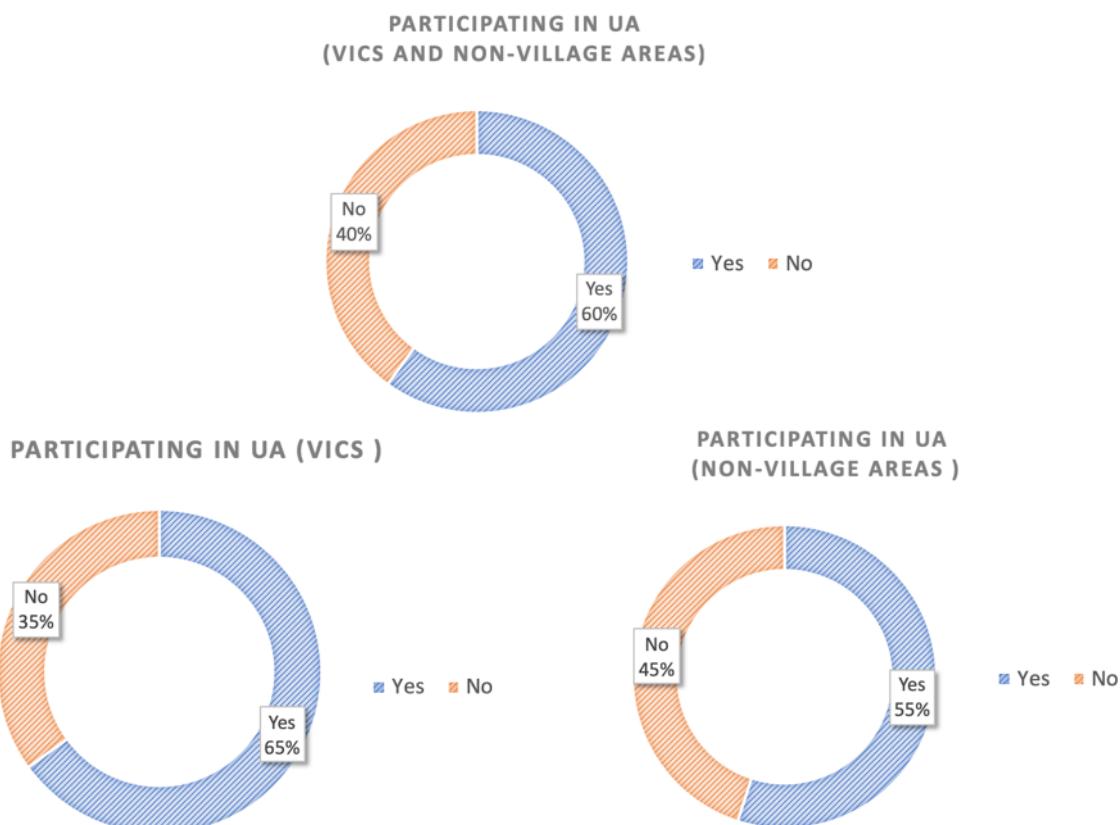


Figure 7.1. Experience in UA – Household

Among the 162 households who were engaging in UA practices in VICs, 80% reported having previous experience in undertaking UA practices, while the remaining 20% households had none. It was found that for the households with previous experience, 90% were still engaging in UA activities as part of their daily routine and the remaining 10% were no longer continuing any UA activities. The situation was significantly different in non-village areas, where 67% households were engaging in UA activities even if they had no previous experience in undertaking UA practices. Furthermore, for those households with previous UA experience, all were still engaging in UA activities. In conclusion, previous experience in UA was not the decisive factor of present participation rate.

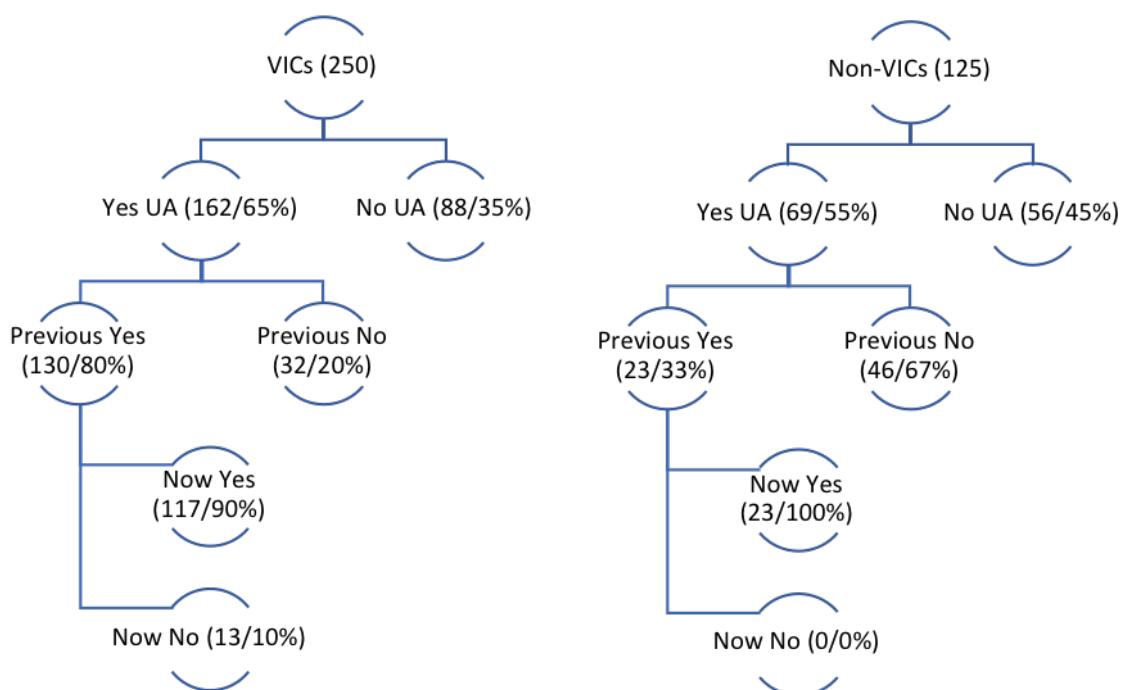


Figure 7.2. Experience in UA –Household

As for the reasons for undertaking UA practices in both VICs and non-village areas, the prevalent answers given were having a previous background in agricultural practices (46%) and pursuing personal interests (40%) (see Figure 7.3). In VICs, the dominant reason was that participants had an agricultural background (78%), followed by the need for supplementary income (26%) (see Figure 7.4). In non-village areas, the proportion of those whose personal interest (60%) was their motivator for UA participation exceeded the proportion of those who were doing so to seek healthier food options (19%) (see Figure 7.5).

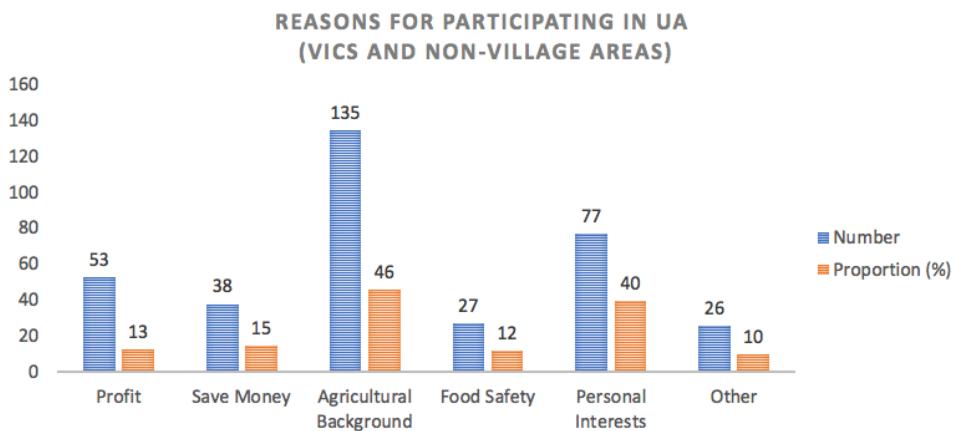


Figure 7.3. Reasons for Undertaking UA in both Areas – Household

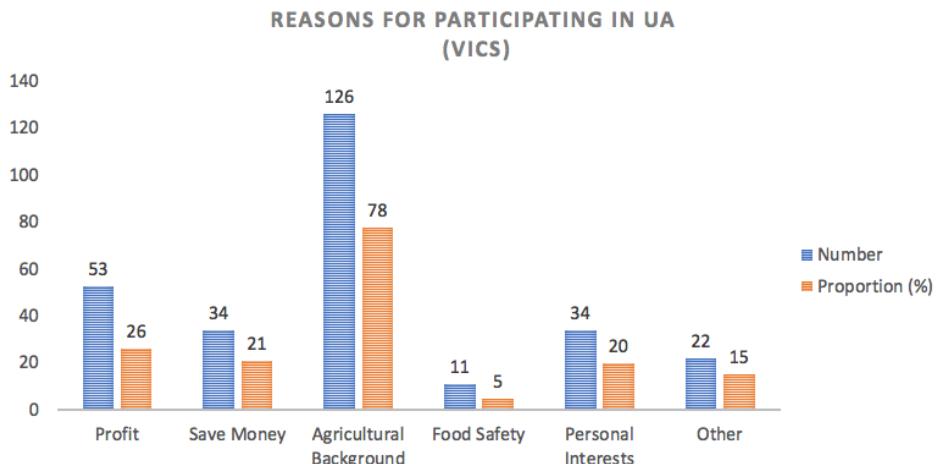


Figure 7.4. Reasons for Undertaking UA in VICs – Household

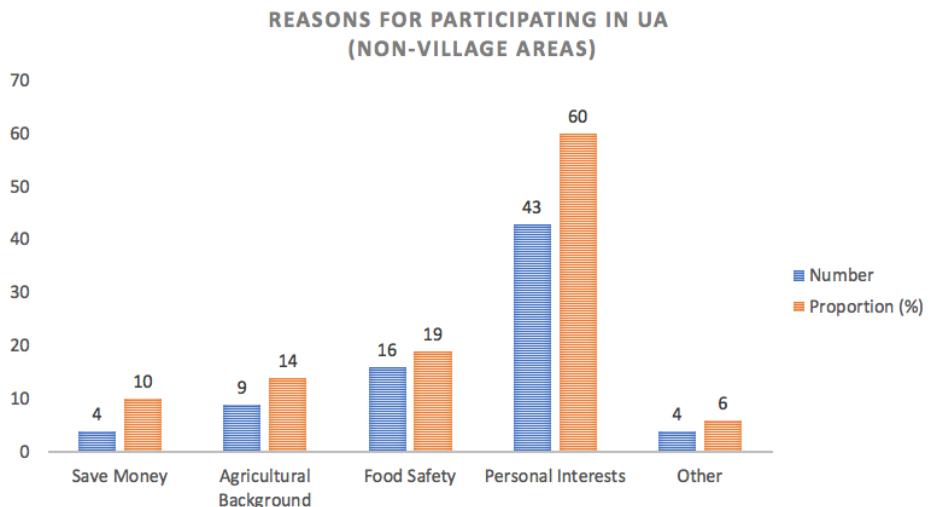


Figure 7.5. Reasons for Undertaking UA in Non-village Areas – Household

These results suggest that the differences in motivations between VICs and non-village areas could be attributed to the demographic composition and income levels. In VICs, for example, a significant proportion of residents held a rural *hukou*. Some of the residents were the local ‘native’ villagers who retained a rural *hukou* before their rural villages were transformed into a VIC. Others who migrated to the VICs from other towns and cities of Yunnan Province or other provinces also maintained their rural *hukou* status. UA could therefore be viewed as a continuation of their agricultural and rural backgrounds, with one function being the creation of income from selling their produce.

In non-village areas, most of the residents held an urban *hukou*. As a general observation, those with higher income levels in non-village areas pursued a higher standard of living and wellbeing. These residents practiced UA because of personal interest in cultivation activities and also in order to obtain homemade ‘healthier’ food, as reflected in their questionnaires and interviews responses.

When asked for the reasons for not undertaking UA practices, the prominent response was space limitation (55%) followed by time limitations (18%) in both VICs and non-village areas (see Figure 7.6). In VICs, the trend was similar in that the prominent answers were space limitations (54%) and time limitations (21%) (see Figure 7.7). The typical indoor area of a rental room in VICs ranged from 10m² to 30m² and private outdoor areas available for each individual and household was scarce or non-existent. In this context, space limitation became the dominant reason for not participating in UA practices. The residents in VICs generally consisted of low to middle-income families whose daily working hours were estimated on average to be around 10-12 hours. This impacted on the participation rate of UA, as some of the people with long working hours might have not enough time dedicated to planting. The situation in non-village areas reflected similar trends, with the dominant reason for non-participation being space limitation (54%) and followed by no specific reason (21%) (see Figure 7.8). The indoor living space in non-village areas was larger than that in VICs, with the typical area ranging from 50m² to 200m². However, the outdoor space available for UA practices was still not large enough for households, especially for those in low-income and middle-income communities.

REASONS FOR NOT PARTICIPATING IN UA (VICS AND NON-VILLAGE AREAS)

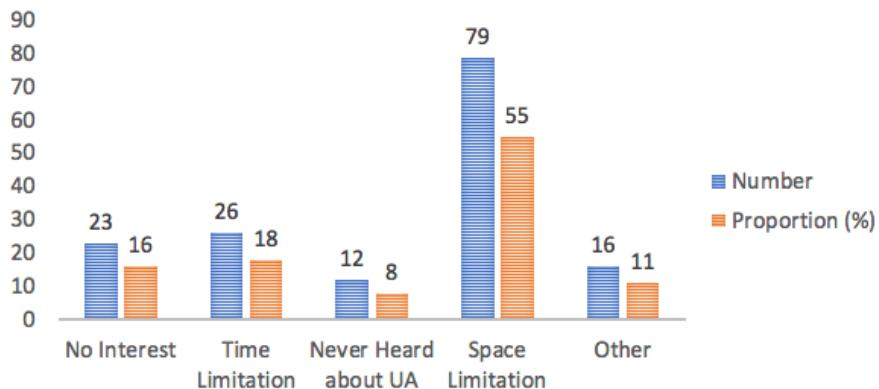


Figure 7.6. Reasons for not Undertaking UA in both Areas – Household

REASONS FOR NOT PARTICIPATING IN UA (VICS)

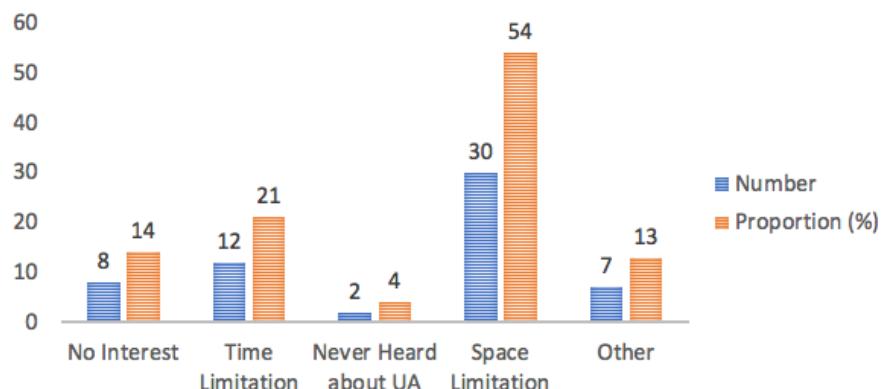


Figure 7.7. Reasons for not Undertaking UA in VICs – Household

REASONS FOR NOT PARTICIPATING IN UA (NON-VILLAGE AREAS)

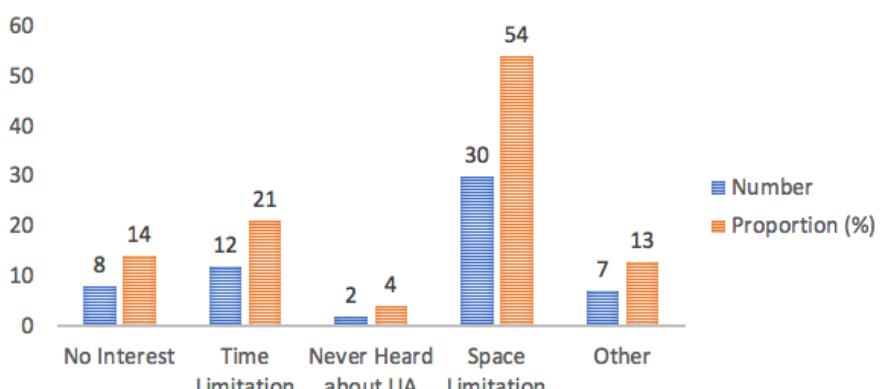


Figure 7.8. Reasons for not Undertaking UA in Non-village Areas – Household

7.2.2 Function Preferences of Urban Agriculture

These selected quotes reflect the typical responses received from participants regarding their functional preferences of UA:

"After the farmland in our village was requisitioned by the government, there are still a few areas of land left under my household control, but the area of the land is too small, and there is no time to take care of it. We plant some vegetables, but it is only enough for our household consumption. I didn't take any to sell at markets for profit."

--A quote from a resident from Xiaotun Village
(a partially-acquired VIC)

"Because space is limited, the vegetables I grow are only for my own family. This is not enough. I also need to go to the market to buy vegetables. And the variety of vegetables I can grow is also very simple."

--A quote from a resident from Jiangan Xiaoqu
(a low-income community in non-village area)

"The farmland allocated to our family still produces vegetables continuously. I took some of the produce for my own family. If we can't finish it, I will go to the vegetable market to sell it."

--A quote from a resident from Xiaoxince Village
(a developing VIC)

According to the questionnaires and semi-structured interviews, the dominant function preference of UA products in both VICs and non-village areas was for family consumption; there were 23% households selling their UA produce for profit (see Figure 7.9). In VICs, the primary rationale of UA was still family consumption, followed by commercial sales (33%)

(see Figure 7.10). In non-village areas, all UA practices were only for family consumption (see Figure 7.11).

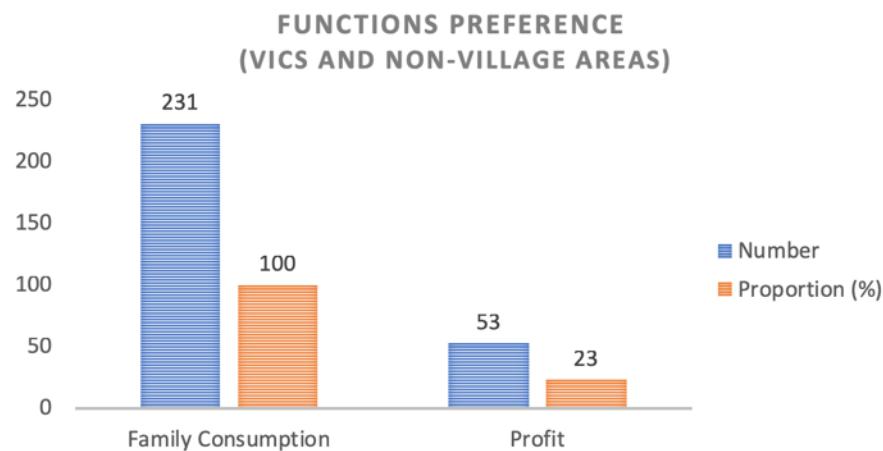


Figure 7.9. Function Preference of UA in both Areas – Household

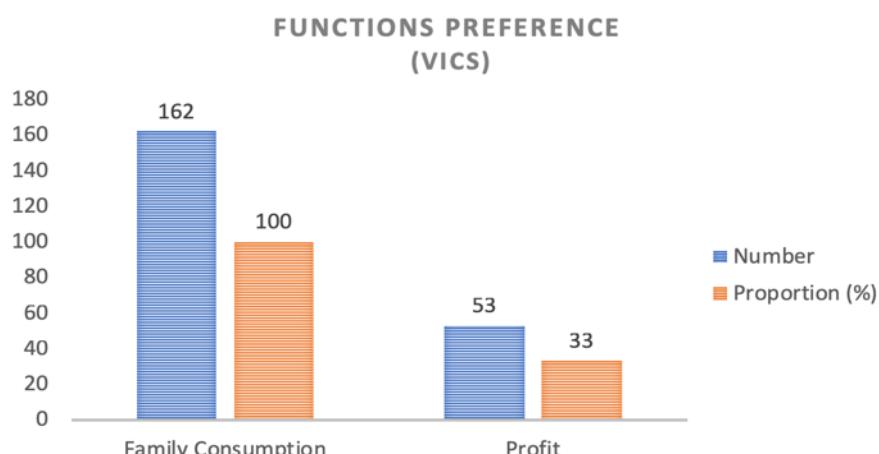


Figure 7.10. Function Preference of UA in VICs – Household

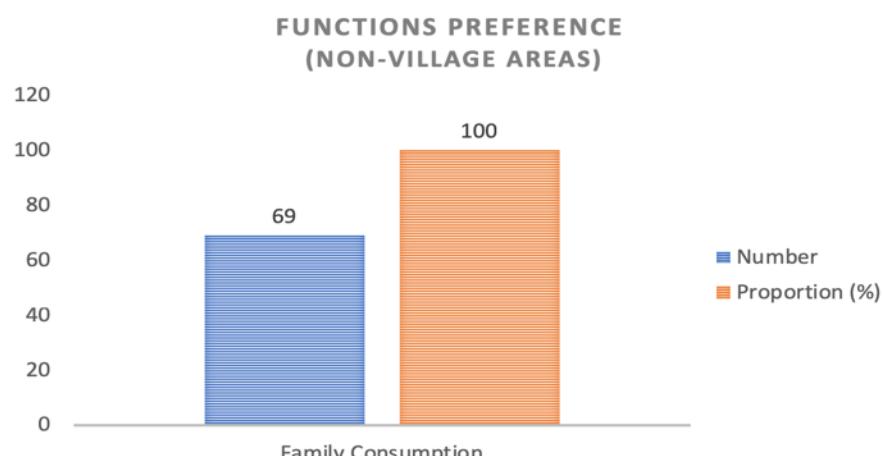


Figure 7.11. Function Preference of UA in Non-village Areas – Household

Within this setting, whether a household gets access to cultivated land specifically allocated for growing crops was the determining factor influencing the sale of produce to the local markets. In VICs, especially in partially-acquired and developing VICs, some of the households were allocated use of cultivation areas, ranging from 50m² to 400m². A portion of the UA produce was to be sold to the local markets to contribute to the households' income. In non-village areas, there was no cultivated land by virtue of being related to formal land uses and its non-incorporation into land planning. As such, all of the UA practices were small-scale because of these space limitations (see Figures 7.12, 7.13, and 7.14), and the amount of produce was reserved for households themselves.

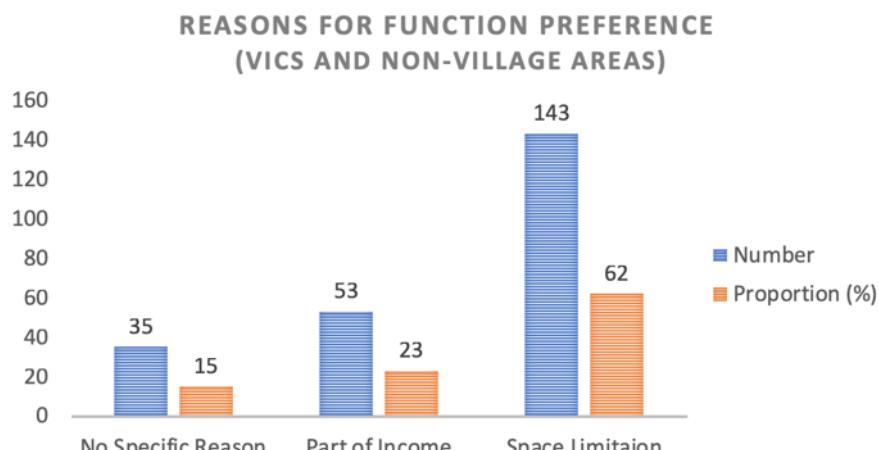


Figure 7.12. Reasons for Function Preference of UA in both Areas – Household

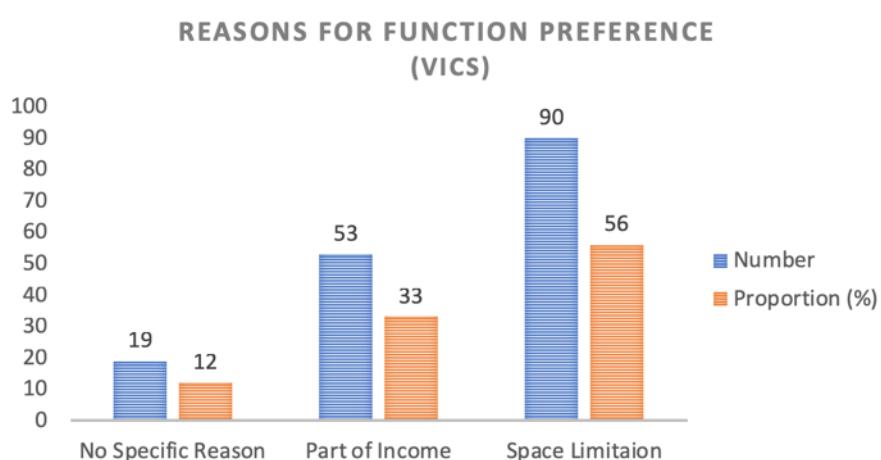


Figure 7.13. Reasons for Function Preference of UA in VICs – Household

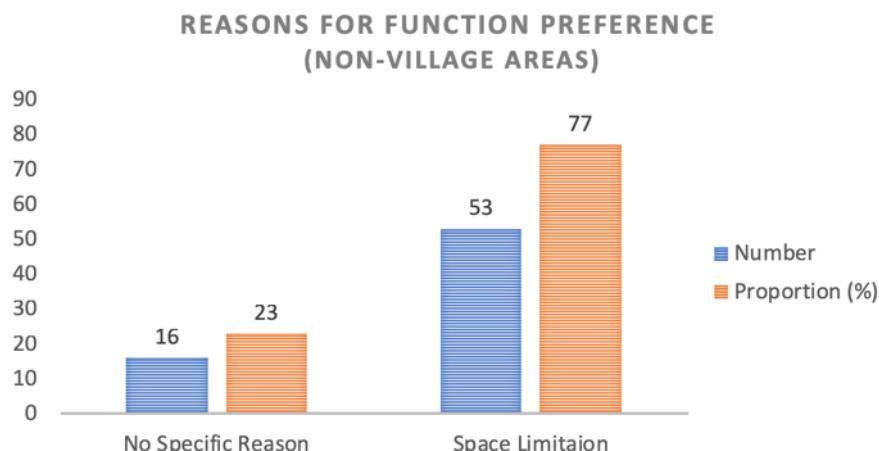


Figure 7.14. Reasons for Function Preference of UA in Non-village areas – Household

7.2.3 Space Type Preferences of Urban Agriculture

These selected quotes reflect the typical responses received from participants regarding space type preferences for UA activities:

"The government requisitioned all the farmland in our village five years ago. We have no place to grow vegetables. I heard that this land was originally going to be used by the government to build new apartments, but it remains vacant because of a shortage of funds. I don't know who was the first person who started to grow vegetables here, but many villagers came later and grow their own stuff. Now you can see we have our order of growing things here."

--A quote from a resident from Yunshan Village
(a fully-acquired VIC)

"I grow vegetables in the public green belt because I think this large green belt being used to only grow grass and trees is too wasteful, and I would like to plant some fresh and pesticide-free vegetables for my family."

--A quote from a resident from Jiangdong Huacheng
(a middle-income community in non-village area)

According to the questionnaires and semi-structured interviews, the households preferred growing UA plants in private spaces (74%), followed by the public domain (26%) in both areas (see Figure 7.15). Citywide, cultivated land (21%) in private spaces and sidewalks (16%) in the public domain were two popular areas chosen for UA use by the households. In VICs, the dominant space for UA activities was also in private space (77%), followed by public domain areas (23%). Specifically, the households in VICs preferred undertaking UA practices in their private cultivated land (29%), and sidewalks (17%) in the public domain (see Figure 7.15). The overall trend of space type preferences in non-village areas was similar to those in the city (see Figure 8.15). The dominant space for UA use chosen by the households was private spaces (66%), primarily in their own yards (29%). The remaining UA practices were observed in the public domain (34%), including public green spaces (20%) and sidewalks (14%).

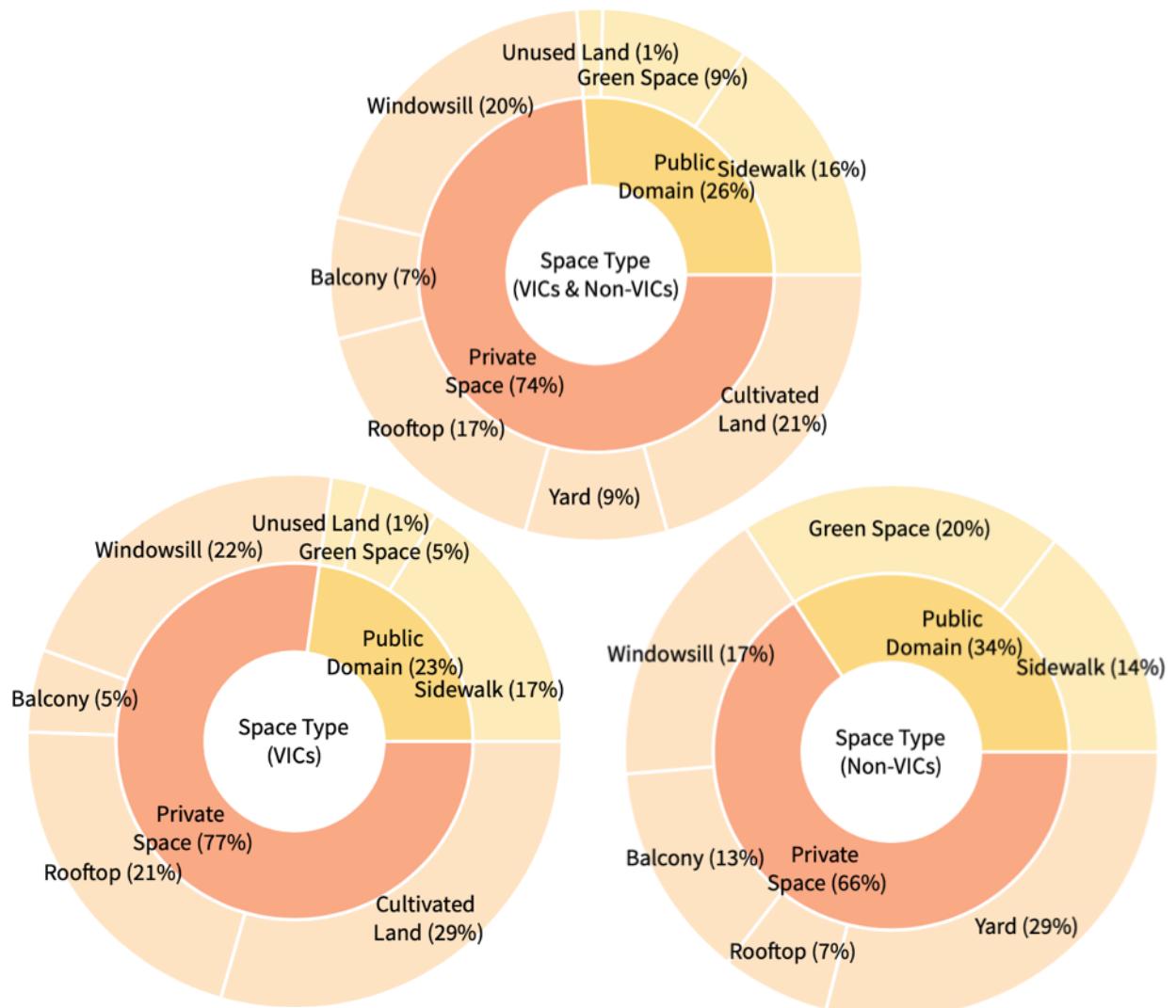


Figure 7.15. Space Type Preference of UA – Household

The difference between space type preferences was determined by the types of outdoor spaces available in VICs and non-village areas. Specifically, the outdoor spaces accessible VIC residents were cultivated land while yards were the dominant space type in non-village areas. In the public domain, there were more public green spaces in non-village areas than in VICs. Hence, in non-village areas, it was convenient for the residents to grow UA plants directly in the soil or place containers in the green spaces. Citywide, the dominant reasons for space type preference were the households seeking to fully utilise the space (37%) for a practical function, regardless of whether it was in public or private spaces (see Figure 7.16). In VICs, the dominant reason behind space selection was the households had direct access to their private cultivated land (53%) (see Figure 7.17). Non-village areas shared the same main reason across the city, which was to fully utilise space (54%) that was viable for UA use (see Figure 7.18). Also, for a significant number of households across the city (26%), space type preference was linked to proximity to their homes. Preferred areas were those located close to the household's property, being convenient for residents to maintain and access their produce. By using areas close to their homes, participants also increased the security of their UA produce from outsider damage and theft through the 'Eyes on the Street'¹ phenomena.

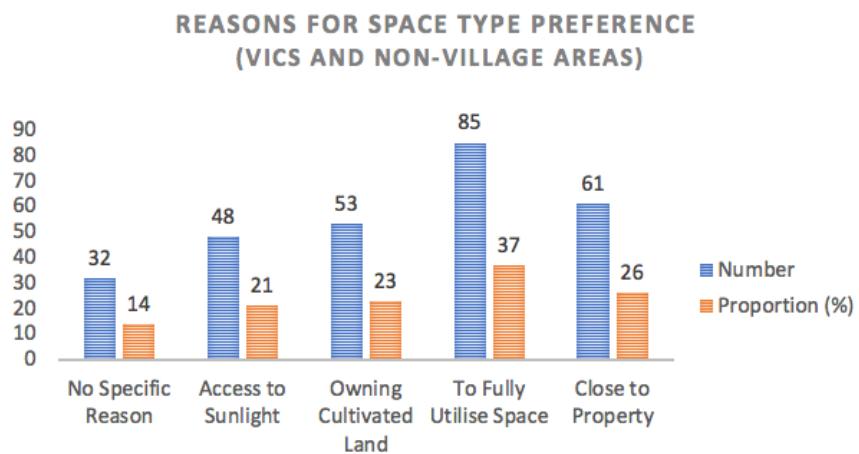


Figure 7.16. Reasons for Space Type Preference of UA in both Areas – Household

¹"Eyes on the Street": Urban sociologist, Jane Jacobs, developed her "Eyes on the Street" theory in her 1961 book Title, "The Death and Life of Great American Cities" (Jacobs, 1961). She argued that increased street traffic in high-density mixed-use communities, day and night, not only helps communities flourish socially and economically, but also acts as self-policing which deters criminal and anti-social behaviour.

REASONS FOR SPACE TYPE PREFERENCE (VICS)

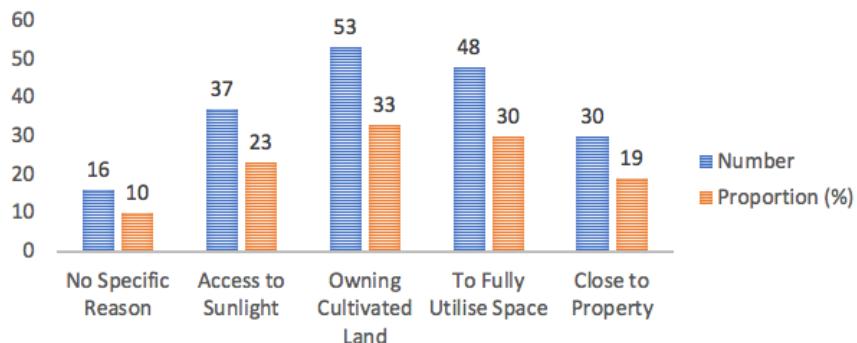


Figure 7.17. Reasons for Space Type Preference of UA in VICs – Household

REASONS FOR SPACE TYPE PREFERENCE (NON-VILLAGE AREAS)

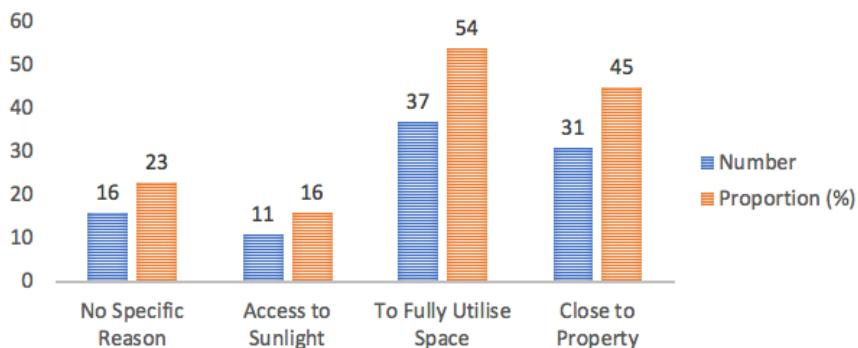


Figure 7.18. Reasons for Space Type Preference of UA in Non-village Areas – Household

7.2.4 Physical Form Preferences of Urban Agriculture

These selected quotes reflect the typical responses received from participants regarding preferences for the physical form of their UA activities:

"I saw this foam box when I went to the vegetable market, the owner of the vegetable stall used it to carry vegetables. I asked the owner to give the box to me because I thought it is a perfect container to grow something. I grow some shallots in the foam box and put it in front of my door."

-- A quote from a resident from Beihegeng Village

(a fully-acquired VIC)

"I usually like to grow flowers and vegetables in my spare time. After I moved here, I had a roof garden, and I went to buy a lot of pots to grow vegetables."

-- A quote from a resident from Jiangdong Huacheng
(a middle-income community in non-village area)

In both VICs and non-village areas, the prevalent geometric shape of the UA practices from a plan view was rectangle/square (47%), followed by circle/ellipse (27%) (see Figure 7.19). Separately, in VICs and non-village areas, the trend of geometric shape was similar, with the dominant shape being rectangle/square (49% in VICs and 44% in non-village areas). However, the drivers of the trend varied in VICs and non-village areas. In VICs, there were some areas of cultivated land that remained under the control of the village collective, and the geometric shapes of the UA practices were often rectangular. However, in non-village areas, the trend aligned with the prevalence of 'modern' geometric shapes, such as rectangular and square grids used in the public green space. Furthermore, the containers with rectangle/square shapes were more popular in both VICs and non-village areas as these shapes maximise planting space.

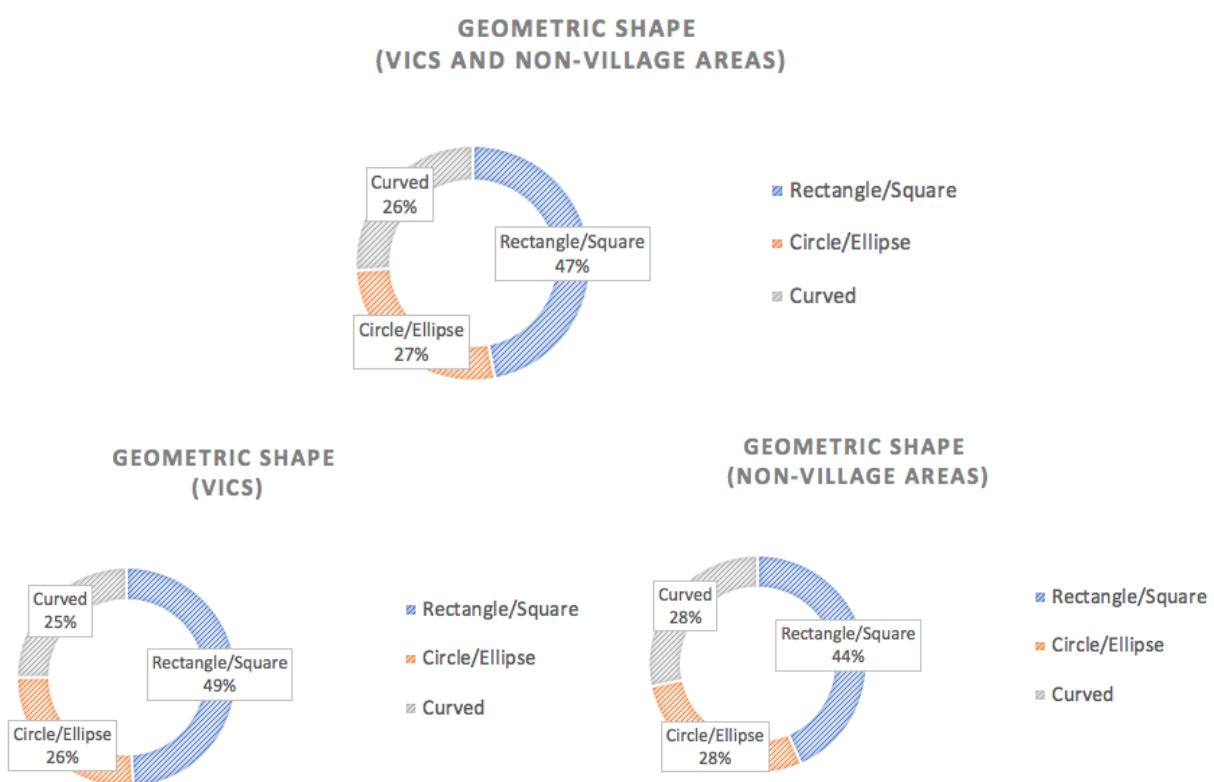


Figure 7.19. Geometric Shape of UA – Household

Across the city, when participants were choosing containers for UA plants, the dominant choice was recycled containers (47%), followed by growing directly in the ground without containers (27%) (see Figure 7.20). In VICs, 47% households preferred recycled containers, including foam boxes (30%), plastic boxes (10%), and metal buckets (6%). There were 28% of households in VICs who chose to grow plants directly into the soil without containers. The preference of container types was similar in non-village areas; the dominant containers chosen by the participants were recycled containers (47%), especially foam boxes (34%). However, unlike VICs, the percentage of gardening-specific containers (24%) in non-village areas were equal to the percentage of those who did not use any containers (24%). Both of the two types of containers were mass-produced items with regular shapes. The reason for the difference in preferences is for some VICs, especially partially-acquired VICs and developing VICs, unused land and cultivated land was available for UA activities. This enabled some households to grow their produce directly into the ground.



Figure 7.20. Dominant Materiality of UA – Household

According to the results of questionnaires and interviews, the households in VICs and non-village areas had different preferences for choosing the species of UA products. Citywide, the dominant species of UA products were vegetables (56%), followed by spices (39%) (see Figure 7.21). The proportion of vegetables being grown in VICs (60%) was higher than in non-village areas (47%). The differences in the percentage of species preferences were mainly determined by the space available for UA activities, since vegetables require wider cultivation space than spices. There was more space for UA in VICs, especially in the partially-acquired VICs and developing VICs, and as such the percentage of vegetables grown in VICs was greater than that of non-village areas. In comparison, the percentage of spices grown in non-village areas was greater than that of VICs, which could be explained by spices requiring smaller areas than vegetables for cultivation.



Figure 7.21. Dominant Species of UA – Household

7.3 Community Groups

7.3.1 Attitudes toward Informal Urban Agriculture

The following selected quotes reflect the typical responses received from community groups regarding their attitudes towards UA practices:

"I have been working in the community committee for 20 years. I have also seen a lot of behaviours regarding UA practices in the public space. For those residents who do not obviously hinder traffic and cause health problems, we generally do not interfere."

-- A quote from a member of community committee from Beihegeng Village
(a fully-acquired VIC)

"I don't think there is anything wrong with growing vegetables in the public green space. Anyway, the vacant space is empty. These public green spaces are neglected and not managed. Many plants have died. The vegetables grown by residents can also add a little green to the living environment."

-- A quote from a member of campus management group from SWFU
(an institution in non-village area)

"We are strictly forbidden to destroy any public green spaces through the growing of vegetables. However, public notification not to plant in public areas, the vegetable growing behaviour still exists. Many residents put some containers for growing vegetables in the green space without destroying the original plants, and some of the practices are hidden behind shrubs. Under this situation, we choose to tolerate the practices."

-- A quote from a member of professional management company from Jiangdong Huacheng
(a middle-income community in non-village area)

"Our village rented part of the farmland for a company to build urban farms. Some of the villagers' farmland was requisitioned, and their income sources have changed. From the traditional sale of agricultural products as income, they now receive their salaries from the company for working as service staff or gardeners."

-- A quote from a member of community committee from Xiaoxince Village
(a developing VIC)

In VICs, the local community committees showed a tolerant attitude towards UA in the public domain, as the condition of the UA practices did not obstruct public spaces or cause any safety issues. In the low-income communities in non-village areas, the community committees also showed a tolerant attitude towards UA occurring in the public domain. The situation was different in the middle-income and high-income communities where the professional management companies of these areas forbade UA practices from the public domain. Overall, whether in VICs or non-village areas, there was a large proportion of people from community groups opposed UA activities being implemented in the public domain, namely 40% in VICs and 62% in non-village areas. There were more who expressed opposition towards UA practices in non-village areas in comparison to VICs.

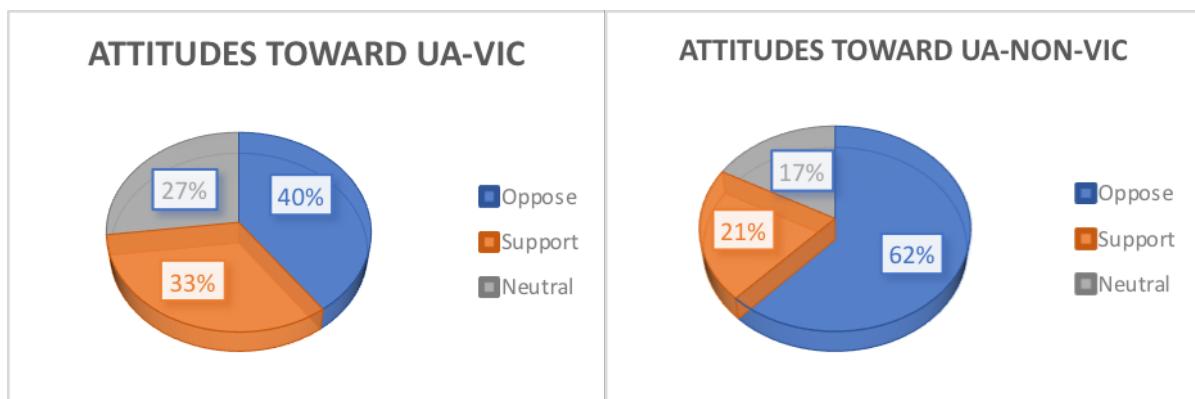


Figure 7.22. Attitudes toward UA in Public Domain-Community Groups

7.3.2 Governance of informal Urban Agriculture

There are many challenges in the practical operation of the UA in VICs and non-village areas. Some communities are inherently densely populated and have limited public space. Some residents through the use of containers affecting the flow of pedestrians and caused public dissent. Local community committees have to intervene by removing the containers and advising residents to be careful where they place the containers. As well, the green spaces in the public domain are generally scientifically planned, carefully designed and specially maintained by management groups and community committees, and are one of the important community infrastructures. Anyone who damages such public green space is seen as disrespectful to the work of community management groups, horticultural workers and community residents. How to effectively use the public land, whether for growing vegetables or other uses, where to plant, who manages are all issues that have to resolve by the local community committees.

7.4 Commercial Operators

These selected quotes reflect the typical responses received from commercial operators regarding UA activities:

“Busy urban life has made urban people less and less exposed to nature. Many people have the idea of going to the countryside in the summer, and we are catering to this idea, moving a complete rural village to the city! Here is a neat, orderly, beautiful scenery!”

-- A quote from a manager from Baicao yuan Pty Ltd
(a commercial operator company)

“Our urban farm is located in one of the developing VICs in Kunming, with convenient transportation, good greening and good natural environment. The background of the urban farm is in the countryside and the design of the urban farm is mainly based on

the experience of rural life. Also, as we need many service staff in the urban farm, we assist to resolve the unemployment pressures in this VIC."

-- A quote from a manager from Chennong Pty., Ltd
(a commercial operator company)

Commercial operators rent the land from village collectives and develop the formal UA practices such as urban farm with the approval of the Kunming Municipal Government. According to the questionnaires and semi-structured interviews, commercial operators prefer developing urban farms with multiple functions, including leisure, dining, agricultural production, plant nursery, and education and demonstration activities. Amongst these functions, the primary functions focus on leisure and dining (see Figure 7.23). As for the space type, all the urban farms are constructed in the private cultivated land that rented from the village collective. In order to satisfy various functions, commercial operators adopt mixed geometric forms, materiality and species.



Figure 7.23. Multifunctional Urban Farm in Kunming

(Source: Author, 2017)

At the beginning of the development process, the commercial operators discuss the primary functions of their UA practices with the Kunming Municipal Government and related departments so as to formulate their development proposals, including ongoing governance arrangements. From the perspective of the Kunming Municipal Government and related institutions, a successful urban farm must be a multifunctional entity which integrates production, leisure and education(KM, 2012a). However, the commercial operators sometimes reluctant to accept all the functions imposed by the Kunming

Municipal Governments and related departments unless they can generate sufficient financial profits in the short term. Thus, lead some operators to introduce trading of ornamental plants and marketing of on-site organic restaurants. As for non-profit functions such as education and leisure, the commercial operators are reluctant to accept.

For example, the Xinyizhou Urban Farm was an urban farm constructed after the Kunming Municipal Government issued the policies of developing UA in Kunming (Weiweilin Yang, 2012). In the original design, the Xinyizhou Urban Farm was to provide multifunctional services including a demonstration area for featured agriculture products, a greenhouse dining area, a lakeside leisure area, and plant nursery (Weiweilin Yang, 2012). However, during the construction and development process of the urban farm, the designed multiple functions became a single function to ensure the project was financially profitable. The urban farm is now a trading market for ornamental plants. The area has been divided into small garden plots ranging from 32m² to 48m² and rented to individuals or enterprises to use as nurseries to raise and display their ornamental plants (see Figure 7.24).



Figure 7.24. Current Situation of Xinyizhou Urban Farm

(Source: Author, 2017)

7.5 Government & Related Department

7.5.1 Attitudes toward Informal Urban Agriculture

"We have realised that in many VICS, especially those with farmland that has been requisitioned by the government but new developments are still pending, residents would (spontaneously) use the open spaces to grow vegetables privately. Residents spontaneously use open space to grow vegetables privately. Since there are no new projects can be carried out for the time being, the practices in vacant public space are allowed to happen."

-- A quote from an officer from Guandu District Government

According to Kunming Greening Regulation (KMPC, 2012), it is prohibited to grow vegetables and other crops in urban green spaces. Despite this rule, in VICS and low-income communities in non-village areas, the government and related departments demonstrated tolerance for UA, in line with local community groups. In middle-income and high-income communities in non-village areas, the greening department does regularly check the status of the green spaces areas and urges the local communities to rectify any violations, such as removing plants and containers.

7.5.2 The Attitudes toward Formal Urban Agriculture

The cultivated land in VICS is protected by the Land Administration Law of the People's Republic of China (PRC, 2004). The cultivated land is only to be used for growing agricultural crops and that it is illegal to any undertake construction works on site. Thus, the UA practices situated in cultivated land in VICS must obey the Land Administration Law. For the 'formal' UA practices, especially the urban farms, the Kunming Municipal Government demonstrated a supportive attitude. The Kunming Municipal Government initiated the development of UA from 2010, seeking to solve the agricultural issues caused by the rapid urbanisation process. The related rules, regulations, and policies that have included UA in Kunming can be found in Table 7.2.

Table 7.2. Rules, Regulations and Policies that included UA in Kunming

Year	Issued Department	Policy Name	Major Content (relate to UA)
2010	Kunming Municipal Government	Promoting the Construction of Modern Agricultural Specific Parks (KM, 2010)	<ul style="list-style-type: none"> Establishing agricultural specific parks to solve issues related to rural development The five functions of Agricultural specific parks include innovation and demonstration of agricultural experiment, utilisation of the results of experiment, education, production, and tourism.
2012	Kunming Municipal Government	Construction of Urban Farms in Kunming (KM, 2012a)	<ul style="list-style-type: none"> Constructing multifunctional urban farms that integrate sightseeing, agricultural production and processing, education, entertainment, dining, accommodation, and related services. A total target of 100 urban farms to be built until 2015.
2012	Kunming Municipal Government	Construction Standard of Urban Farms in Kunming (KM, 2012b)	<ul style="list-style-type: none"> Total area of urban farms should be no less than 200 hectares. The infrastructure of the urban farms should be controlled under 5% of the total planned area. The restaurant in the urban farms should use more than 80% of self-produced and pollution-free agricultural products. The number of tables available for dining should no less than 100, and the number of beds for accommodation should no less than 100. Farmland vegetation (including crops) coverage rate should exceed more than 60% of the total planned area.
2016	Kunming Municipal Government	Further Promotion of the Construction of Urban Farms in Kunming (KM, 2016)	<ul style="list-style-type: none"> Based on the existing 48 urban farms, the target is to have a total of 52 running by 2020. Focusing on creating urban farms with a high degree of specialisation, outstanding themes and distinctive features.
2017	Government of Yunnan Province	Master Plan of the Development of Modern Plateau Agriculture in Yunnan Province 2016-2020 (YN, 2017)	<ul style="list-style-type: none"> Developing multifunctional agriculture. Developing household farms.

7.5.3 New Initiatives in Urban Agriculture

With the development of UA in Kunming, there have been many new initiatives led by the Kunming Municipal Government and their related departments. The ‘Square Foot Garden’¹ is one of these new innovations (KM, 2017). Launched in March 2017 by the Kunming Agricultural Bureau, the program aims to provide professional guidance of UA for the general city dwellers who have an interest in growing vegetables and related UA activities. As the director and the training provider of this program, Chennong Pty., Ltd performed several experiments and chose the suitable species recommended for household cultivation. Also, the company provided standard containers for households to use (see Figure 7.25).



Figure 7.25. The Demonstration of Standard Containers for ‘Square Foot Garden’

(Retrieved from KM, 2017)

During the first phase of the program, three designs of vegetable gardens were presented, including 3m², 6m², and 9m² sizes. The Kunming Agricultural Bureau carried out the demonstration and promotional activities for the ‘Square Foot Garden’, with five main districts in Kunming used as pilot areas. In April 2018, a year after the launch of the program, the residents who attended the promotional activities operated their own ‘Square Foot Garden’ program under the guidance of Chennong Pty., Ltd and related agricultural institutions.

¹‘Square Foot Garden’ was popularised by Mel Bartholomew in a 1981 Rodale Press book and PBS television series (Bartholomew, 1981).

One of the pilot communities, Xihua Community, also launched an initiative at the beginning of 2018 that distributed more than 1,000 packages of vegetable seeds for free to the local residents (Kunming Daily, 2018). By April of 2018, Xihua Community received more than 350 photos from local residents regarding their DIY vegetable gardens and provided technical consultation for over 5000 residents.

In early 2018, the official website for ‘Square Foot Garden’ was established by the Kunming Agricultural Bureau on WeChat, which is one of the mainstream social media apps in China (see Figure 7.26). The aim was to share professional information on social media to guide city dwellers on how to grow vegetables and spices more efficiently by themselves. The detailed tutorials provided include:

- ‘Garden Update’: News updates for the ‘Square Foot Garden’ program and UA in Kunming.
- ‘Planting Tutorial’: Professional planting guidance for households, including watering methods, the use of fertilisers and an introduction to different species of vegetables.
- ‘Experience Share’: Providing healthy recipes.
- ‘Q&A’: A space for residents to ask questions about vegetable cultivation.
- ‘Agricultural Demonstration’: Demonstration of the successful cases of vegetable cultivation.



Figure 7.26. The Website of Kunming Agricultural Bureau ‘Square Foot Garden’ on Wechat

(Screen Captured from Wechat in October, 2018, Translated by Author)

7.6 Summary

This chapter reveals the perspectives of different stakeholders in UA, including households, community groups, commercial operators, and governments and related departments. Amongst the stakeholders, household was the largest group of stakeholders who undertake UA activities in both VICs and non-village areas.

- Among the 375 household participants, 60% had experience in undertaking UA practices. The dominant reason for undertaking UA was their connection to an agricultural background (58%), either through previous performances of agricultural practices in rural villages or their current participation. The remaining 40% of participants did not have experience in planting vegetables by themselves. The prevalent response of the latter respondents for why they had not undertaken UA activities was space limitation (55%), referring to the shortage of land available for cultivation in or around their households.
- All UA practices were performed for the purpose of family consumption, which refers to the consumption of UA products such as vegetables and spices within the households. However, 23% of respondents reported selling produce to the local market to supplement their household income.
- 74% of household participants prefer reducing their private space for undertaking UA activities, while the remaining 26% of participants grew their vegetables and spices in public domain areas.
- The dominant geometric shape from the plan view of UA was rectangle/square (47%).

The expressions of UA had different aspects in VICs and non-village areas:

- The number of people who had experience in UA was different. In VICs, 65% of participants had experience in UA, whereas in non-village areas the rate among participants was lower (55%).

- The rationales for undertaking UA were different in each area. In VICs, the prevalent response provided from residents was their UA practices were pursued because of their background in agricultural activities (78%). In comparison, residents of non-village areas cited personal interests (62%) as the main reason for undertaking UA practices.
- The function preferences of UA were different. In VICs, the function of UA preferred by all participants was family consumption (100%), with a further 33% also including commercial sales as an additional primary function. In non-village areas, family consumption was the only function preference (100%).
- The dominant place of cultivation chosen by the participants in the private space is different. In VICs, the dominant place in the private space is cultivated land (29%). While in non-village areas, the dominant place in the private space is yard (29%).
- The dominant location for cultivation chosen by the participants in the public domain was different. In VICs, the dominant area in the public domain for planting was along sidewalks (16%). Conversely, in non-village areas the dominant area for planting within the public domain was in green spaces (20%). This preference was mainly attributed to the green space ratio in non-village areas being higher than in VICs.
- The rationale behind space type preferences was different. In VICs, the primary consideration for space selection for UA practices was whether the households had access to private cultivated land (33%). Households in non-village areas chose to plant in their private yards or in the public green space, motivated by a desire to fully utilise the space in or around their properties (54%).

The expressions of UA also shared similarities in VICs and non-village areas:

- In both VICs and non-village areas, over half of the households were undertaking UA practices, specifically 65% households from VICs and 55% households from non-village areas.
- The dominant reason for not undertaking UA in VICs and non-village areas was space limitations, which was 56% and 54% respectively.

- The prevalent function of UA in both areas was family consumption. The reason was that most UA practices were small in size and scale, thereby limiting the amount of production possible so individual household consumption was prioritised over commercial endeavors.
- The dominant space chosen by participants in both areas for undertaking UA was in their private spaces; 77% in VICs and 66% in non-village areas.
- The dominant geometric shape of UA practices from the plan view was similar; rectangle/square was the most prevalent type in both VICs (49%) and non-village areas (43%).
- The dominant containers used for planting was similar. Both VICs (47%) and non-village areas (47%) chose to use recycled containers for their UA activities.
- The dominant species of UA products in both VICs and non-village areas was vegetables, at 60% and 47% respectively.

Community groups in VICs (40%) and non-village areas (62%) both shared negative views/perceptions regarding UA taking place in public domain areas. In VICs, the main perspectives towards UA activities in public areas were tolerance and negotiation. In particular, UA practices were considered tolerable as long as they do not damage public facilities or obstruct vehicles and pedestrian access to public areas.

For commercial operators, UA provided a good opportunity for potential profit. UA provided a means of applying for funding and receiving support from local governments, as well as an efficient method of improving company's image. In Kunming, there were about 48 urban farms were managed by commercial operators by 2016.

Local municipal governments and their related departments and institutions viewed UA from three main perspectives:

- UA practices within public domain: For those participants who grew vegetables in the public domain of residential areas, commercial areas, and street spaces, the municipal governments and related institutions defined the behaviour as the

'destruction' of public facilities and being harmful to society. The situations were different in VICs and non-village areas. In VICs and the low-income communities in non-village areas, where formal governance and community social capital were weak, UA activities in public domain were tolerated. Contrastingly, UA activities in public spaces were not tolerated in the formally planned and developed areas of non-village locations. Any residents found responsible for growing vegetables in the public domain were 'punished'. In summary, the local municipal government and related departments/institutions prohibited UA practices in public domain but tolerated some activities.

- Small-scale practices within households: Local institutions created programs to educate local residents on how to grow UA plants efficiently. An example of these initiatives included the 'Square Foot Garden' program developed and launched by the Kunming Agricultural Bureau.
- Large-scale urban farms: The Municipal government issued several policies to encourage and support multifunctional urban farms, which is one form of UA in developing VICs.

The greening rate in the public domain of non-village areas was relatively high in comparison to VICs. The designed public green spaces had a combination of plants to provide ornamental and aesthetic benefits for the residential areas in non-village areas. However, in some communities in non-village areas, especially low-income communities with relatively low governance force, the design and maintenance of green spaces were unsatisfactory, providing an opportunity for residents to pursue illegal planting behaviour. The tolerant attitudes of local governance force allowed the residents of low-income communities in non-village areas to adapt not only the public green spaces, but also the hard surfaces within the residential areas by placing containers for growing purposes.

In conclusion, during the investigations in Kunming, UA was expressed in different configurations in both VICs and non-village areas. Some of the 'informal' UA practices were initiated by local residents, while other 'formal' practices were carried by commercial operators with multiple functions. There were no specific literature sources confirming when and how 'informal' UA practices began, but evidence of their existence from

stakeholders' initiatives was observed in both public and private spaces throughout Kunming. The development of 'formal' large-scale UA projects in Kunming was confirmed to have started in 2012. These practices focused on the establishment of multifunctional urban farms in peri-urban areas (KM, 2012a). Several successful urban farms are now serving hundreds and thousands of people who live in or around Kunming.

8 Discussion and Conclusion

This research aimed to gain a strong understanding of the role and nature of UA in the urbanisation process by exploring the changing functions, space types, physical forms and rules and regulations that impact or influenced by UA in the transformation of the city. Kunming, China, was the city case chosen as the urban laboratory to draw understandings of this phenomena in the Chinese context. With a steep upwards trajectory in population, the development of urban areas has resulted in the shrinking of agriculture productive lands, both within and outside the city, leading to many new land use patterns. In this setting, individual, academic, industry and government interest in understanding and promoting UA as a strategy for enhancing household food sovereignty, boosting local revenue and improving the city image have become areas of critical research (Cai & Barry, 1994; Indraprahasta, 2013; Zezza & Tasciotti, 2010).

China's economic structure has transformed from a rural, centralised state to an urban, market-oriented economy through its urbanisation progress (Akguc, Liu, & Tani, 2014). Since the economic reforms commencing in 1978, China has achieved remarkable success in poverty reduction (Park & Wang, 2001; Ravallion & Chen, 2007). At the same time, China has been undergoing rapid urbanisation, with millions of migrants moving from the countryside into urban areas. People living in rural areas are attracted by job opportunities and better living conditions in urban areas. As a result, more and more rural residents are moving to urban areas and find work as cheap manual labourers due to their relatively low education levels (Du, Park, & Wang, 2005). Thus, migration plays a crucial role in transforming the structure of household income, as well as the spatial patterns of their neighbourhoods.

Kunming is now a city experiencing different modes of development and urban renewal. Like many contemporary cities in the Global North and South, Kunming is marked by uneven development, including encompassing areas of formally planned living areas and 'informal settlements', such as VICs. Within the rural-urban transformation process, the

expressions and rationales of UA have been changing, especially in the past decade (L. Wang, 2016). In this context, Kunming provides an opportunity to investigate the transformation of UA as well as the urbanisation process of the city. In this context, typology analysis provided a key tool to deconstruct the transformation of UA and the broader process of urbanisation.

8.1 Summary of Key Findings from the Research Questions

UA in Kunming presents itself in different ways and at different scales from urban farms, private vegetable plots, and the occupation of public spaces by individuals and groups, to micro small-scale changes in the private and public domain. It is due to this diversity that the data collection resulted in a wealth of information and knowledge for analysis. In summary, the overall key findings from the three primary research questions are as follows:

Question One: What are the functions, types and forms of UA practices in the transformation of VICs and the wider city?

Functions:

At the citywide level, the primary function of UA as preferred by the households was for family consumption, which refers to the use of UA products by household members. Across the city, all households consumed UA products within their household. Amongst all households, 23% sell their produce to the local market as a means of supplementing their household income. In VICs, the percentage of functional preference is similar; all households preferred consuming UA products within their household, with a further 33% of them selling their products to the local market. However, in non-village areas, UA products were only used for family consumption. For the commercial operators who ran urban farms on rented land in VICs, the primary function of UA was for leisure and dining activities, followed by plant nursery operation. Table 8.1 shows the typology of primary functions of UA. In VICs, the combination of different functions was greater than those of non-village areas. For example, the urban farms in VICs might integrate leisure, dining, plant nurseries, and other functions to provide diverse experiences to visitors.

Table 8.1. A Typology of Primary Functions

Location	Stakeholder	Function	Description	Example
Non-village Areas	Households	Family Consumption	Use UA products within households	
VICs	Households	Family Consumption	Use UA products within households	
		Profit	Sell their produce to local markets	
VICs	Commercial Operators	Leisure	Build an edible landscape by using agricultural and ornamental plants to attract tourists	
		Dining	Build a dining hall in the greenhouse and provide organically-grown cuisine	
		Nursery	Divide the land into many small areas and rent them to individuals and companies for plant nurseries	

Location	Stakeholder	Function	Description	Example
VICs	Commercial Operators	DIY Vegetable Plots	Provide the plots for visitors to grow vegetables by themselves	
		Accommodation & Functions	Provide accommodation rooms and conference venues for businesses	
		High-tech Agriculture	Demonstrate high-tech agricultural facilities	
		Education	Demonstrate the agricultural history to educate younger generation	

Space Types:

In regards to the space types preferred by the households for UA in both VICs and non-village areas (see Tables 8.2 & 8.3), the dominant space chosen by the households was private space (74%), followed by the public domain (26%). In VICs, 73% of households preferred to use their private space for plots when undertaking UA practices, while the remaining 27% of the households preferred public domain area. In non-village areas, more residents grew UA plants in their own private space (75%) compared to public domain areas (25%). The practices operated by the commercial operators in VICs were larger scale and therefore only observed as occurring in private space.

Table 8.2. A Typology of Primary Space Types - VICs

Location	Stakeholder	Space Type	Description	Example
VICs	Households/ Commercial Operators	Private Space	Cultivated Land	Allocated to households by the village collectives for agriculture purpose only
			Balcony	Balconies attached to the buildings
			Rooftop	Located at the top floor of buildings owned by households
			Windowsill	Internal windowsills and the spaces between windows and the burglar-resistant bars
	Households	Public Domain	Sidewalk/ Alleyway	The paths or alleyways between buildings or both
			Green Space	Designed public green space for ornamental plants
		Public Domain	Unused Land	Belongs to village collectives or the state, or redevelopment work was commenced but eventually terminated

Table 8.3. A Typology of Primary Space Types – Non-village Areas

Location	Stakeholder	Space Type	Description	Example
Non-village Areas	Households	Private Space	Yard	Front or back yards that attached to the buildings
			Balcony	Balconies attached to the buildings
			Rooftop	Located at the top floor of buildings owned by households
			Windowsill	Internal windowsills and the spaces between windows and the burglar-resistant bars
	Public Domain	Sidewalk/Pedestrian Path	The paths or alleyways between buildings	
		Green Space	Designed public green space for ornamental plants	

Physical Forms:

Physical forms including geometric shape, materiality, and dominant species were expressed either using containers or UA crops being planted directly in the ground. The geometric shape of UA practices from the plan view was one measurement of physical form (see Table 8.4). Citywide, the dominant geometric shape was rectangle/square (51%), followed by circle/ellipse (27%). In VICs, the trend was similar with 51% of practices taking a rectangle/square form, and 28% of the practices using a circle/ellipse shape. In non-village areas, the situation was also similar in that the dominant geometric shape from the plan view was rectangle/ square (51%), followed by circle/ ellipse (25%) and curved (25%). Commercial operators who established and operated urban farms, the dominant geometric shape chosen was curved and irregular.

Table 8.4. A Typology of Primary Physical Forms – Geometric Shapes

Physical Form	Stakeholder	Description	Example
Geometric Shape	Curved	Households/ Commercial Operators	Non-linear and irregular shape  
	Rectangle /Square	Households/ Commercial Operators	Linear and regular shape (could be in ground or use containers)  
	Circle/ Ellipse	Households/ Commercial Operators	Circle or ellipse shape (could be in ground or use containers)  

Another measurement of physical form is materiality, which refers to the types of containers used for undertaking UA practices (see Table 8.5). In both VICs and non-village areas, recycled containers (39%) were the popular containers preferred by the households.

In VICs, the dominant containers preferred by the households were recycled containers (36%), as well as growing UA plants directly into the soil (35% have no containers). In non-village areas, the popular containers used were recycled containers (45%), followed by gardening specific containers (29%). In order to accommodate different functions, the UA practices in these urban farms had various shapes due to the multiplicity of containers or other methods of efficient display and planting.

Table 8.5. A Typology of Primary Physical Forms - Materiality

	Physical Form	Stakeholder	Description	Example
Materiality	No Containers/ In Ground	Households/ Commercial Operators	Grow the edible plants directly into the soil on ground	
	Gardening Specific Containers	Households/ Commercial Operators	Designed for potting plants, including plastic and clay flower pots, and the vertical planting devices	
	Recycled Containers	Households	Acquired from daily use, including foam boxes, plastic baskets, and metal buckets	

In regards to preferences of plant types, which is the third measurement of UA (see Table 8.6), the dominant species chosen for cultivation across the city were vegetables (55%). The situation was similar in VICs that vegetables (59%) were the most popular species for planting, particularly bok choy (45%). In non-village areas, the preferences varied, where the dominant species type planted by households was spices (52%), especially shallots (29%). The species of UA plants in the urban farms operated by the commercial operators were diverse and included not only edible vegetables and spices, but also ornamental plants.

Table 8.6. A Typology of Primary Physical Forms – Dominant Species

	Physical Form	Stakeholder	Description	Example
Dominant Species	Vegetables	Households/ Commercial Operators	Vegetables including bok choy, beans, cucumbers, eggplants, loofahs, etc.	
	Spices		Spices including shallots, coriander, mint, etc.	
	Poultries		Poultry including ducks, chickens, geese, etc.	
	Ornamental Vegetables	Commercial Operators	Special species of vegetables with ornamental value	

Rules and Regulations:

In VICs, there were no specific rules and regulations governing UA activities in the public domain. The local community committee, as well as the policymakers and supervisors from

municipal government, expressed a tolerant attitude toward UA practices initiated by residents in the public domain. Conversely, private spaces in VICs had strict laws to protect the use of cultivated land (PRC, 2004). Low-income communities in non-village areas reflected a similar situation in terms of the rules and regulations of public and private spaces. Middle-income and high-income communities in non-village areas differed; management rules were relatively strict toward adaptive UA practices in public domain areas. In contrast, the municipal government expressed a supportive attitude towards planned and ‘formal’ UA practices, whether they occurred in the remaining cultivated land in VICs or in private spaces, such as balconies and rooftops in both VICs and non-village areas. Supportive formal strategies included policy support and professional guidance programs and initiatives. The commercial operators who intended to develop urban farms were required to follow the strict policies and regulations (KM, 2012a) issued by the Kunming Municipal Government and related institutions.

Question Two: What are the motives of the various stakeholders who undertake these UA practices and how do they create and shape the form and function of the cities?

The Stakeholder Groups:

There are four main groups of stakeholders who involved in UA practices in Kunming, including households, community groups, commercial operators, and government and related departments.

Stakeholder 1 - Households:

Among the households, the participation rate of those undertaking UA in both VICs and non-village areas in Kunming was 60%. The remaining 40% of participants had no experience planting UA crops at the household level. In VICs, there were 65% of households with experience undertaking UA practices, while the remaining 35% lacked any UA experience. In non-village areas, the UA participation rate of households was 55% and the remaining 45% had no UA experience. In VICs, for the households who had experience in undertaking UA practices, whether this was previous or current experience, the dominant

reason for choosing UA as part of their daily routine was their background in agriculture (78%). For the households in non-village areas, the primary reason for undertaking UA practices was due to their personal interests (62%), rather than a previous connection to agricultural-related occupations. The dominant reason provided by households regarding not undertaking UA practices was space limitation in both VICs (56%) and non-village areas (54%).

Stakeholder 2 - Community Groups:

In VICs, 40% of research participants from local community groups opposed UA practices invading public domain areas, 33% supported the activities and 27% were neutral. In non-village areas, 62% of the participants belonging to the local community groups opposed UA practices occurring in the public domain, while 21% supported the practices and 17% of participants expressed their neutral perspectives. Despite the varying opinions, the community committees in VICs and parts of non-village areas tolerated the UA practices present in the public domain as long as those practices did not disrupt transportation and area accessibility. In the middle-income and high-income communities in non-village areas, professional management groups replaced community committees as the main conduit of local governance. These professional management groups established strict rules and regulations regarding UA practices in the public domain, and adaptive urbanism practices such as UA were not allowed under any circumstances.

Stakeholder 3 - Commercial Operators:

Commercial operators also play a crucial role in the UA systems of the city. Receiving policy and financial support from the Kunming Municipal Government and the Kunming Agricultural Bureau, the commercial operators have created several successful cases of multifunctional urban farms in Kunming. There are clear benefits for commercial operators to develop multifunctional urban farms, including generating profit, as well as improving company image and profile. The construction of these urban farms also helps reduce the unemployment rate for the communities in adjacent VICs, boosting the revenue of the local area, as well as providing educational opportunities for children who are born and lived in

the urban areas and willing to learn the ‘ancient agricultural history’ and experience the lifestyle in the countryside.

Stakeholder 4 - Governments and Related Departments:

For local authorities, such as the district governments and the Kunming Municipal Government, as well as esteemed institutes like the Kunming Agricultural Bureau, UA practices are viewed from three perspectives. Firstly, the policymakers view UA practices in the public domain as ‘informal’ UA, thus bringing disorder to the city. In this situation, the policymakers and supervisors prefer to ignore the UA practices in the public domain in VICs and part of non-village areas. The reason is that the VICs and some low-income communities in non-village areas are perceived as ‘informal’ and it is assumed that these locations will eventually be redeveloped as the urbanisation process continues. Secondly, the governments and institutions support and encourage ‘formal’ UA practices, specifically to the multifunctional urban farms developed by commercial operators, which bring significant social, economic, and ecological benefits to the city. Lastly, there is an emerging trend for UA practices in Kunming based on the ‘Square Foot Garden’ ethos, as developed by the Kunming Agricultural Bureau. The aim of these projects is to provide professional suggestions and guidance to help local residents grow vegetables more efficiently with techniques informed by scientific principles. In summary, Kunming Municipal Government and related departments play the roles of both regulator and facilitator by support the development of ‘formal’ urban farms as well as the small-scale UA practices undertaken by local households.

Question Three: How should the planning system respond to the range of UA practices emerging in the city?

As seen in this research, the expressions of UA are strongly connected to the context of local residential conditions. Understanding context and notions such as ‘local’ and ‘vernacular’ are very important. This is re-affirmed within the literature (KM, 2017; M. Li et al., 2014; Yuerong Wang & Jia, 2017), which shows that UA is a popular activity in Kunming despite opposition from various regulating bodies. The main issue arising in UA, such as the

growing of vegetables and spices in the public domain, is that those activities may impede the designed green space by reshaping it with private activities.

According to the research results, opposition to UA is driven by 'top-down' notions of disorder and unregulated performance in the private space and the public domain. It could be argued that should the benefits of UA activities at the household level be better understood, its need to be included in Kunming's planning systems would be recognised. The large-scale UA practices, which refers to growing food for commercial purpose so as to generate revenue, requires stakeholders to find adequate space in the city, including private spaces, to grow food for wholesale and retail sales to urban consumers. Though there are advantages and opportunities brought by UA practices, there are also challenges, including the contamination of land for urban farms from earlier 'unchecked' industrial activities, and the underutilisation of private spaces for UA purposes. In this setting, there is a need to consider different ways of supporting and regulating UA in the planning system at all levels.

While the overlapping of practices could be classified as 'responsive urbanism' (Chant, 2012; Stevens, Plowright, & Adhya, 2010), this is a challenge for the government as part of its efforts to make Kunming a more liveable and modern city. While this may be a problematic consideration for government, there are a number of possible initiatives to integrate the formal and informal practices so that they meet the demands of city residents.

- **Education and awareness:** Recognise the 'green needs' of the residents in terms of UA activities, health benefits, greening and ecological contributions to climate change. Provide education opportunities to the local residents in order to help them select and use the space wisely and minimise the adverse environmental effects caused by UA practices such as drainage and the safe use of fertilisers. Collectively engage the cooperation of local residents, authority departments, and other interested groups to re-vitalise public spaces to increase the accessibility of the spaces for multiple users and stakeholders.
- **Space mobilisation:** Include community management in the use of public infrastructure such as open space to meet the residents' UA requirements. Consider

the alternative planting spaces in the high-density urban areas, including the installation of green roofs that leverage from the experience of other cities (Francis & Jensen, 2017; Rayner, Farrell, Raynor, Murphy, & Williams, 2016). Construct community gardens for local residents, which would also provide a practical solution to alleviate community conflicts raised by illegal planting practices (Armstrong, 2000; Glover, 2004);

- **New guidelines:** Issue related rules, regulations and guidelines toward UA practices in both private and public spaces which address type, location and management of the UA practices.

8.2 Implications for Theory and the Practices

8.2.1 The Overlapping Nature of Formal and Informal Urban Agriculture

In the context of Kunming, ‘formal’ and ‘informal’ UA practices coexist spatially and at different scales. The attitudes towards ‘informal’ UA varies between growers and non-growers, as well as between growers, and different stakeholders including commercial operators and government institutions. Understanding and defining the ‘informal’ and ‘formal’ UA practices is crucial in order to seek better developmental strategies for UA in Kunming.

Due to the lack of community management, neglected public infrastructure, and the government’s disregard for residents’ living needs, such as their personal sentiment, social activity, food quality, and living expenses, VICs and the low-income communities in non-village areas display a greater amount of ‘informal’ UA practices. These residential areas have relatively ‘loose’ community management arrangements in place and witness the phenomena of some households illegally taking over the public domain and transforming these spaces for UA use.

Apart from the ‘informal’ UA practices in the public domain, there are a large amount of ‘informal’ UA practices that can be found in private spaces, including small-scale vegetable plots in windowsills, yards, balconies, and rooftops in both VICs and non-village areas.

These encroachments were not recognised by the planning system or any agricultural institutions due to their small-scale nature and negligible impact.

There are two major expressions of ‘formal’ UA practices in the private spaces of VICs, including the traditionally cultivated land grown by the households and the multifunctional urban farms developed by the commercial operators. For the traditionally cultivated land, there are laws and regulations to protect the cultivated land in or around the city (PRC, 1999, 2004). According to the regulations, apart from growing vegetables and crops on the cultivated land, it is illegal for any individuals or groups to occupy the cultivated land for construction or any other uses. There are many rules and regulations which support the development of multifunctional urban farms in private spaces(KM, 2012a).

In the context of how the city is planned and developed, these ‘bottom-up’ practices cannot be simply disregarded and defined as inappropriate. A deeper understanding of the nature of ‘formal’ and ‘informal’ UA as found in this research may help in better integrating UA informality into the local planning system.

8.2.2 Emergent Urban Agriculture - Negotiation and Contestation

As discussed before, urban informality can be seen as a mode of production (Meagher, 1995; Roy, 2005). In this research, the negotiation of space by ‘informal’ UA practices is one expression of urban informality, namely the space negotiation in the public domain and the negotiation of boundaries between private and public spaces.

The original and formal uses of the public domain in both VICs and non-village areas are mainly focussed on creating outdoor open spaces for the residents as a means to connect to ‘nature’ and facilitate communicating with one another. Moreover, in almost all cases, the public open spaces, including streets, provide access to the buildings and shapes the transportation network. Compared to the ‘formal’ uses, UA practices in the public domain are viewed as ‘informal’ uses. These ‘informal’ UA practices coexist with the ‘formal’ uses of the public domain without fully eliminating the original functions of the space. In other words, the UA practices coexist with the ‘negotiated space’ in the public domain, which

include residents claiming the spaces temporarily or permanently. For example, some of the households place their containers for growing vegetables within an abandoned public green space (see Figure 8.1). These practices do not hamper pedestrians and vehicles using the area, thus, the original functions remain and co-exist with the ‘new’ UA practices.



Figure 8.1. Space Negotiation of UA Practices

(Source: Author, 2017)

The negotiation of boundaries is reflected when the households try to ‘push’ the boundaries between their private plots and the adjacent public domain. For example, some households attempt to extend their private space by occupying the public green space next to their private yards (see Figure 8.2). By claiming the space, the households territorialise the space for cultivation, and it is easier to maintain the UA practices in the public domain which is close to their private yards.



Figure 8.2. Space Negotiation of UA Practices (push the boundaries)

(Source: Author, 2017)

8.2.3 Urban Agriculture- A Mix of Space Rights and Responsibilities

When using any public space, a typology of rights and responsibility can be found including ‘public rights’, ‘public-private rights’, ‘private-public rights’, and ‘private rights’ (Carmona, 2015). In this research, there are two categories of space rights can be summarised based on the investigations of the dominant space types in both VICs and non-village areas, namely, ‘public-private rights’ and ‘private rights’ (see Table 8.7). The public-private rights include the adaptive UA practices in the public domain that undertaken by the households, such as the vegetable plots within the public green space in VICs. The private rights refer to the UA practices in the private spaces, such as the urban farms constructed by the commercial operators and the private vegetable gardens grown by the households.

Table 8.7. Space Rights and Responsibility of UA in Kunming

(Adapted from Carmona, 2015)

Rights and Responsibility	Description	Image
Public-private rights	Space owned by the public sector, adapted and privatised by individuals and groups	
Private rights	Space owned and managed by commercial operators or households, conditional open access to general citizens	
	Space owned and managed by households, only available to authorised persons	

8.2.4 Challenge of Understanding Local Ordering Principles

Ordering principles refers to the formal rules of architecture and design, which “allow diverse forms and spaces of a building to coexist perceptually and conceptually within an ordered, unified, and the harmonious whole” (Ammar, 2017). These ‘modern architecture’

principles apply to modern designed cities, including the use of axis, symmetry, hierarchy, rhythm, datum, and transformation (Ammar, 2017). In this research, some of the formal ordering principles can be found in ‘informal’ UA practices in VICs in Kunming, especially in the public domain. However, compared to the modern areas, the ordering principles are not always ‘regular’ in VICs and have some adaptations (see Table 8.8). In other words, there is a mix of modern ordering principles with local configuration.

Table 8.8. Ordering Principles of UA in the public domain VICs in Kunming

Modern Ordering Principles	Ordering Principles of UA in VICs
Axis (With central line)	Axis (The containers for UA practices have been placed in a line)
Symmetry (Two parts are mirror images of each other)	Asymmetry (UA practices are different from the surrounding plants)
Hierarchy (The most important things being the most prominent)	Non-Hierarchy (UA practices are hidden in the alleyways or behind the buildings)
Rhythm/Repetition (The use of repeated forms)	Rhythm/Repetition (The land for UA practices has been divided into different sizes of rectangles)
Datum (Tie together or anchor all other elements of the design)	Datum (UA practices have been tied together as a cluster)

Modern Ordering Principles		Ordering Principles of UA in VICs	
Transformation (The elements transform by growing bigger or smaller but they may also rotate, stretch, or morph into a different elements)		Transformation (The original public green space has been transformed for UA practices)	

The transformation of the public domain is a form of insurgent urbanism (Hou, 2010). Transformation as one of the ordering principles, which has been a frequently observed ordering principle of UA in VICs in Kunming. There are several variations of the transformation by using different methods, including insertion, add-ons/attachment, removal, and reuse/recycle (see Table 8.9).

Table 8.9. Transformation Methods of UA Practices in Kunming

Transformation Methods	Description	Images	
Insert	Insert UA practices into present public green spaces and keep original plants, often growing UA plants directly in the ground	 	
Add-on/Attach	Growing UA plants in containers and place or attach them to buildings	 	
Removal	Remove original plants and use for UA practices	 	
Reuse/Recycle	Reuse the vacant and unused land for UA practices	 	

8.3 Final Reflections

The self-organised methods for civic involvement and their relationship to planning systems are evolving globally (Boonstra & Boelens, 2011). In Kunming, the ‘bottom-up’ performance of ‘informal’ UA practices in both VICs and non-village areas can be viewed as self-organised actions which stem from the initiatives of local individuals and groups. These self-organised actions have often been viewed as spontaneous forms of recreating both the public and private spaces in VICs and non-village areas in Kunming. At present, the development of UA practices in Kunming are still in the initial stages. The lack of systematic rules and regulations of these ‘informal’ UA practices causes many issues (B. He & Zhu, 2018), often for government authorities due to the potential conflicts of public interest.

In this research, UA practices are seen to have the potential to contribute to a more liveable and resilient Kunming. On the one hand, the ‘formal’ UA practices play a pivotal role in the implementation of urban ecology, ‘greening of the city’, and economic strategies at the city level, as well as contributing to restoring natural cycles and ecosystems’ environmental services (Archdeacon, 2015; Burton et al., 2013; Ferreira et al., 2018). On the other hand, the ‘informal’ UA practices at different scales show the resilience of local residents in regards to their adaptive UA performance in both private and public spaces. During the rapid urbanisation process of Kunming, urban form and the living environment have changed in various ways. Due to the transformation of VICs and the wider city, some of the residents have had to live in areas that are different from their original settlements. Also, there are rural-urban migrants who leave their rural environments and have moved to the city for better living conditions and quality of education. As a result, local residents and migrants undertake UA practices and recreate and reclaim the spaces to gain a sense of belonging so as to survive in the urban areas (see Figure 8.3).



Figure 8.3. UA Resilience of Residents in Kunming

(Source: Author, 2017)

The owner of the above UA practice is a parking officer who takes care of monitoring vehicles parking in area. Since the officer must be on duty for 24 hours every day, he and his family live in a portable dwelling close to the vehicle. In order to lower the living expense, they removed the original climber plants and grass (left) and grew vegetables for their household consumption (right). For the officer and his family, UA practices acts as a tool to help them survive in the urban area.

This study highlights the co-evolution of agriculture, urban form, and built form in Kunming. At the urban scale, a variety of rural villages with their cultivated land have been transferred into high density VICs with a small amount of cultivated land or without any land for planting activities (see Figure 8.4). As a result, the production mode of agriculture changed from traditional large-scale production to small-scale UA practices by using private and public spaces in the urban areas. At the architectural scale, compared to the buildings in VICs, the newly-built residential buildings in non-village areas provide more interior spaces for the households. As for the outdoor spaces, the design of private balconies, rooftops, and yards allow the households to undertake UA practices in their private spaces (see Figure 8.5). In this setting, the categories of UA plants grown by the households are more diverse than before. Furthermore, modern design of residential areas considered more public green spaces for local residents (see Figure 8.6). The increasing size of public green space also provides more spaces for the residents to adapt for private UA uses. At the agricultural level, the modes of agriculture are transferred from large-scale agricultural production in the rural areas to small-scale UA practices in the public and private spaces in the urban areas; from single function to multiple functions.

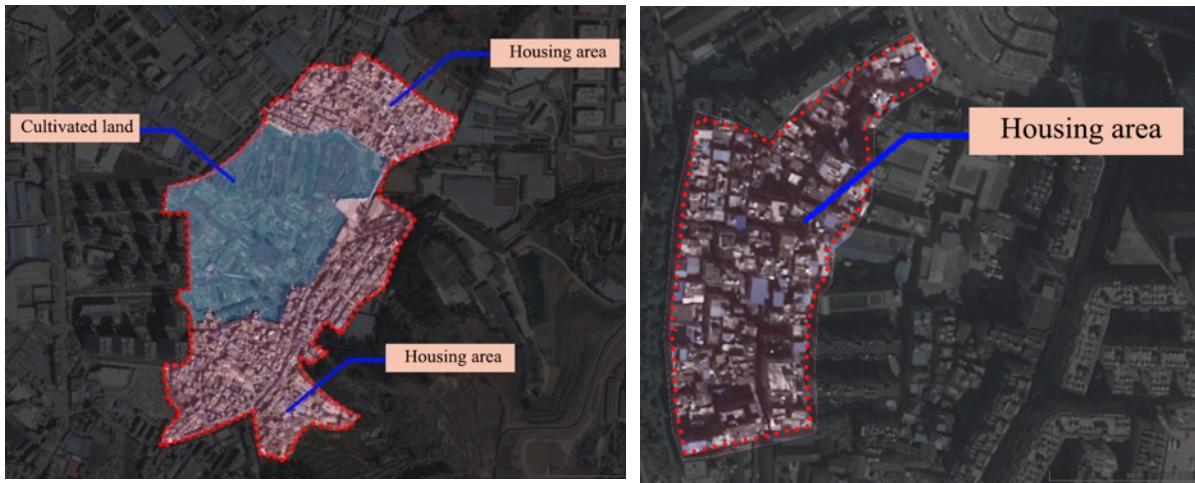


Figure 8.4. Comparison of VICs with Cultivated Land (left) and VICs without Cultivated Land (right) in Kunming

(Map captured from Google Earth, 2017)

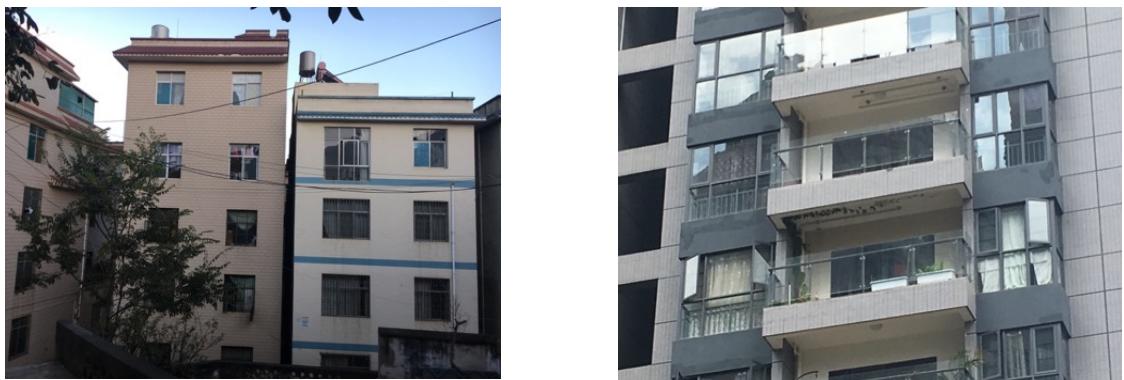


Figure 8.5. Comparison of Architectural Style in VICs (left) and Non-village Areas (right) in Kunming

(Source: Author, 2017)



Figure 8.6. Comparison of the Public Spaces in VICs (left) and Non-village Areas (right) in Kunming

(Source: Author, 2017)

Amongst the divergent UA stakeholders in Kunming, the meaning of UA varies in different ways. For the household participants and community groups, UA benefits them by supporting their living demands by providing healthier foods, supplementing incomes, utilising interstitial spaces, and creating a sense of belonging in a rapidly changing urban environment. The commercialised UA activities, as are operated by the commercial enterprises, stimulate private sector growth and boost the company profit. For the wider city, the development of UA allows the integration of nature and ecological practices within the urban areas. UA practices have been increasingly identified as productive and socially inclusive practices which utilise private and public spaces in cities (Firth, Maye, & Pearson, 2011; Holland, 2004).

The innovative form of resident-led UA practices occurs within the framework of re-using and re-adapting public spaces. Delineating these informal UA practices as simply right or wrong is problematic given they meet a human need, yet could be considered as illegal and unauthorised. Furthermore, the emergence of the informal UA indifferent spatial configurations challenges the main stream meanings and functions of urban spaces whilst presenting new possibilities for urban development. The temporariness, flexibility, and adaptability that characterise these emerging informal UA activities contributes to the formation of the hybrid character and utilisation of urban public spaces. The adaptation of space increases the accessibility and usability of public resources potentially available to the wider city (Nissen, 2008).

The integration of small- and large-scale UA practices into local planning systems provide new challenges to the government. In this context, Kunming Municipal Government needs to consider these practices as a two-way collaborative process that consolidates top-down and bottom-up approaches. Specifically, there is a need to provide more opportunities for people to access the unused spaces available for UA practices and establish uses such as community gardens. This would deregulate some of the strict regulation towards adapting public open spaces, while on the other hand introduce new rules on using land to regulate the planting behaviours in these areas.

In conclusion, the research on the informality of UA in Kunming highlights how people transform plots and other spaces in private and public domains. This includes adapting open spaces and green spaces into ornamental, recreational, and entertainment functions together with UA uses. As seen in this research, typology research emerges as a strong tool to deconstruct the expressions of UA (Carmona, 2015). Through typology analysis, we understand the ‘parts’ of UA, including function, space type, physical form, and rules and regulations of the practices (see Figure 8.7). We learn how they connect and correlate at different scales, reflecting the flow and connections between these ‘parts’, and thus providing an understanding of the ‘whole’ (Dovey, 2010). In this setting, UA practices can be viewed as a socio-material assemblage which reflects the way in which residents produce form, engage with, take over, and territorialise space (Rapoport, 1968). It provides us with valuable insights on how the city is really made and shaped.

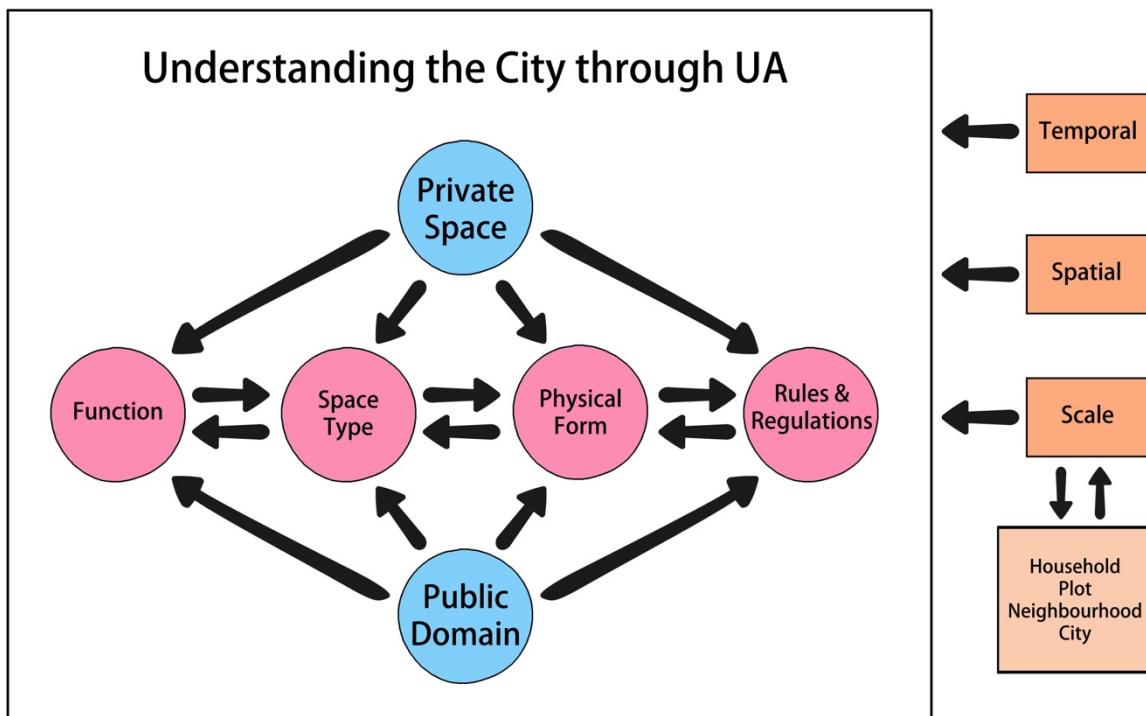


Figure 8.7. Flow and Connections of UA – the Configuration of Different Variables shaping Urban Form

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Appendix A: Urban Agriculture Practices in the Village in the City

1. Within the Second Ring Road

a. Fully-acquired VIC- Dashuying Village

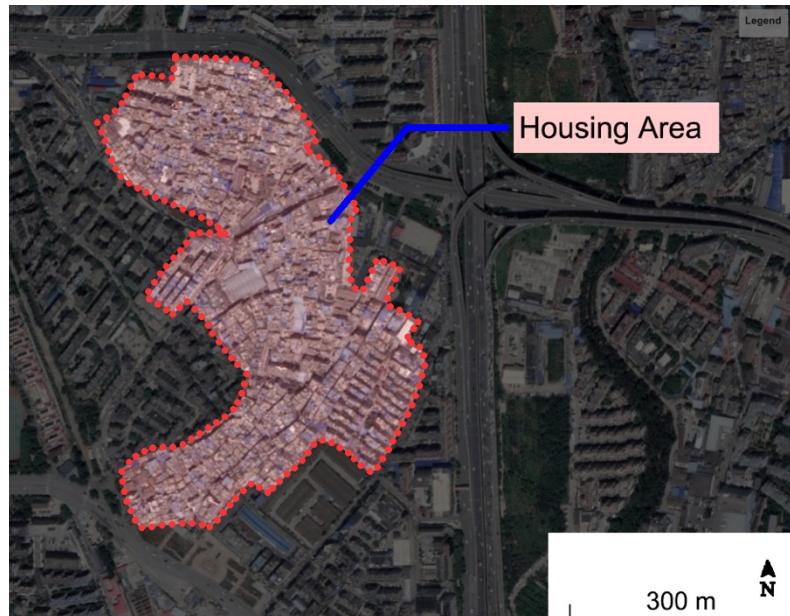


Figure AP1. The Satellite Map of Dashuying Village
(Map Captured from Google Earth, 2017)

Background

Dashuying Village affiliates to Jinma community of Guandu district and located near the Second Ring Road of Kunming (see Figure AP1). It is now the existing biggest fully-acquired VIC within the Second Ring Road. The basic information of Dashuying Village can be found in Table AP1. Among the overall population, there are 60% temporary residents, who rent the properties from owners, while 40% of residents live in their own properties.

Table AP1. Basic Information of Dashuying Village
(Data Retrieved from GDKM, 2016)

Total Area (ha)	Housing Area (ha)	Building Amount	Floor Area Ratio	Population
16.9	16.9	765	1.81	22950

The residents in Dashuying Village are low-income and middle-income level. The monthly average household income for this village in the city is counted as CNY ¥5,000 (AUD\$1,000). The average education level is secondary school level (GDKM, 2016). The buildings in

Dashuying Village are around 3-6 storeys in height and built from bricks (see Figure AP2). The exterior walls of the buildings are painted, and the front side of the buildings often decorated with tiles. For the buildings near the primary and secondary roads, the ground floors act as the retail space for businesses such as grocery stores, restaurants, utility services, banks, laundromats, and so on.

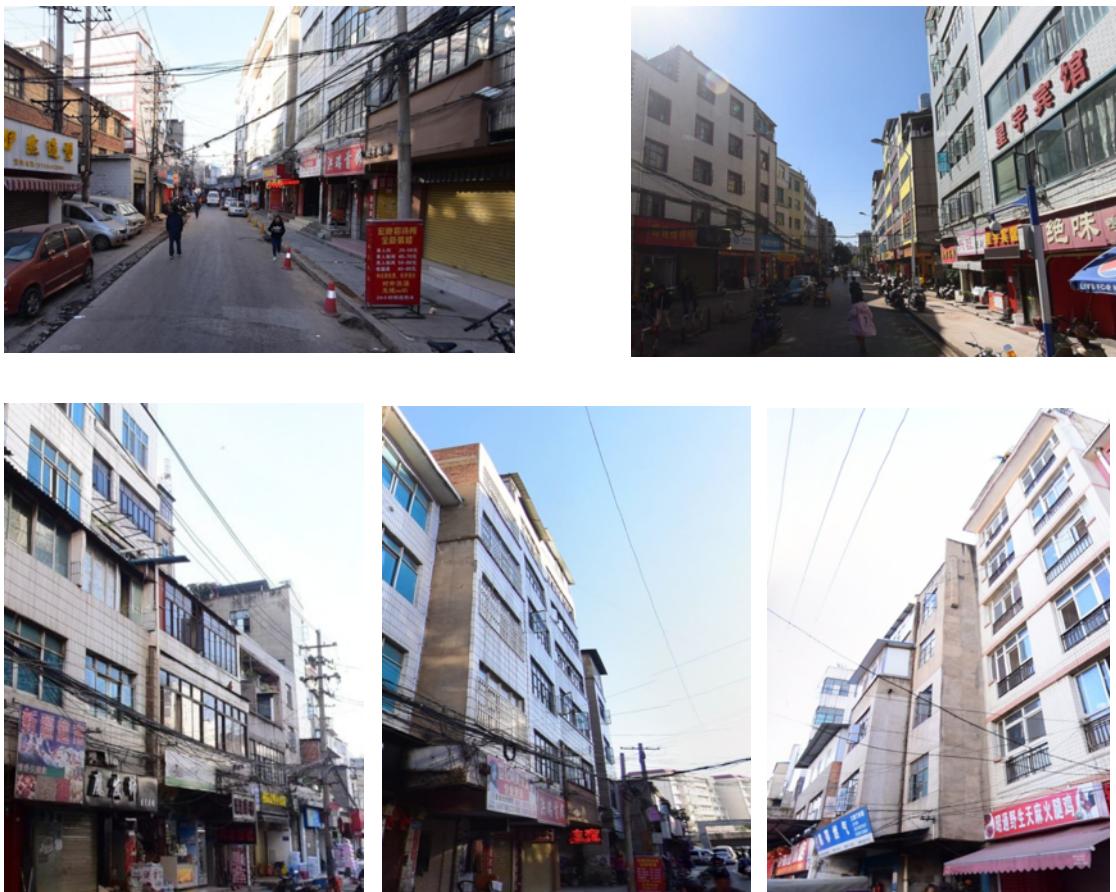


Figure AP2. Street View and Building Style of Dashuying Village
(Source: Author, 2017)

Expressions of UA

In Dashuying Village, there were 184 UA practices in both the public and private spaces (Figure AP3), with a density of 10.89 practices per hectare.

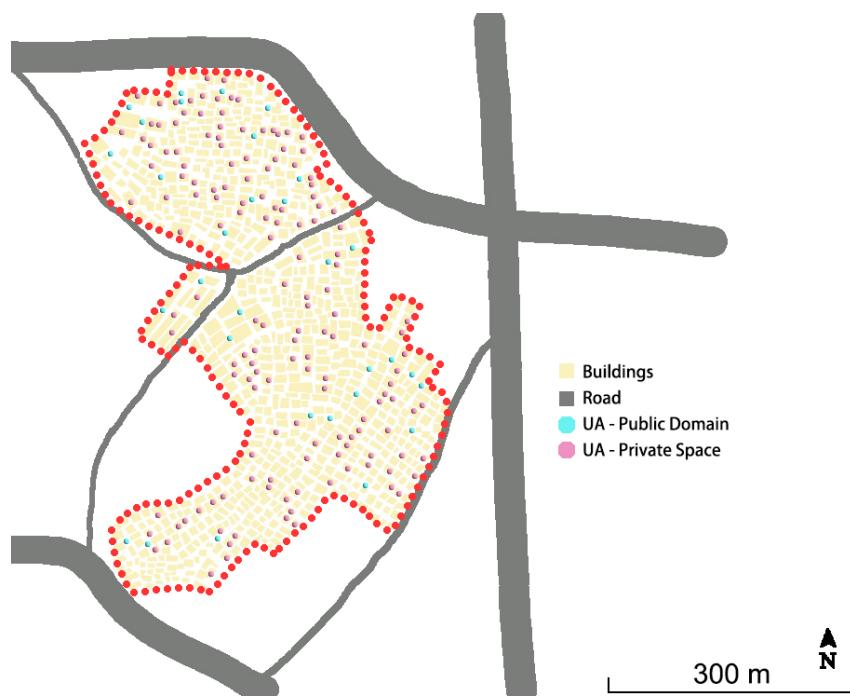


Figure AP3. Distribution of UA Practices in Dashuying Village

During the investigation, 25 people had been randomly chosen as the participants to complete the questionnaires or semi-structure interviews. According to the results of the questionnaires and interviews, 40% of the participants have the experience of undertaking UA practices, the remaining 60% have no UA experiences.

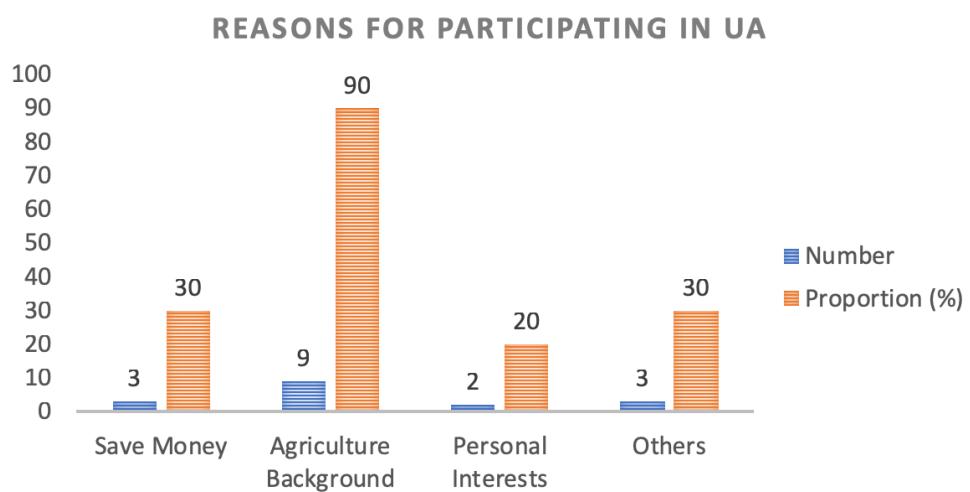


Figure AP4. Reasons for Participating in UA in Dashuying Village

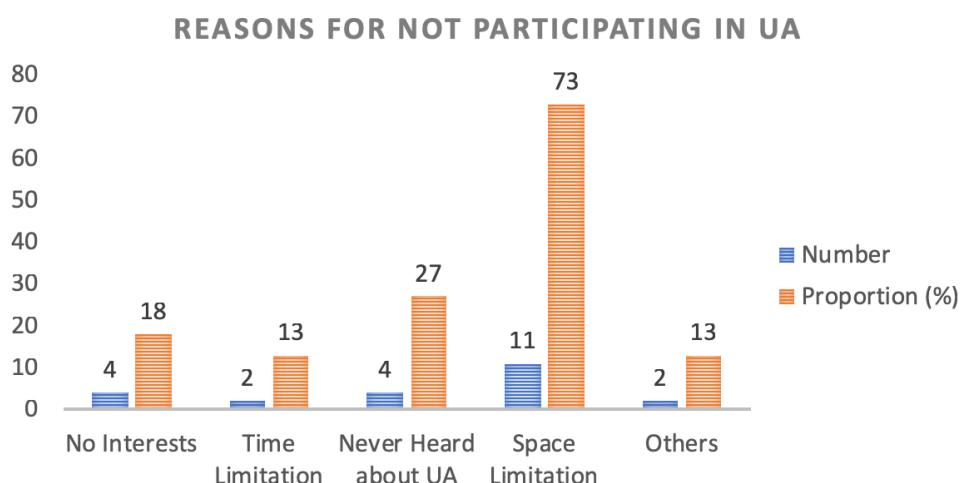


Figure AP5. Reasons for not Participating in UA in Dashuying Village

Function:

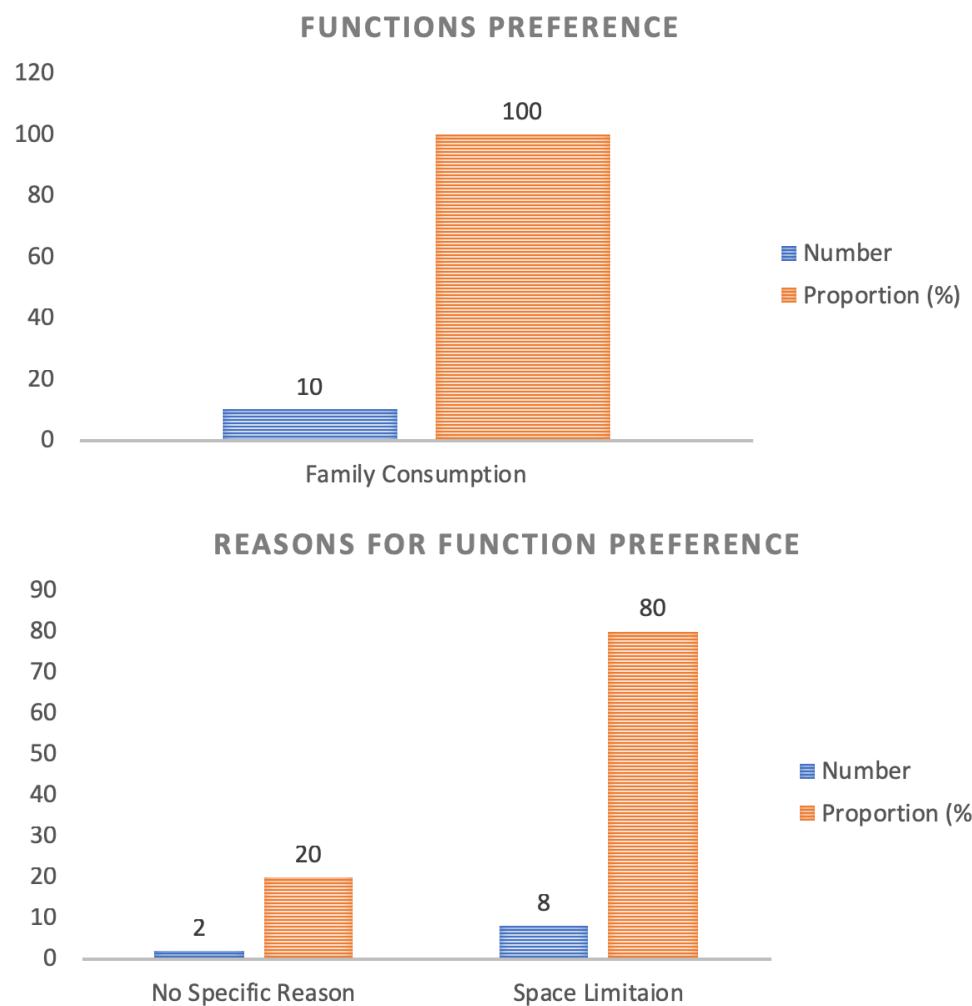
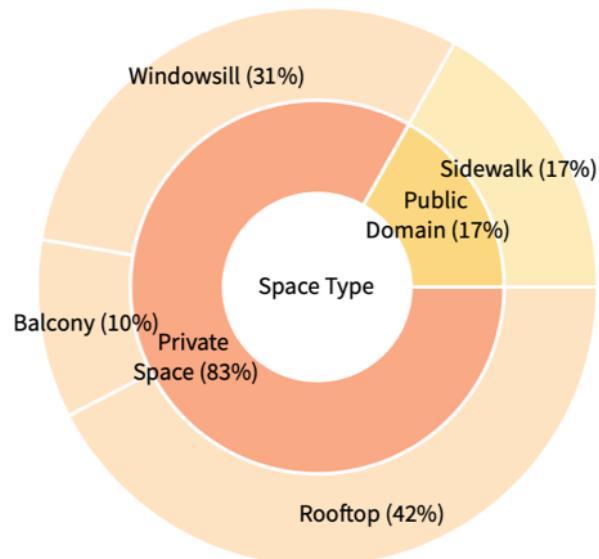


Figure AP6. Functions Preferences of UA in Dashuying Village

Space Type:



REASONS FOR SPACE TYPE PREFERENCE

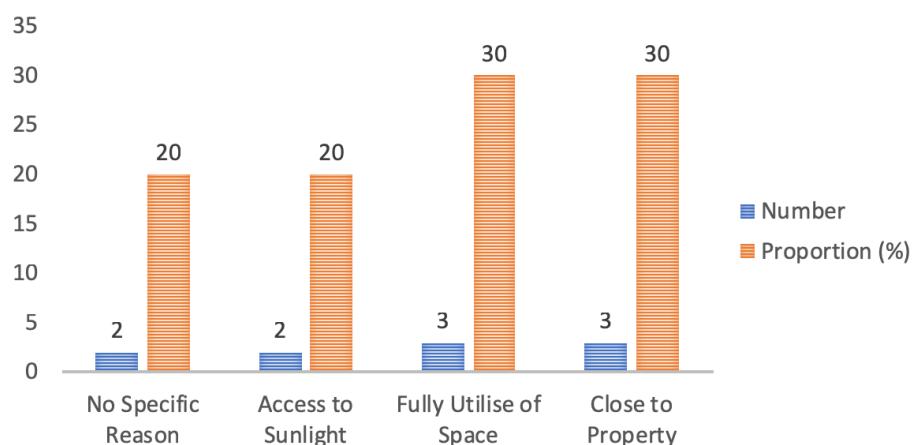


Figure AP7. Space Type Preferences of UA in Dashuying Village



Figure AP8. UA Practices in Dashuying Village- Private Space
(Source: Author, 2017)



Figure AP9. UA Practices in Dashuying Village- Public Domain
(Source: Author, 2017)

Physical Form:

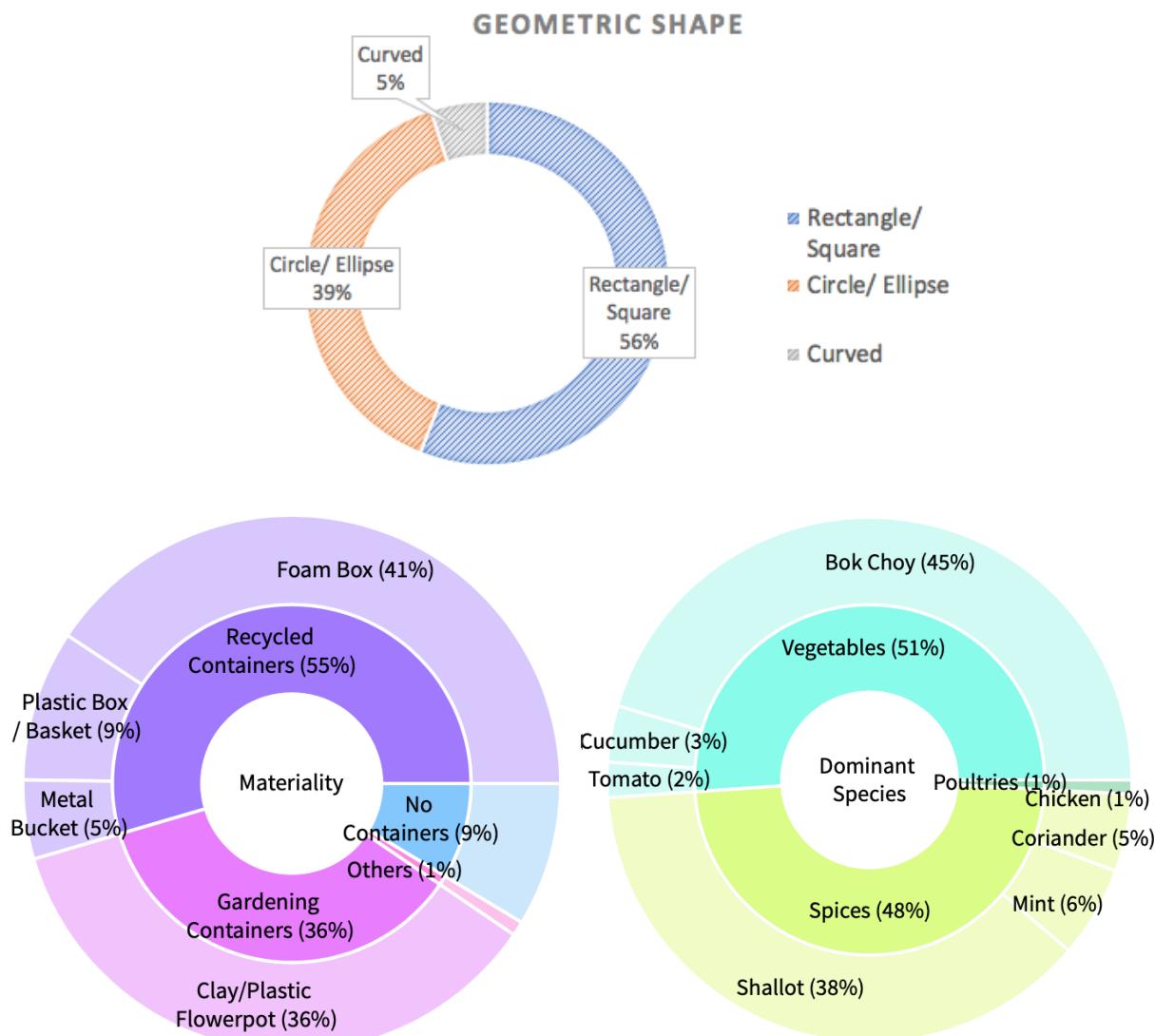


Figure AP10. Physical Form of UA in Dashuying Village

Rules and Regulations:

There are no strict rules and regulations for UA behaviours. The local community believes that UA practices in the public domain can be accepted as long as they do not destroy the public facilities or cause the connectivity issues for local transport. In private space, the residents do not have any specific rules for the urban agricultural practices including the cultivated techniques and species.

2. Within the Third Ring Road

a. Fully-acquired VIC- Jindaoying Village



Figure AP11. Satellite Map of Jindaoying Village
(Map Captured from Google Earth, 2017)

Background

Jindaoying Village belongs to Jinchen community, Panlong district. It is one of the fully-acquired VIC within the Third Ring Road in Kunming (see Figure AP11). The basic information of Jindaoying Village can be found in Table AP2. There are 7% of permanent residents and 93% of temporary residents in Jindaoying Village (PLKM, 2016b). The residents here are low-income to middle income level, and the monthly household income is around CNY ¥5,000 (AUD \$1,000). The average education level is secondary school level.

Table AP2. Basic Information of Jindaoying Village
 (Data Retrieved from PLKM, 2016b)

Total Area (ha)	Housing Area (ha)	Commercial Area (ha)	Building Amount	Floor Area Ratio	Population
33.94	16.79	17.15	790	1.88	23700

Back to 1999, all the commercial area was cultivated land. With the development of Jindaoying Village, the village collective turned the cultivated land into commercial area (see Figure AP12). The commercial area consists of a trading centre for selling and repairing cars and accessories, and a market for ornamental plants and stones. The transformation of the land brought more than 100 work opportunities for this VIC.

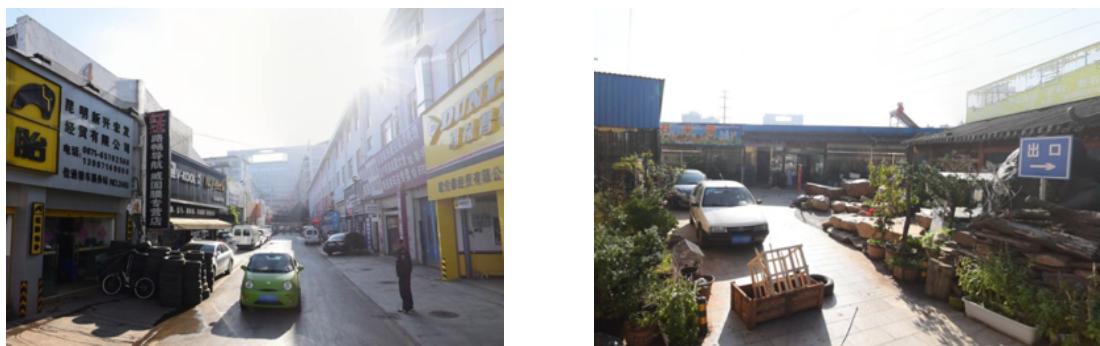


Figure AP12. Commercial Area in Jindaoying Village
 (Source: Author, 2017)

There are 790 self-constructed buildings in the housing area, which create 8324 rooms for rent. In Jindaoying Village, the buildings are 4-7 storeys and the exterior walls were decorated by tiles. For security reasons, some of the windows have the anti-theft grid. The grid extant the windows and becomes the outside windowsill. In this VIC, the ground floors of the buildings facing the primary roads provide space for retail activities, such as clinics, laundromats, barber shops, grocery stores, and other uses (see Figure AP13).



Figure AP13. The Street View and Building Style of Jindaoying Village
 (Source: Author, 2017)

Expressions of UA

In Jindaoying Village, there were 153 UA practices in both the private and public spaces (see Figure AP 14), with a density of 9.11 practices per hectare.

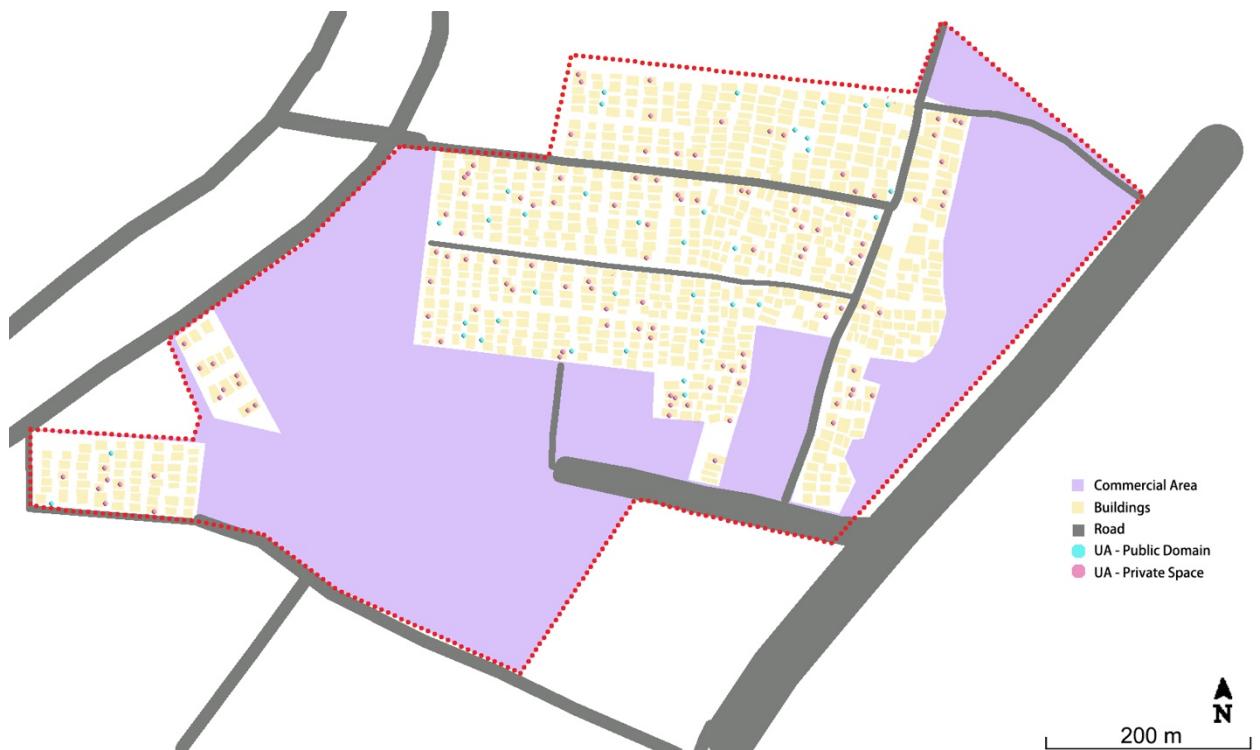


Figure AP14. Distribution of UA Practices in Jindaoying Village

During the investigation, 25 people had been randomly chosen as the participants to complete the questionnaires or semi-structured interviews. According to the results of the questionnaires and interviews, 48% of the participants have the experience of undertaking UA practices, the remaining 52% have no UA experiences.

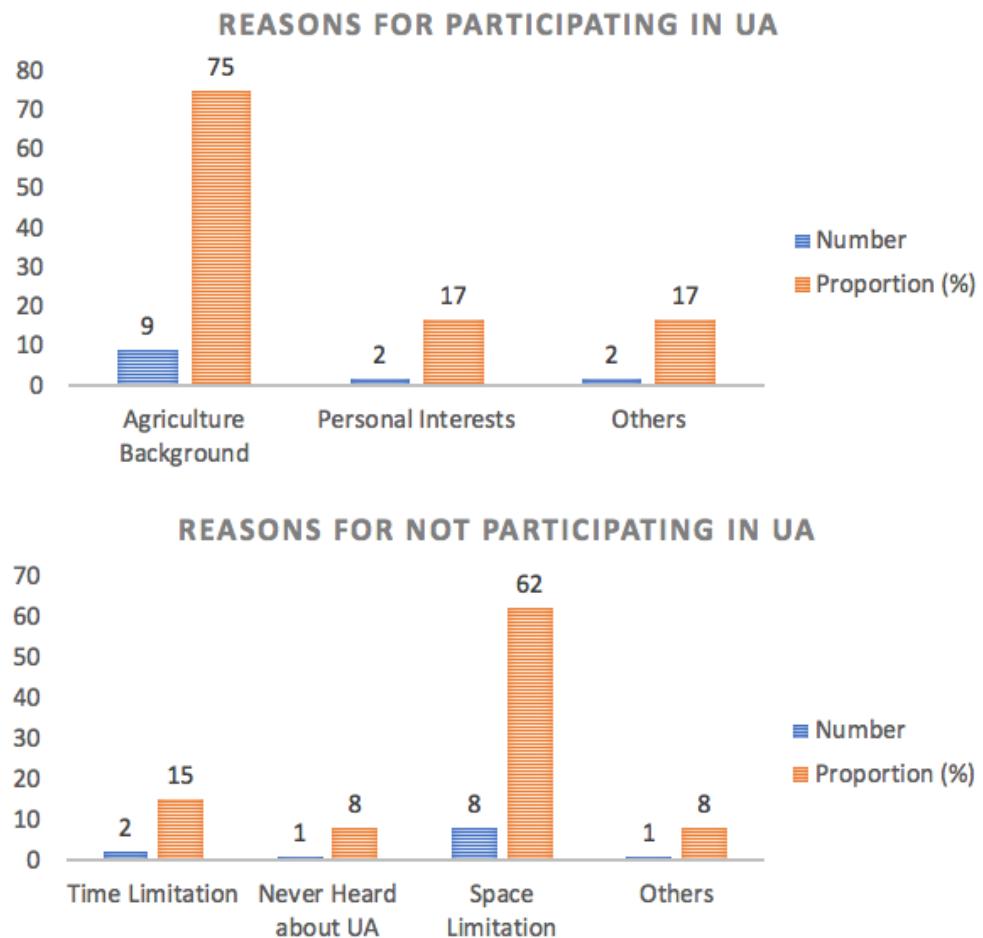


Figure AP15. Reasons for Participating or not Participating in UA in Jindaoying Village

Function:

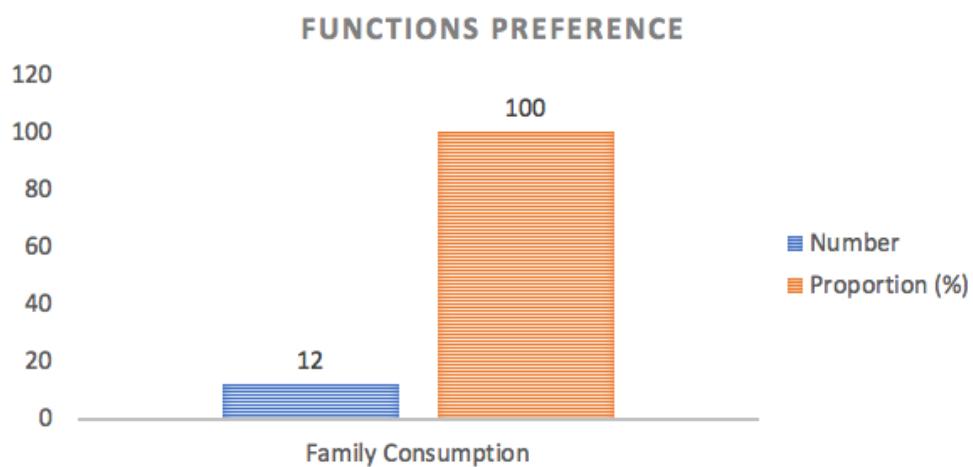


Figure AP16. Functions Preferences of UA in Jindaoying Village

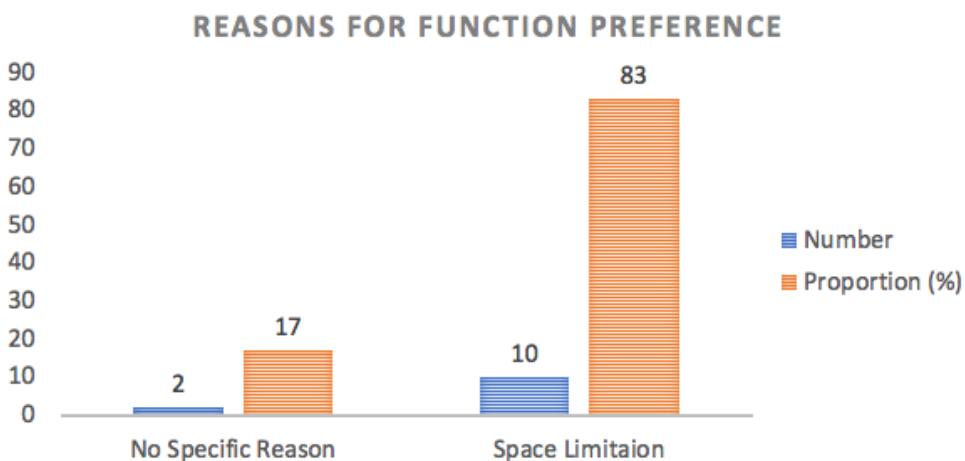


Figure AP17. Reasons for Functions Preferences of UA in Jindaoying Village

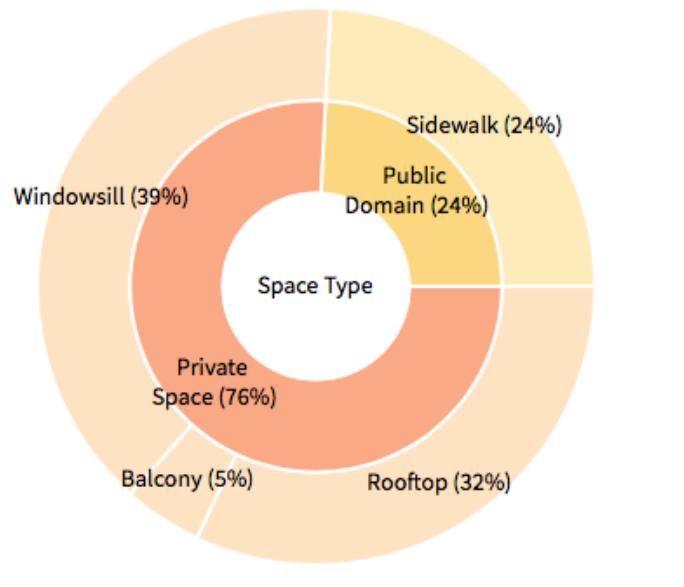
Space Type:



Figure AP18. UA Practices in Jindaoying Village- Private Space
(Source: Author, 2017)



Figure AP19. UA Practices in Jindaoying Village- Public Domain
(Source: Author, 2017)



REASONS FOR SPACE TYPE PREFERENCE

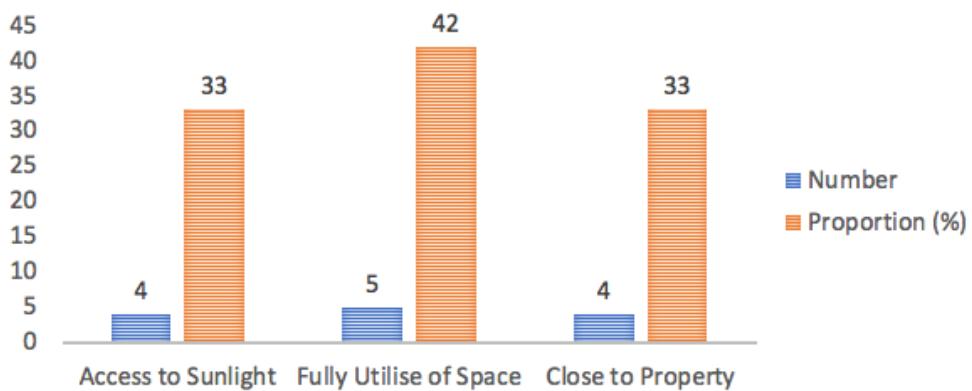


Figure AP18. Space Type Preference of UA in Jindaoying Village

Physical Form:

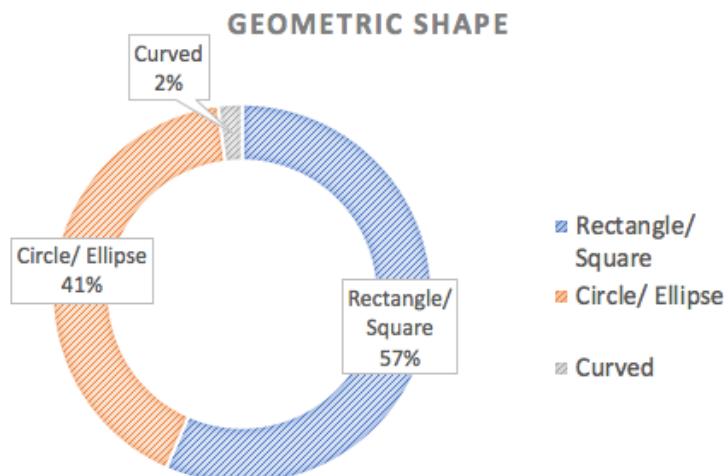


Figure AP19. Physical Form of UA in Jindaoying Village – Geometric Shape

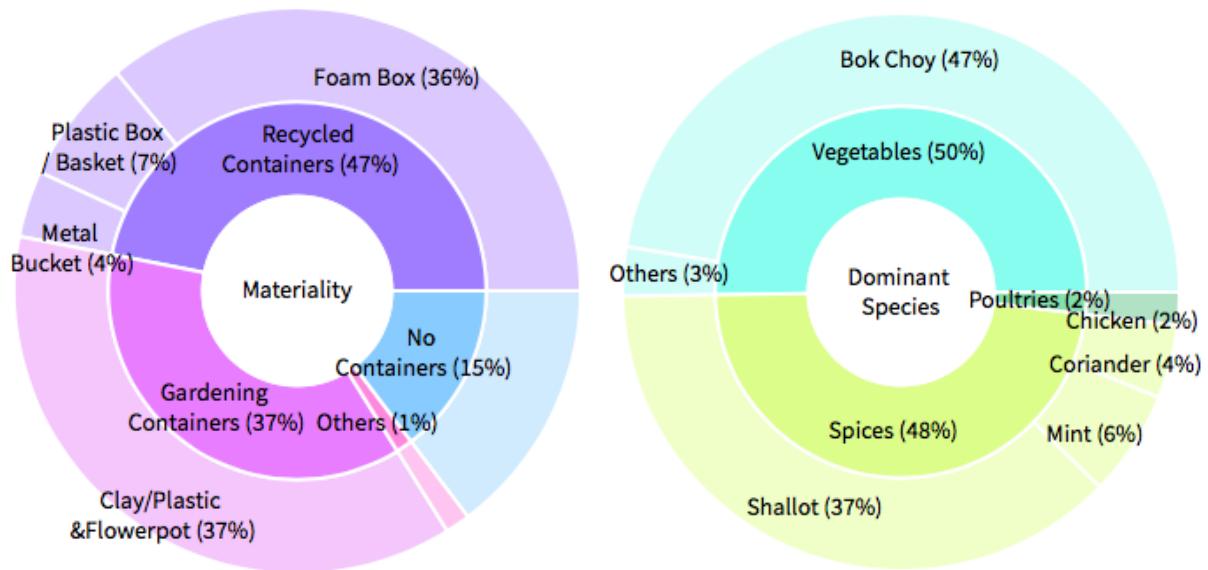


Figure AP19. Physical Form of UA in Jindaoying Village – Materiality and Dominant Species

Rules and Regulations:

As in former fully-acquired VICs, there are no strict rules and regulations for urban agricultural behaviours in Jindaoying Village. The local community believes that urban agricultural practices in the public domain can be accepted as long as they do not destroy the public facilities or cause the connectivity issues for local transport. In private space, the residents do not have any specific rules for the UA practices including the cultivated techniques and dominant species.

b. Partially-acquired VIC- Changdigeng Village



Figure AP20. Satellite Map of Changdigeng Village
(Map Captured from Google Earth, 2017)

Background

Changdigeng Village located near the north Third Ring Road and belongs to Qinglong community, Panlong district. It is a partially-acquired VIC between the Second Ring road and the Third Ring Road of Kunming (see Figure AP20). The basic information of Changdigeng Village can be found in Table AP3. There are about 60% of residents in this VIC are temporary tenants, while the remaining 40% are permanent owners. The residents in Changdigeng Village are low-income population, the monthly average household income is around CNY ¥4,000 (AUD\$800). The average education level is secondary school level(PLKM, 2016c).

Table AP3. Basic Information of Changdigeng Village
(Data Retrieved from PLKM, 2016c)

Total Area (ha)	Housing Area (ha)	Cultivated Land (ha)	Warehouse Area (ha)	Number of Buildings	Floor Area Ratio	Number of Residents
6.61	4.02	1.54	1.05	198	1.85	4950

The buildings in this VIC are 4-6 storeys and built with bricks. Some of exterior walls are decorated by tiled (see Figure AP21). There is one primary road across the VIC and width is around 3 meters. For the buildings facing the primary road, the ground floor act as

commercial function including grocery, laundry, and restaurant. Back to the end of 2006, there were 14.58hectares of cultivated land in Changdigeng Village. With the urban development, the municipal government started to take the cultivated land from Changdigeng Village since 2012. Until 2016, there were only 1.54 hectares of cultivated land left in Changdigeng Village.



Figure AP21. Street View and Building Style of Changdigeng Village
(Source: Author, 2017)

Expressions of UA

In Changdigeng Village, there were 95 UA practices in both the public and private spaces (Figure AP22), with a density of 23.61 practices per hectare.

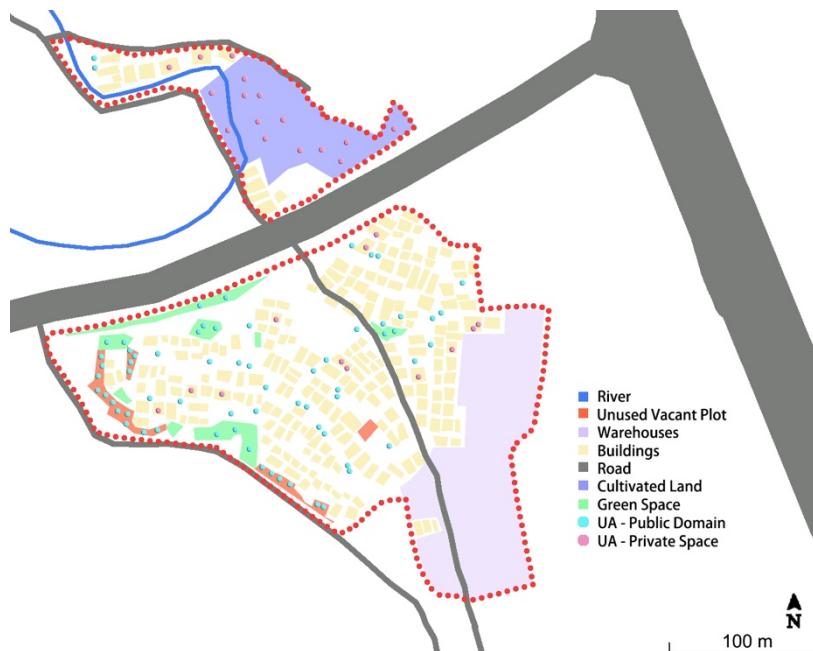


Figure AP22. Distribution of UA Practices in Changdigeng Village

During the investigation, 25 people had been randomly chosen as the participants to complete the questionnaires or semi-structured interviews. According to the results of the questionnaires and interviews, 72% of the participants have the experience of undertaking UA practices, the remaining 28% have no UA experiences.

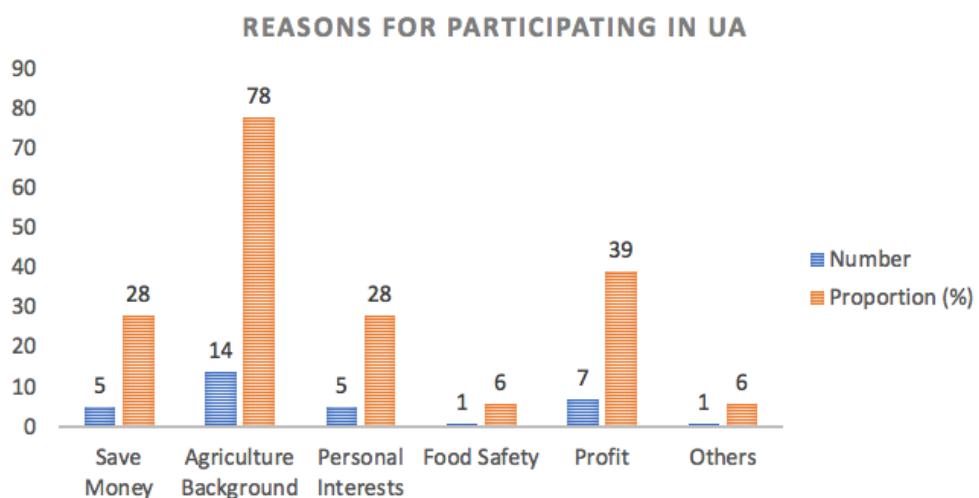


Figure AP23. Reasons for Participating in UA in Changdigeng Village

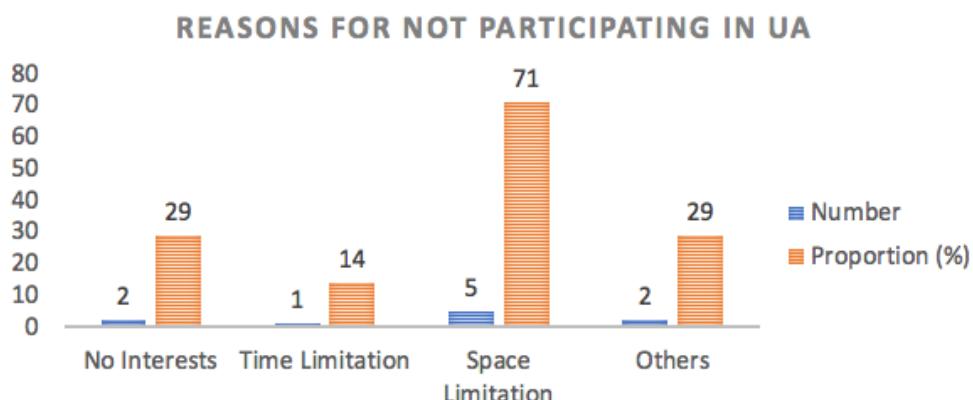


Figure AP24. Reasons for not Participating in UA in Changdigeng Village

Function:

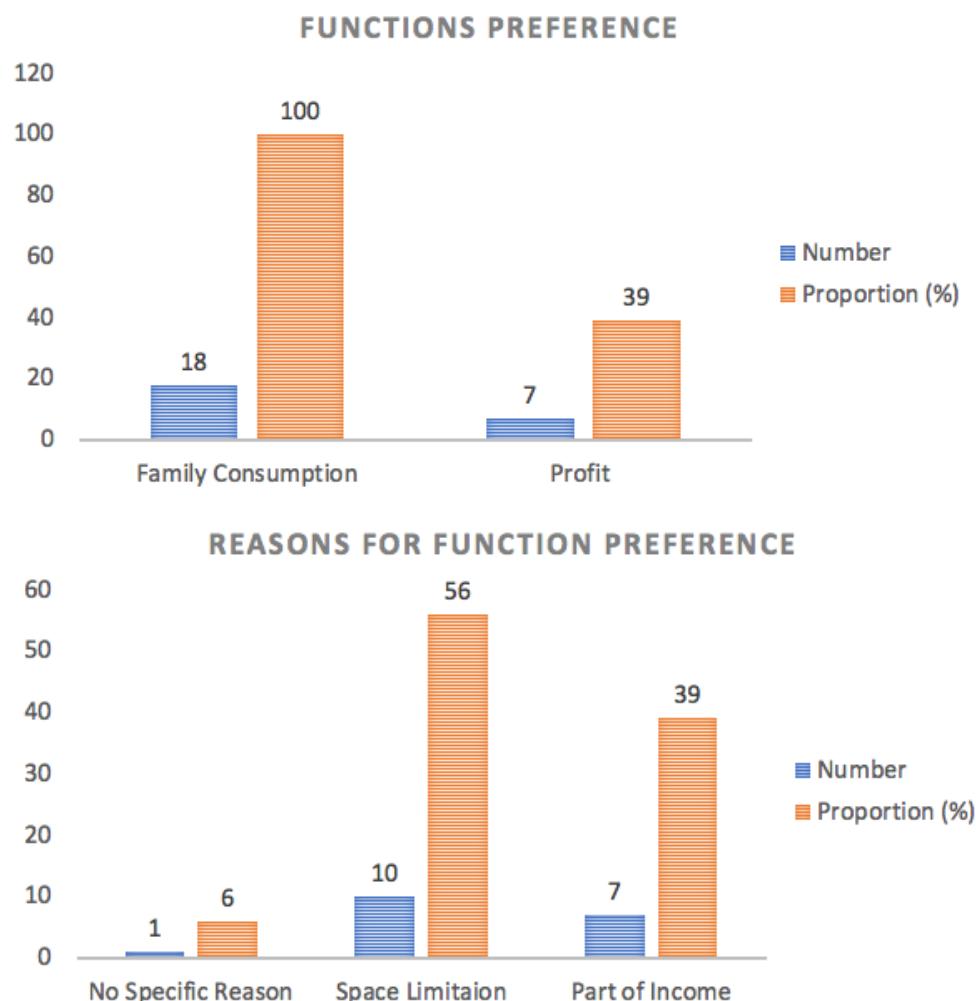


Figure AP25. Functions Preferences of UA in Changdigeng Village

Space Type:

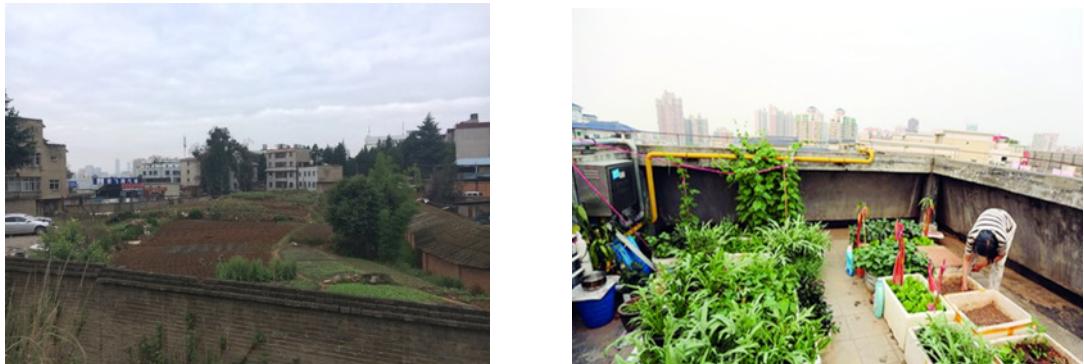


Figure AP26. UA Practices in Changdigeng Village- Private Space
(Source: Author, 2017)



Figure AP27. UA Practices in Changdigeng Village- Public Domain
(Source: Author, 2017)

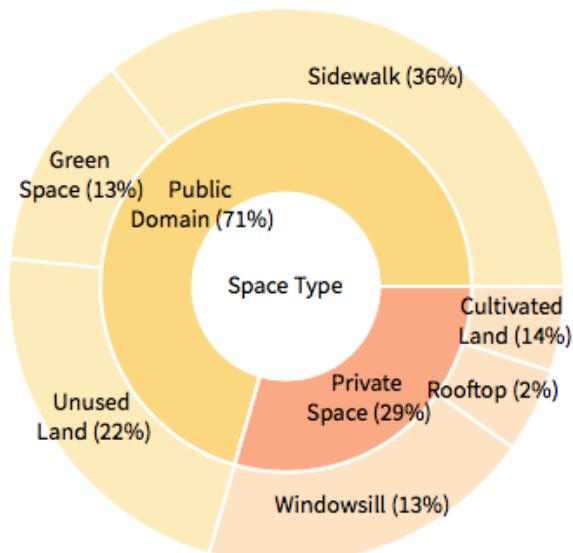


Figure AP28. Space Type Preferences of UA in Changdigeng Village

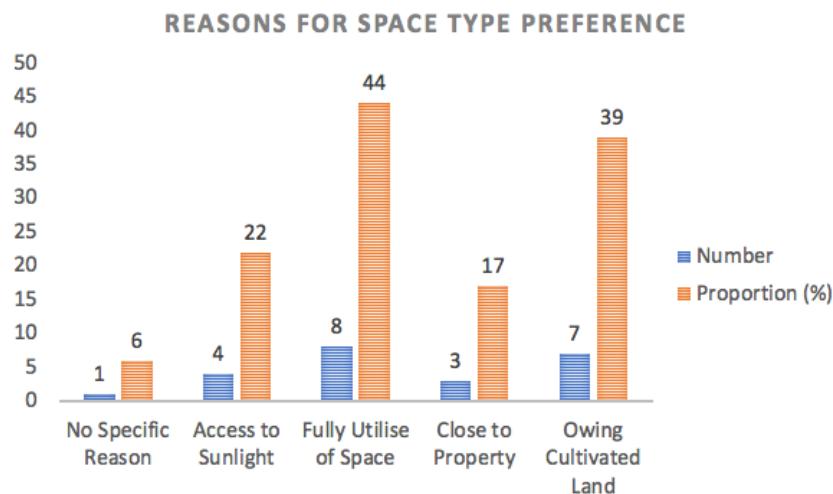


Figure AP29. Reasons for Space Type Preferences of UA in Changdigeng Village

Physical Form:

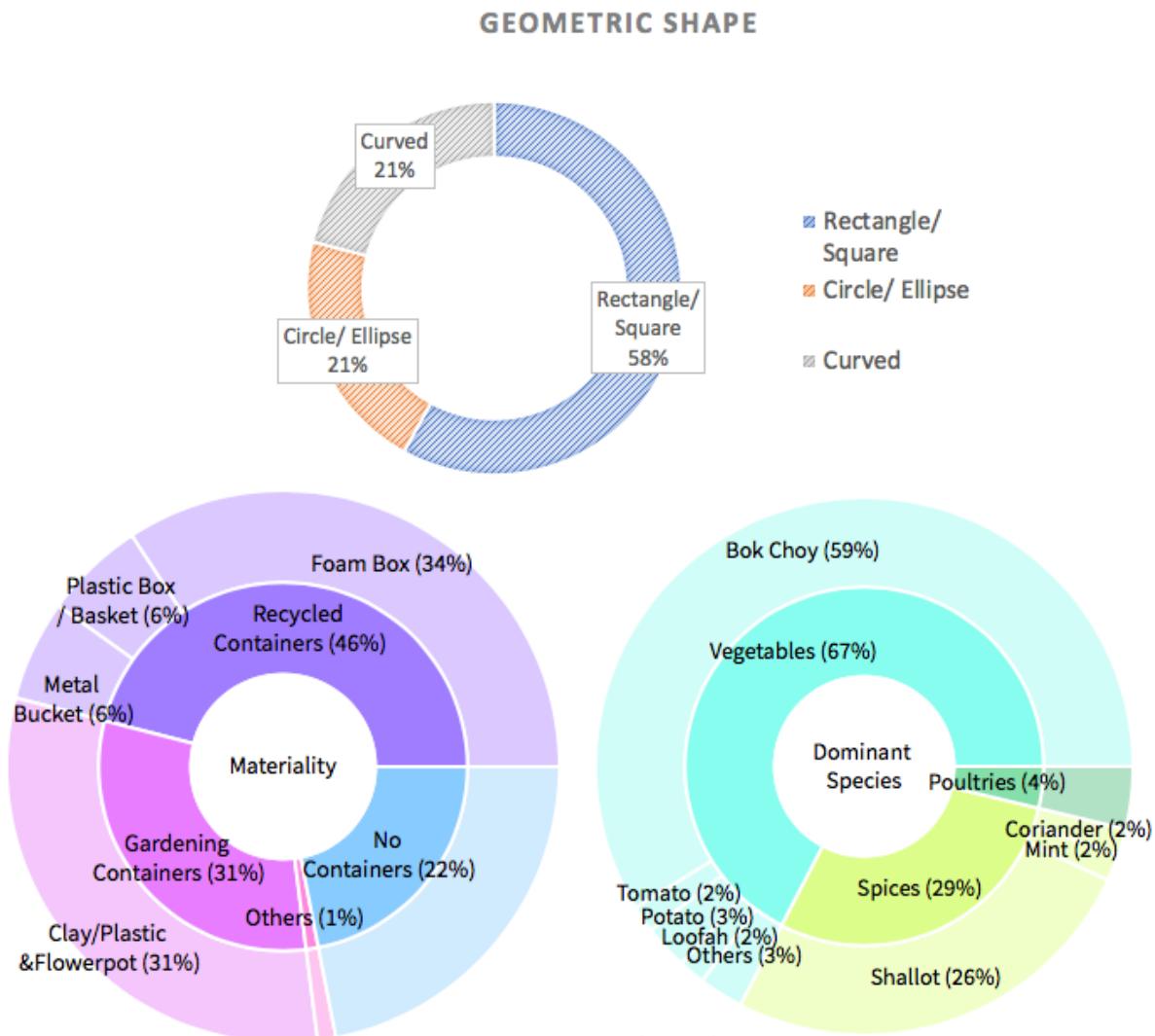


Figure AP30. Physical Form of UA in Changdigeng Village

Rules and Regulations:

There are no strict rules and regulations toward urban agricultural behaviours. The local community believes that urban agricultural practices in public domain can be accepted as long as they do not destroy the public facilities. In private space, especially in the housing area, the residents do not have any specific rules for the urban agricultural practices including the cultivated techniques and species. The cultivated land is part of the private space, the central government has the policies to protect the cultivated land (PRC, 2004). The policies aim to make sure the function of cultivated land is only to grow crops, any construction work in cultivated land is against the law.

3. Outside the Third Ring Road

a. Partially-acquired VIC- Yangchang Village



Figure AP31. Satellite Map of Yangchang Village
(Map Captured from Google Earth, 2017)

Background

Yangchang Village belongs to Jinchen community, Panlong district and it is a partially-acquired VIC outside the Third Ring Road of Kunming. The basic information of Yangchang Village can be found in Table AP3. The population in Yangchang Village is approximately 14400 and 79%

of them is temporary tenants. The residents in Yangchang Village are low-income population, the monthly average household income is around CNY ¥ 3,500 (AUD\$700). The average education level is secondary school level.

Table AP3. Basic Information of Yangchang Village
(Data Retrieved from PLKM, 2016c)

Total Area (ha)	Housing Area (ha)	Cultivated Land (ha)	Warehouse Area (ha)	Unused Land (ha)	Number of Buildings	Floor Area Ratio	Number of Residents
30.15	9.11	1.35	4.8	14.89	576	2.21	14400

Expressions of UA

In Yangchang Village, there were 105 UA practices in both the public and private spaces (see Figure AP32), with a density of 11.52 practices per hectare.

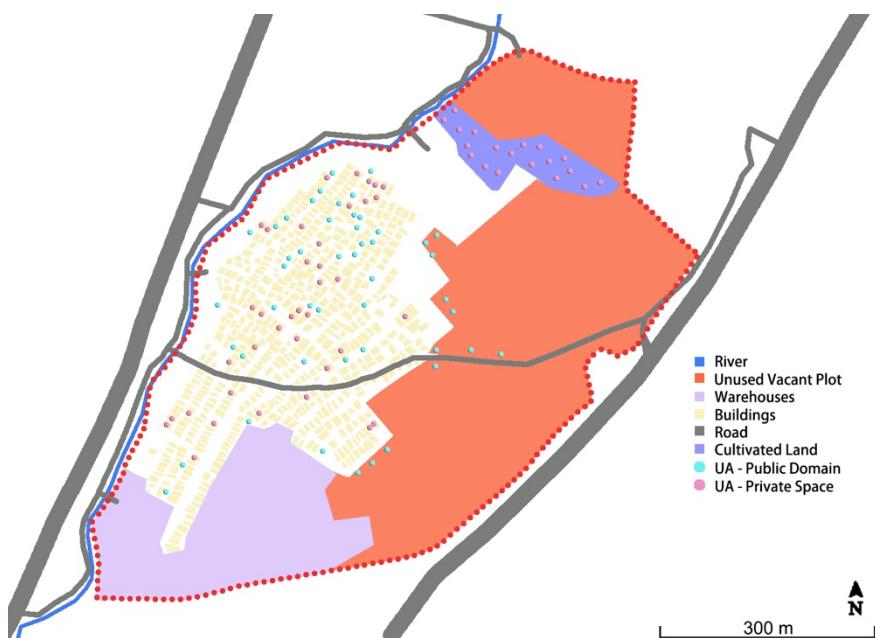


Figure AP32. Distribution of UA Practices in Yangchang Village

During the investigation, 25 people had been randomly chosen as the participants to complete the questionnaires or semi-structured interviews. According to the results of the questionnaires and interviews, 72% of the participants have the experience of undertaking UA practices, the remaining 28% have no UA experiences.

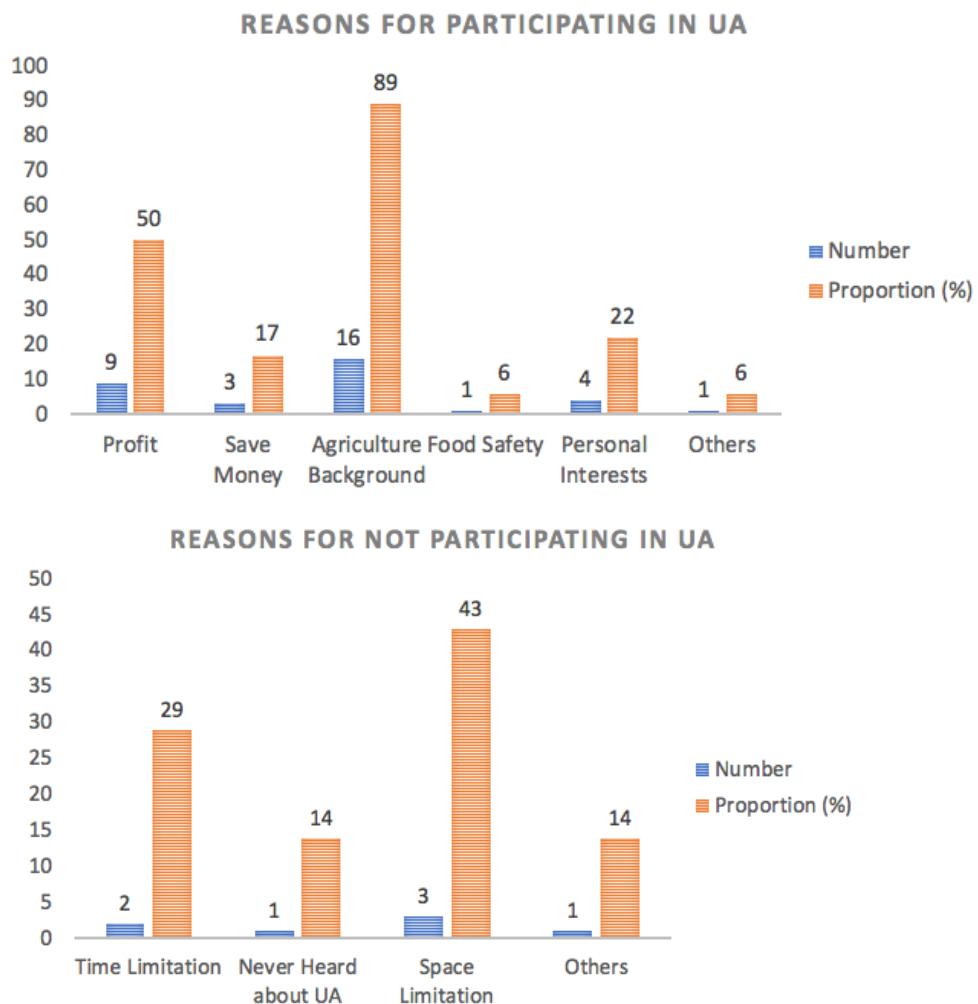


Figure AP33. Reasons for Participating or not Participating in UA in Yangchang Village

Function:

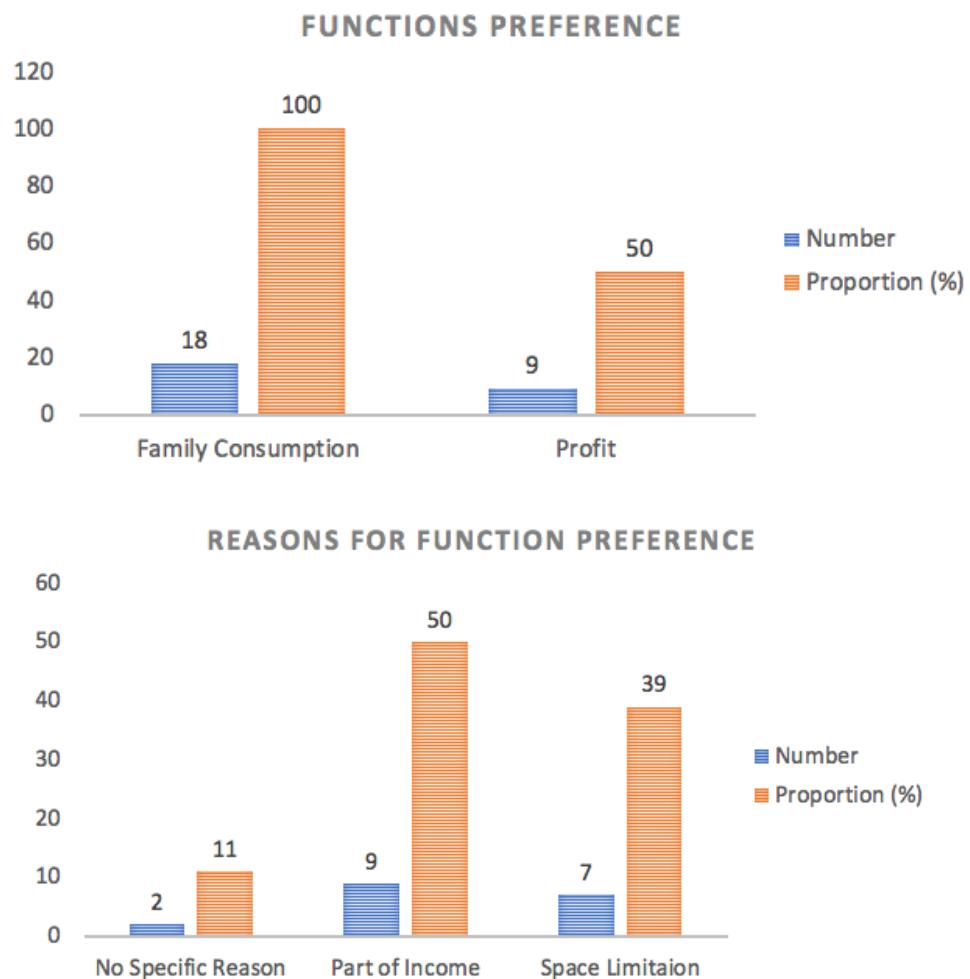


Figure AP34. Functions Preferences of UA in Yangchang Village

Space Type:

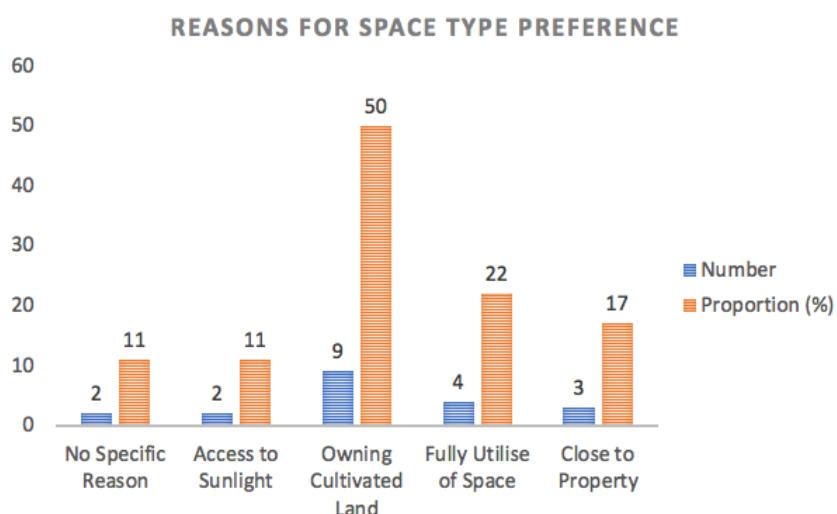
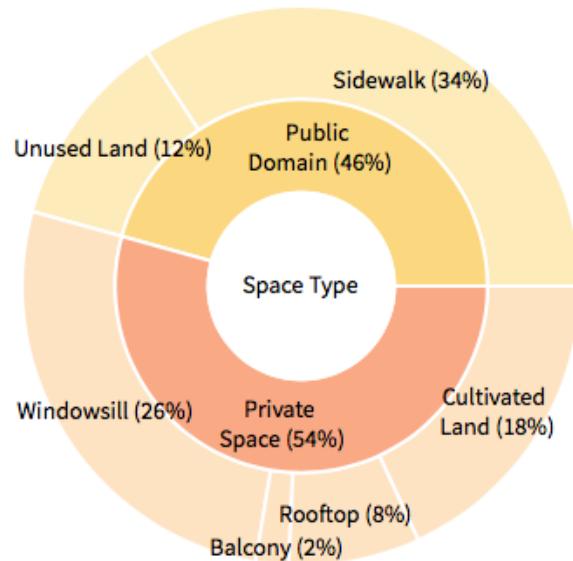


Figure AP35. Space Type Preference of UA in Yangchang Village



Figure AP36. UA Practices in Yangchang Village- Private Space
(Source: Author, 2017)



Figure AP37. UA Practices in Yangchang Village- Public Domain
(Source: Author, 2017)

Physical Form:

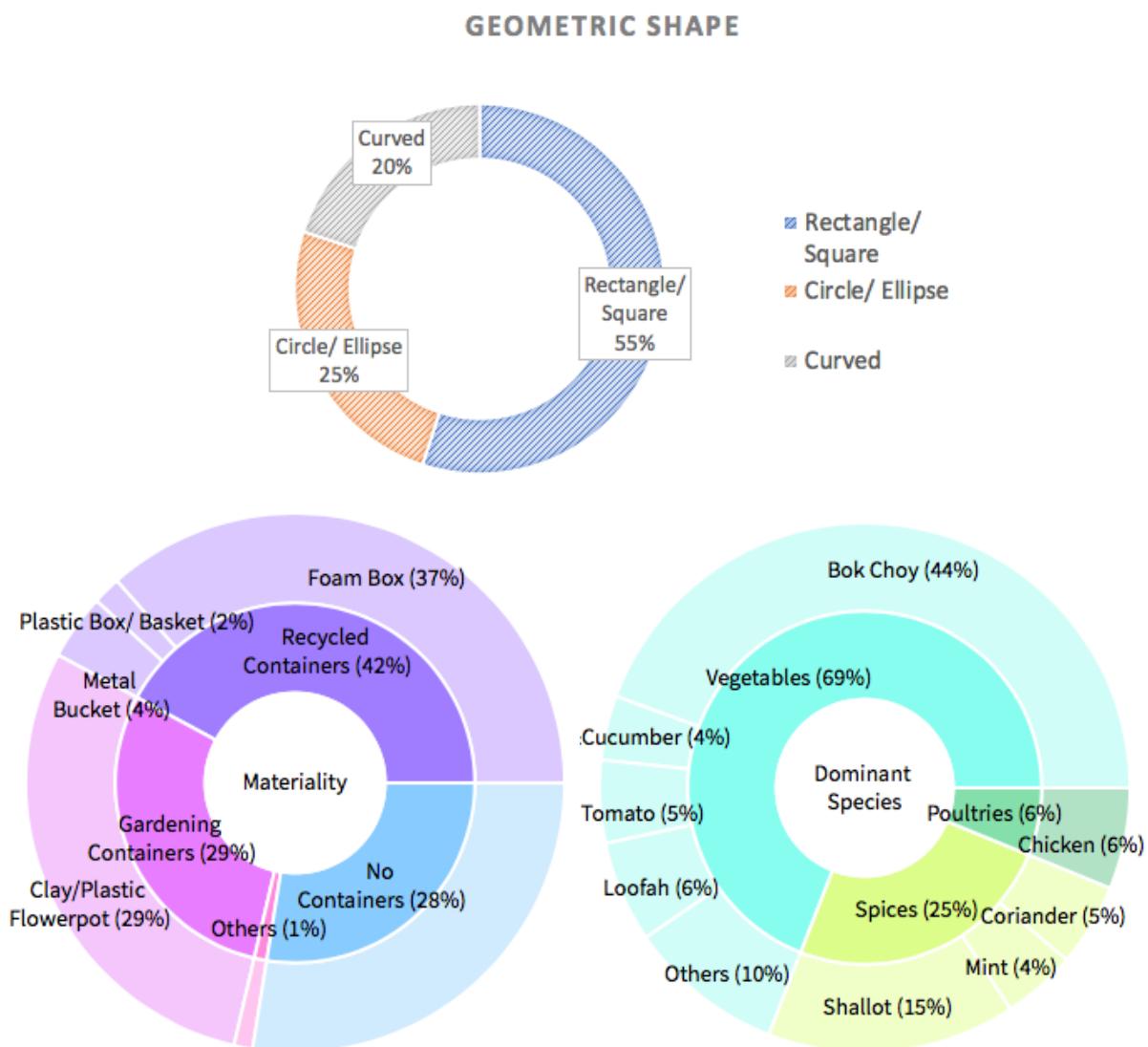


Figure AP38. Physical Form of UA in Yangchang Village

Rules and Regulations:

There are no strict rules and regulations toward urban agricultural behaviours. The local community believes that urban agricultural practices in public domain can be accepted as long as they do not destroy the public facilities. As for the UA activates within the unused land, the community thought the land hand been by the government and they do not have the ability to manage the land. In private space, especially in the housing area, the residents do not have any specific rules for the urban agricultural practices including the cultivated techniques and species. The cultivated land is part of private space, the central government has the policies to protect the cultivated land. The policies aim to make sure the function of cultivated land is to grow crops and any construction work in cultivated land is against the law.

b. Developing VIC- Baofeng Village



Figure AP39. Satellite Map of Baofeng Village
(Map Captured from Google Earth, 2017)

Background

Baofeng Village belongs to Puji community, Wuhua district and it is located outside the Third Ring road, it is now a developing VIC in Kunming. The basic information of Baofeng Village can be found in Table AP4. The population here is approximately 9664. Among them, 29% of them are temporary residents who rent the properties from the owners and 71% of residents are

owners and live in their own place. The temporary residents are the migrant workers from other towns and cities of Yunnan Province. The residents in Baofeng Village are average middle-income. The average annual household income for this village in the city is counted as CNY ¥6,000 (AUD\$1,200). The average education level is secondary school level.

Table AP4. Basic Information of Baofeng Village
(Data Retrieved from WHKM, 2016)

Total Area (ha)	Housing Area (ha)	Cultivated Land (ha)	Warehouse Area (ha)	Number of Buildings	Floor Area Ratio	Number of Residents
169.82	20.27	125.34	24.21	604	1.07	9664

The buildings in Baofeng Village are average 4-6 storeys, build from bricks and decorated by white tiles (see Figure AP40). There are still 125.34 hectares of cultivated land left in Baofeng Village (see Figure AP41).



Figure AP40. Street View and Building Style of Baofeng Village
(Source: Author, 2017)



Figure 41. Cultivated Land in Baofeng Village
(Source: Author, 2017)

Expressions of UA

In Baofeng Village, there were 226 UA practices in both the public and private spaces (see Figure AP42), with a density of 11.15 practices per hectare.

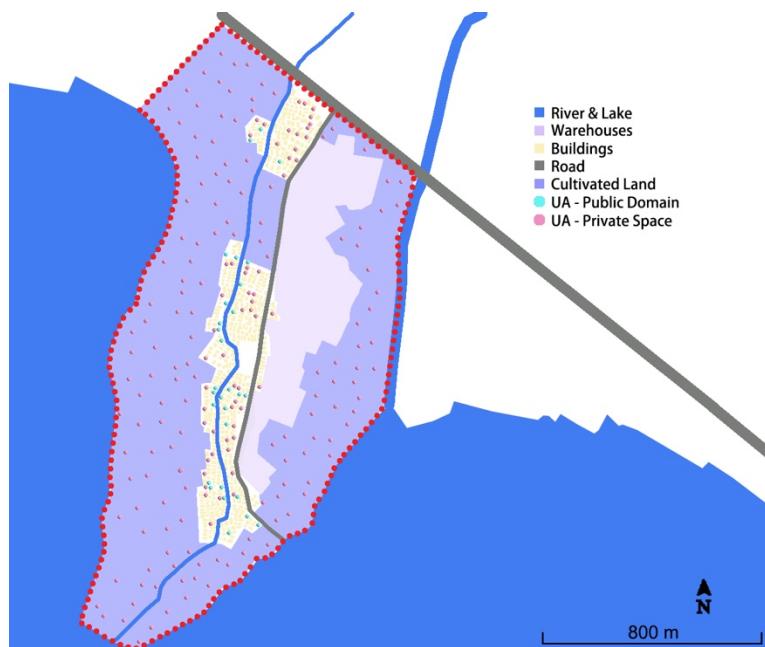


Figure AP42. Distribution of UA Practices in Baofeng Village

During the investigation, 25 people had been randomly chosen as the participants to complete the questionnaires or semi-structured interviews. According to the results of the questionnaires and interviews, 92% of the participants have the experience of undertaking UA practices, the remaining 8% have no UA experiences.

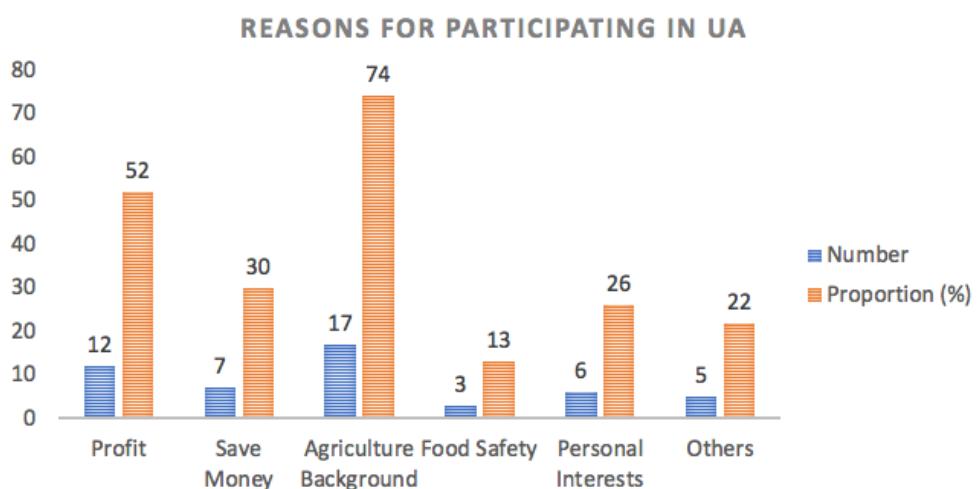


Figure AP43. Reasons for Participating in UA in Baofeng Village

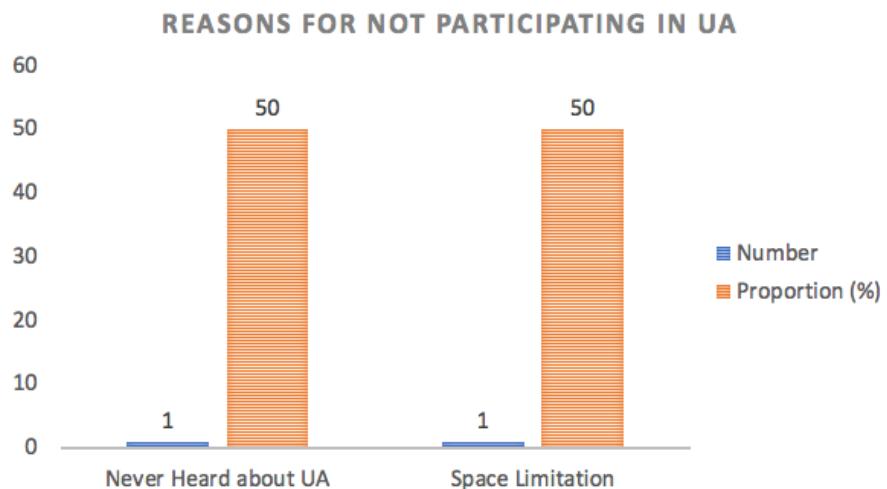


Figure AP44. Reasons for not Participating in UA in Baofeng Village

Function:

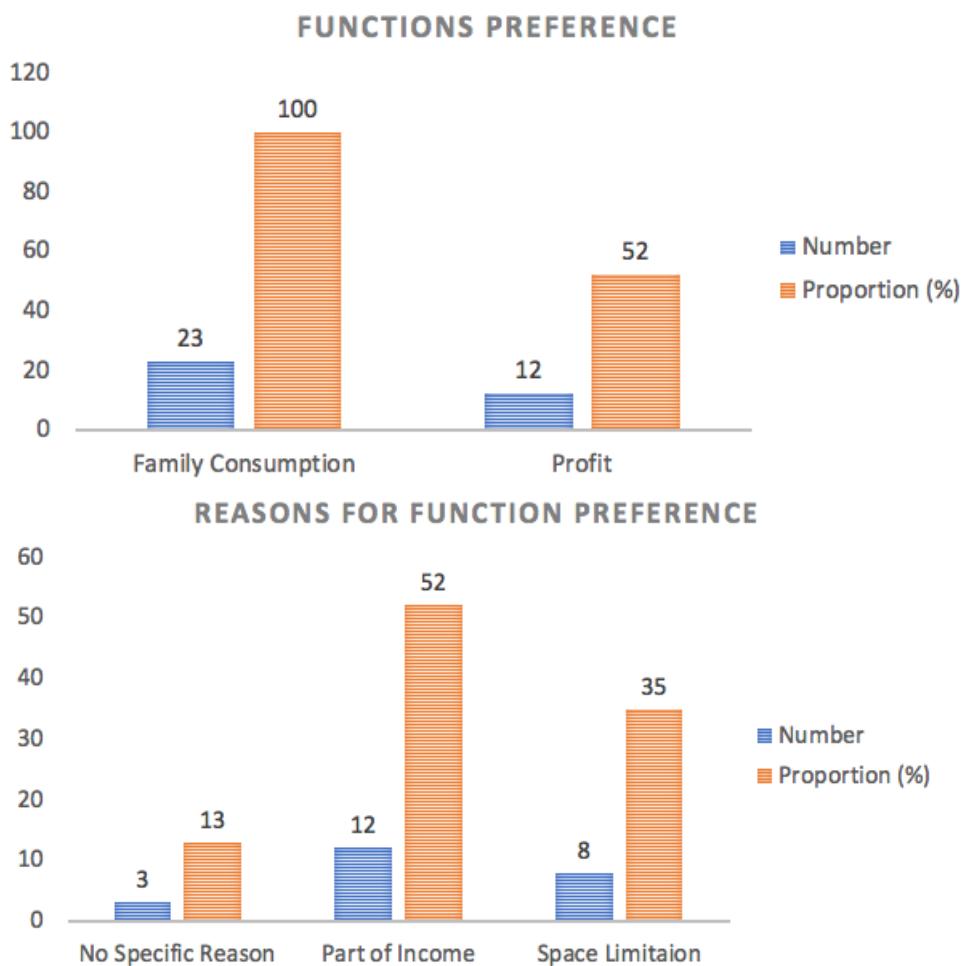


Figure AP45. Functions Preferences of UA in Baofeng Village

Space Type:

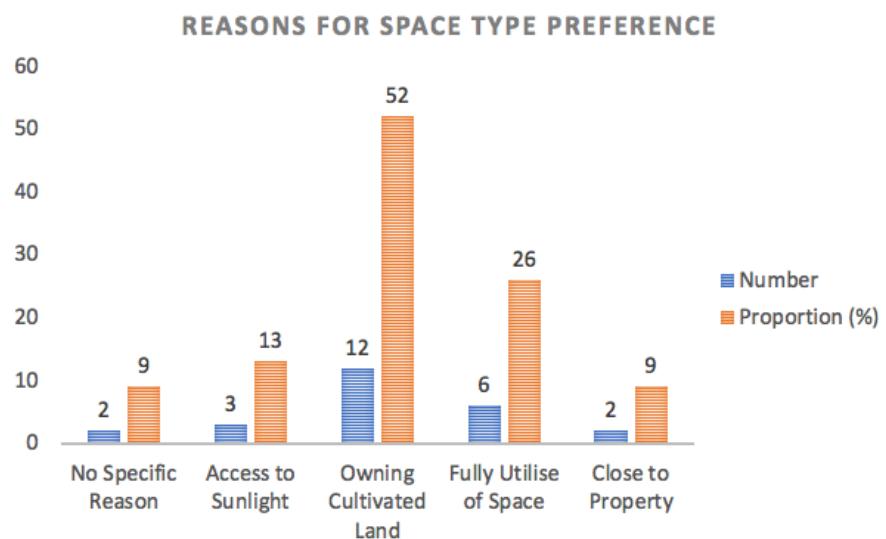
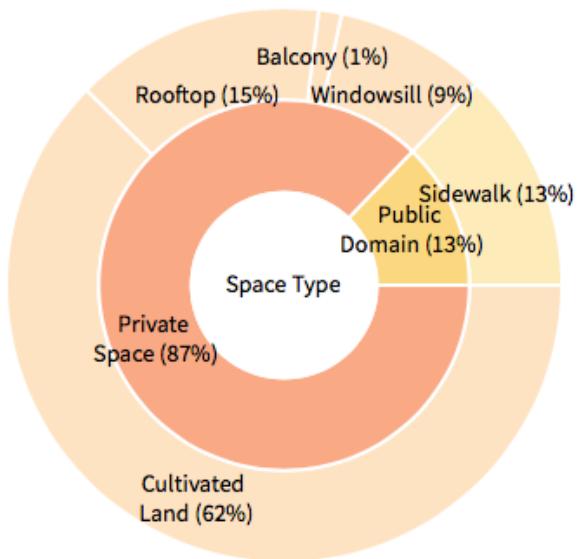


Figure AP46. Space Type Preference of UA in Baofeng Village



Figure AP47. UA Practices in Baofeng Village- Private Space
(Source: Author, 2017)



Figure AP48. UA Practices in Baofeng Village- Public Domain
(Source: Author, 2017)

Physical Form:

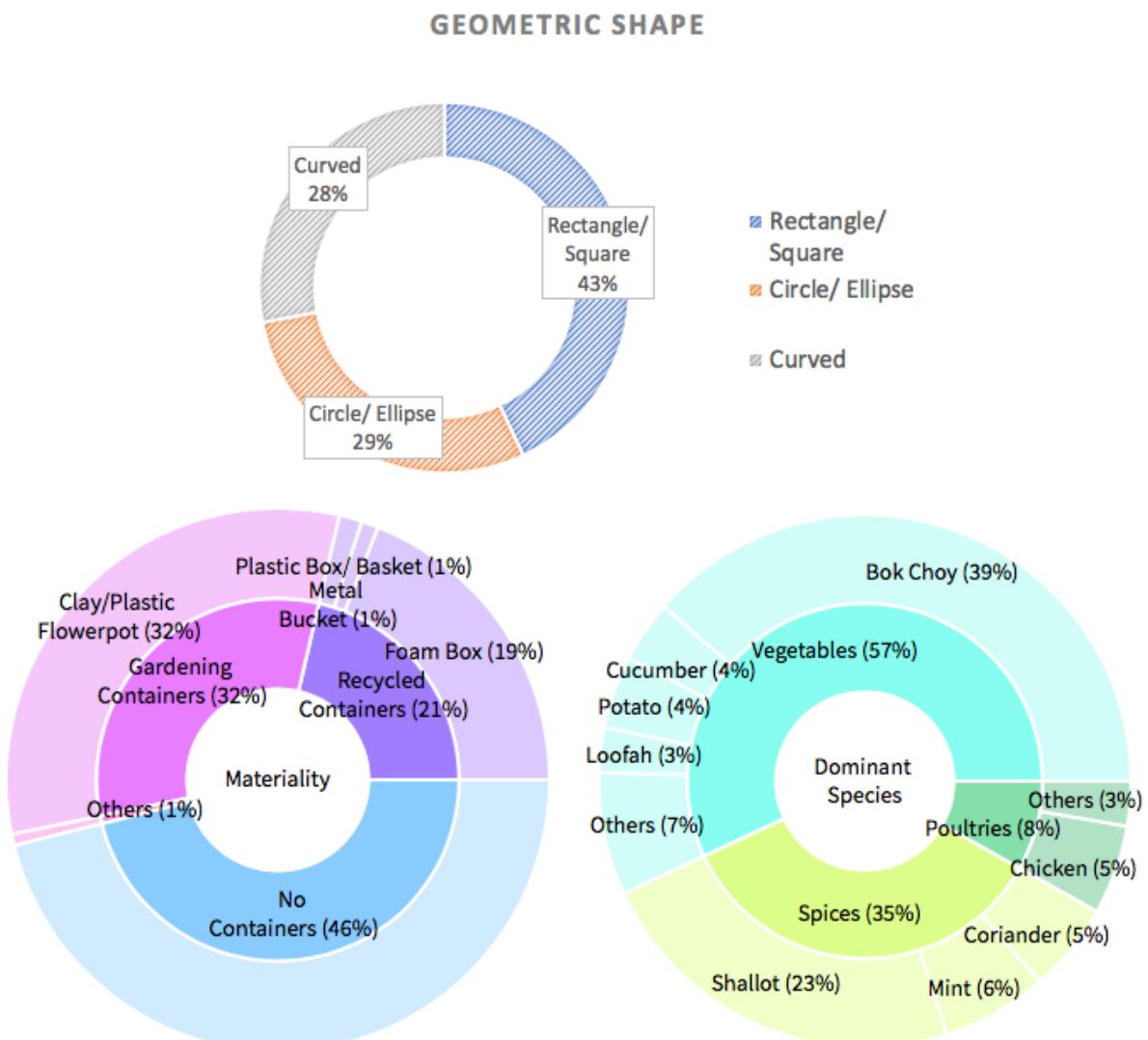


Figure AP49. Physical Form of UA in Baofeng Village

Rules and Regulations:

There are no strict rules and regulations toward urban agricultural behaviours. The local community believes that urban agricultural practices in public domain can be accepted as long as they do not destroy the public facilities. As for the UA activates within the unused land, the community thought the land hand been by the government and they do not have the ability to manage the land. In private space, especially in the housing area, the residents do not have any specific rules for the urban agricultural practices including the cultivated techniques and species. The cultivated land is part of private space, the central government has the policies to protect the cultivated land. The policies aim to make sure the function of cultivated land is to grow crops and any construction work in cultivated land is against the law.

Appendix B: Questionnaire for Households and Community Groups

Section A: Baseline

1. What is your age group?

- Under 25
- 26-50
- Over 50

2. What is your gender?

- Female
- Male

3. Which area do you live in?

- Within the 1st ring of Kunming
- Within the 2nd ring of Kunming
- Within the 3rd ring of Kunming
- Outside the 3rd ring of Kunming
- Outside of Kunming

4. What kind of property do you live in at present?

- Apartment (Buy or rent from real estate) –to Q6
- House (Buy or rent from real estate) –to Q6
- Self-constructed building –to Q5
- Resettlement housing area/affordable housing –to Q6

5. Do you have access to any land around your property which you use or could use for urban agriculture or other use?

- Yes, please indicate _____
- No

6. What is your living situation within the household?

- Live alone –to Q8
- Live with parents –to Q7
- Live with partner/spouse (with or without children) –to Q7
- Other (Describe) _____ –to Q7

7. How many people are there in your household (including yourself)?

- 2-3
- 4-5
- Over 5

8. What is your highest education level?

- Primary education
- Secondary education
- Bachelor or equivalent
- Master or equivalent
- Doctoral or equivalent
- Other (Describe) _____

9. What is your working status?

- Part-time working –to Q10
- Full-time working –to Q10
- Not working/Full-time student –to Q12
- Retired –to Q12

10. What is your occupation?

- Academic/education
- Administrative/officer
- Service industry
- Agriculture/forestry
- Self-employed
- Other (Describe) _____

11. How much is your annual household income?

- Under \$20,000
- \$20,000-\$50000
- \$50,000-\$80,000
- Over \$80,000

12. Are you familiar with the concept of “Urban Agriculture”?

- Yes, very familiar –to Q14
- Yes, heard about it –to Q14
- No, know nothing about it –to Q13

*Urban agriculture is the practice of cultivation, processing, and distributing food in or around a village, town, or city. These activities occur in peri-urban areas urban farm, within green spaces, community gardens, and balcony/rooftop/yard agriculture, etc.

13. Are you willing to learn something about urban agriculture?

- Yes –to Q14
- No (Describe the reason) _____ –Stop here and thanks

14. Have you ever seen people undertaking urban agricultural activities within any part of Kunming?

- Yes –to Q15
- No – Stop here and thanks

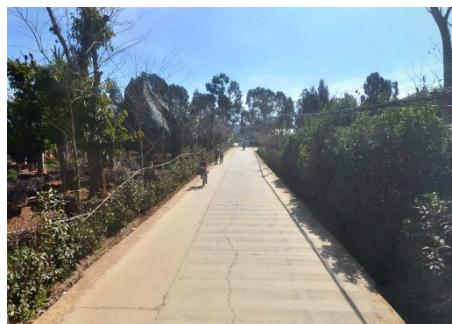
15. Have you visited/participated in any kinds of urban agricultural practices?

- Yes –to Q16
- No– Stop here and thanks

16. What kinds of urban agricultural practices did you see/visit/participate in? **Choose as many as is applicable.**



- Urban farm
 - Farmers, city dwellers and commercial operators acquire the land through lease; develop urban agricultural plots in scale and standardisation.
 - Organised and planned.
 - A multifunctional place for sightseeing, leisure, entertainment, production picking, trading and education.



- Nursery
 - Farmers, city dwellers and commercial operators acquire the land through lease; develop urban agricultural plots in scale and standardisation.
 - Organised and planned.
 - Place for raising and trading the plants used for urban agriculture and city landscape.



- Fruit Garden
- Farmers, city dwellers and commercial operators acquire the land through lease; develop urban agricultural plots in scale and standardisation.
 - Organised and planned.
 - The place for fruit trading and fruit picking.



- Community Garden
- Any piece of land gardened by a group of people, utilising either individual or shared plots in the private or public land.
 - Government recognised, organised and planned.
 - Provide fresh products and plants as well as contributing to a sense of community and connection to the environment and an opportunity for satisfying labour and neighbourhood improvement.



- Adapting Agriculture in Residential Areas
- The household/individual residents adapt the use of public green space in the residential areas into private agricultural purposes.
 - Organised or unplanned performance/use.



- Adapting Agriculture in Street Space
- The household/individual residents adapt the use of public green space in the street space into private agricultural purposes.
 - Organised or unplanned performance/use.

Other (Describe) _____

17. How do you participate in urban agricultural practices? **Choose as many as is applicable.**

- Plant and cultivate the plot
- Pick the products (vegetables, fruits, herbs etc.) by yourself
- Attend a training course about urban agriculture
- Attend education lessons designed for children
- Visit the practices/observation
- Other (Describe) _____

18. How long does it take you to participate in the urban agricultural practices per week (Average)?

- Under 1 hour
- 1-2 hours
- 2-5 hours
- Above 5 hours

19. How much does it cost you to get access to urban agricultural enterprises/farms per week, including entering any urban agriculture practices and purchasing of any products (Average)?

- Free
- Under \$5
- \$5- \$10
- \$10- \$20
- \$20- \$50
- \$50- \$100
- \$100- \$200
- Above \$200

20. What kinds of places do you think are most suitable for undertaking urban agricultural practices? **Choose as many as is applicable.**

- Within private area (Including private balcony, rooftop, yard, and developer control farm)
- Within public area (Including public green space, balcony, and rooftop)
- Within the area near the village in the city
- Other (Describe) _____

21. Do you undertake any types of urban agricultural practices?

- Yes, undertaking one or more practices at present –to Q23
- Not now, but have undertaken some in the past –to Q23
- Never –to Q22

22. Do you have any plans to undertake urban agricultural practices if the opportunity became available?

- Yes (Describe the practices) _____ – Stop here and thanks
- No (Describe the reason) _____ –Stop here and thanks

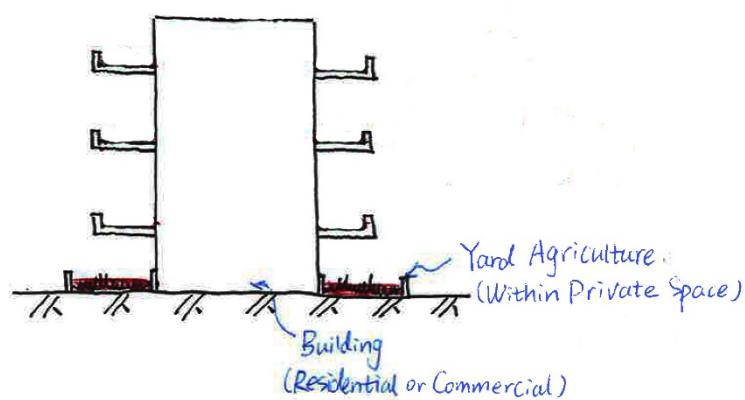
Section B: Experience about Urban Agricultural Practices

23. Where do you undertake the urban agricultural practices?

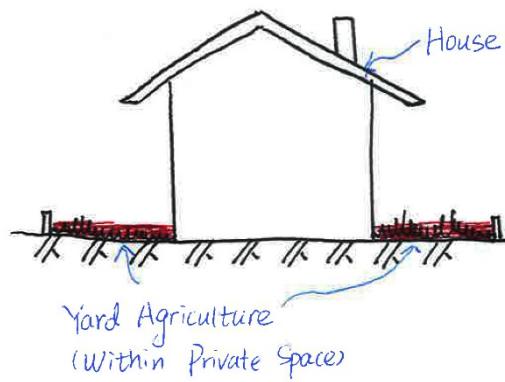
- In private space –to Q24
- In public space –to Q25
- Combination –Choose the proper answer from Q24 and Q25
- Other (Describe) _____ –Choose the proper answer from Q24 and Q25

24. If you undertake the urban agricultural practices in your private space,

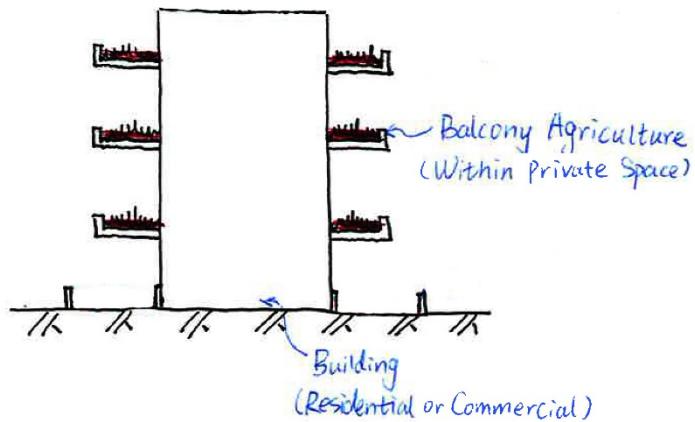
1) What is the location of the practice? **Choose as many as is applicable.**



Yard agriculture
(The agricultural performance in the private yard of a multi-floor building)

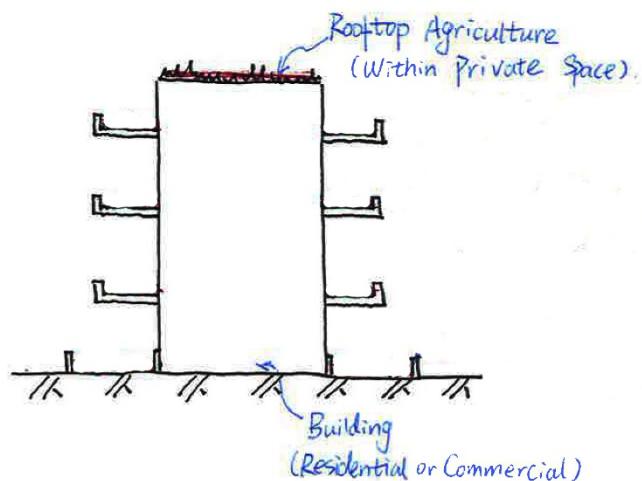


Yard agriculture
(The agricultural performance in the private yard of a house)



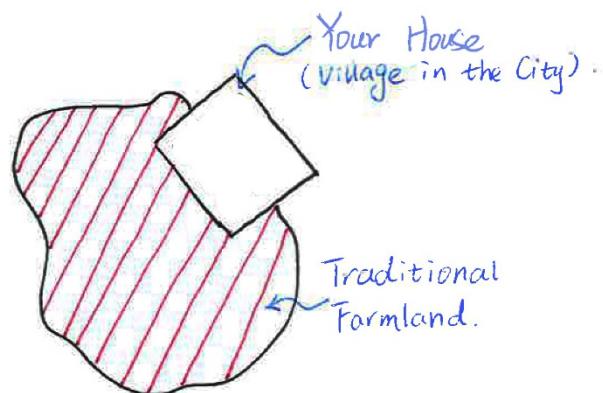
□□Balcony agriculture

(The agricultural performance in the private balcony of a multi-floor building)



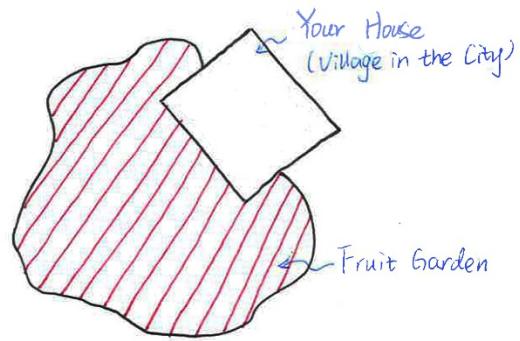
□□Private rooftop

(The agricultural performance in the private rooftop of a multi-floor building)



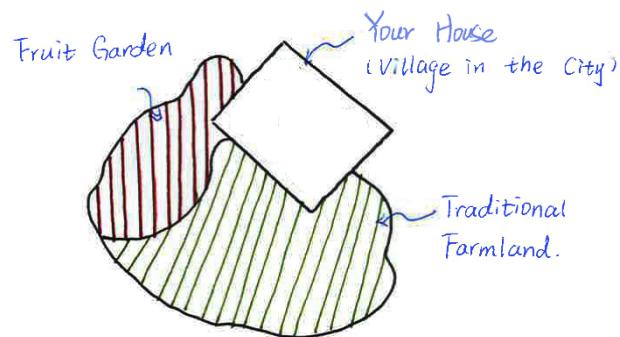
□□Traditional agriculture

(Traditional, mass production agricultural performance in the cultivated land in the village in the city)



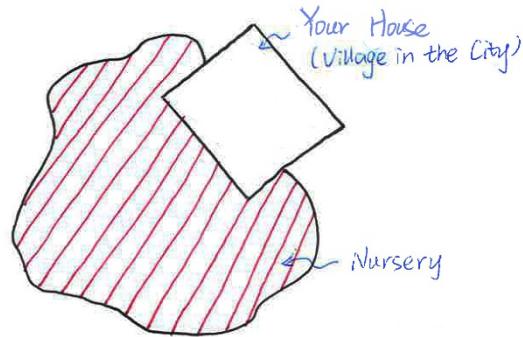
□□Fruit garden

(Use the whole area of cultivated land in the village in the city to plant fruit trees and conduct fruit picking)



□□Fruit garden

(Use the parts of cultivated land in the village in the city to plant fruit trees and conduct fruit picking)

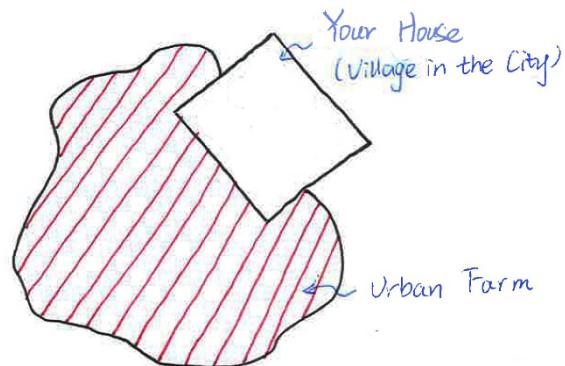


□□Nursery (Using the whole cultivated land in the village in the city to raise and trade the plants for landscape purpose)



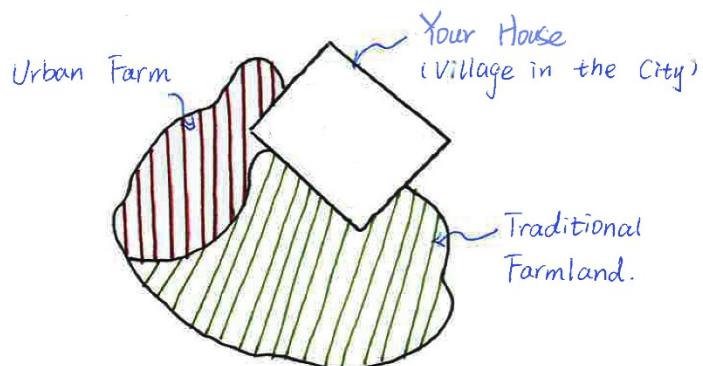
Nursery

(Use parts of the cultivated land in the village in the city to raise and trade the plants for landscape purpose)



Urban farm

(Using the whole cultivated land in the village in the city to become urban farm)



Urban farm

(Using parts of the cultivated land in the village in the city to become urban farm)

Other (Describe and draw simple figures if possible) _____

2) Why did you choose the specific location to undertake the practices?

- The location is close to my property
 - The location is good for the cultivation
 - Fully use the spare space
 - Random selection
 - Other (Describe)
-

3) What is the geometrical form of the practice?

- Circle
 - Triangle
 - Rectangle/Square
 - Polygon
 - Irregular/non-linear
 - If non-linear, describe and draw simple figures if possible
-
-

4) How much area do you use to undertake the urban agricultural practices?

- Under 10 m²
- 10– 20 m²
- 20 – 100 m²
- 100 -500 m²
- 500 -1000 m²
- 1000-5000 m²
- Above 5000 m²

5) Which functional type of urban agricultural practices do you undertake?

- For non-commercial use (individual/household) –to Q24-6)
- For commercial use –to Q24-7)
- Combination use (Describe) _____ –to Q24-6)

6) For non-commercial use, how do you deal with your production?

Family/Community consumption

Donation/Charity

Neighbourhood exchange/gift

Other (Describe) _____

7) If commercial, how much can you acquire from your urban agricultural practices annually?

Under \$1000

\$1000-\$2000

\$2000-\$5000

Over \$5000

8) Within your annual income, what percentage is derived from urban agricultural practices?

Under 1%

1%-5%

5%-10%

10%-20%

20%-50%

50%-80%

80%-100%

9) How much does it cost you to undertake the urban agricultural practices annually (For example, the cost to access land, buy the seed, fertilizer, and other accessories)?

Under \$100

\$100-\$200

\$200-\$500

Over \$500

10) What is the approximate percentage of urban agricultural cost of your annual expenses?

Under 1%

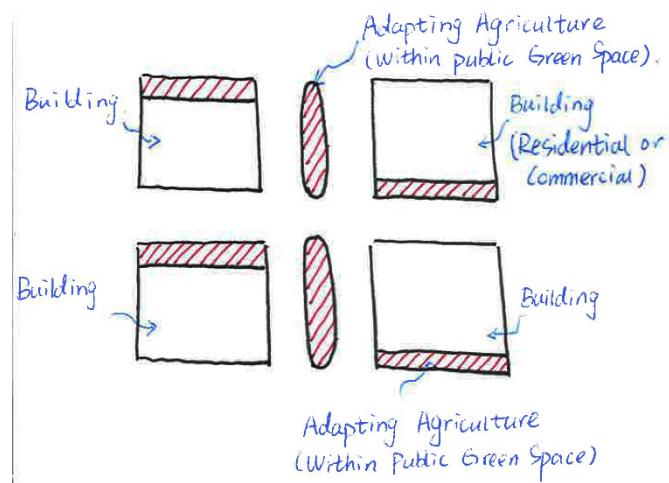
1%-5%

5%-10%

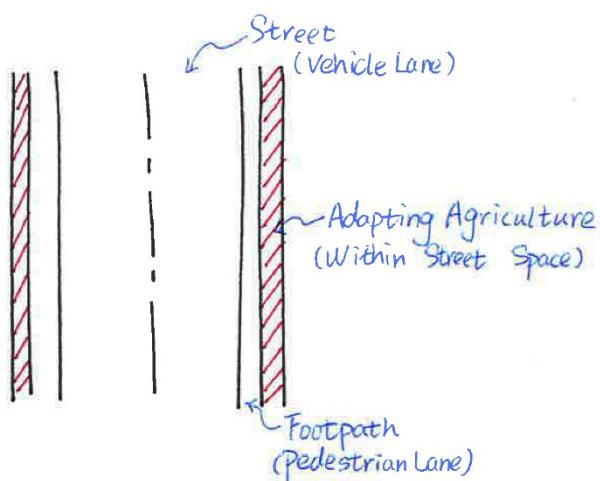
Over 10%

25. If you undertake the urban agricultural practices in the public space,

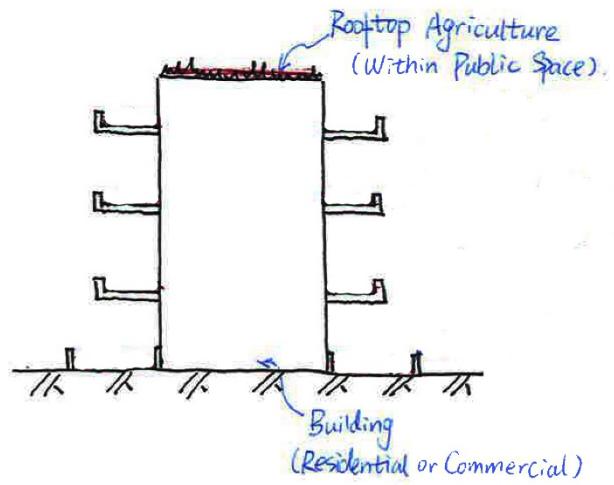
1) What is the location of the practice? **Choose as many as is applicable.**



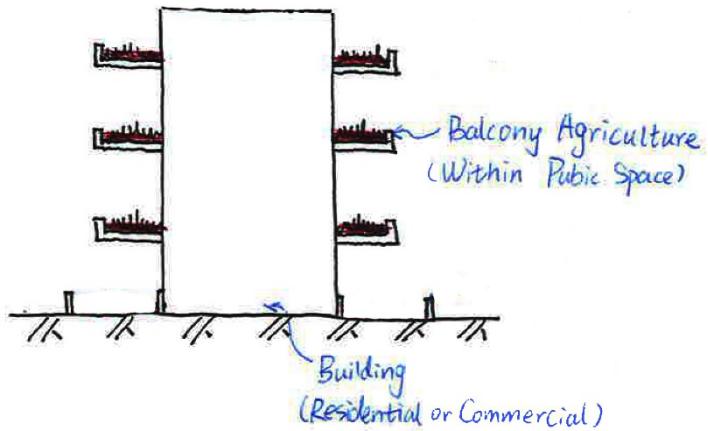
Adapting agriculture within the housing space
(The adapting performance that transfer the public space/greenspace into agriculture use)



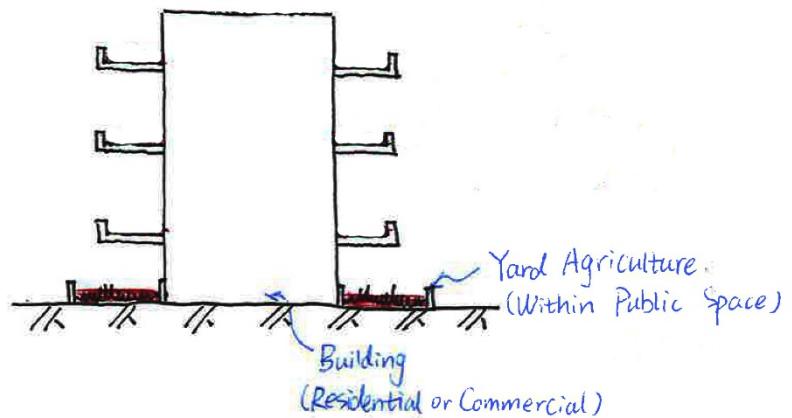
Adapting agriculture within the street space
(The adapting performance that transfer the public space/greenspace into agriculture use)



□□Rooftop agriculture
(The agricultural performance in the public rooftop of a multi-floor building)

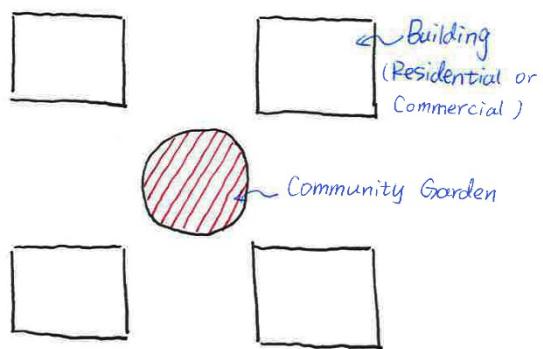


□□Balcony agriculture
(The agricultural performance in the public balcony of a multi-floor building)



□ Public yard

(The agricultural performance in the public yard of a multi-floor building)



□ Community garden

(The agricultural performance in the public space owned by the community)

□ Other (Describe and draw simple figures if possible) _____

2) Why did you choose the specific location to undertake the practices?

- The location is close to my property
 - I enjoy the company of people who use this space
 - The location is good for the cultivation, such as sunlight, soil type, etc.
 - Fully use the spare space
 - Random selection
 - Other (Describe) _____
-

3) What is the geometrical form of the practice?

- Circle
 - Triangle
 - Rectangle/Square
 - Polygon
 - Irregular/non-linear
 - If non-linear, describe and draw simple figures if possible
-
-

4) How much area do you use to undertake the urban agricultural practices?

- Under 5 m²
- 5– 10 m²
- 10 – 20 m²
- 20 -50 m²
- Above 50 m²

5) Which functional type of urban agricultural practice do you undertake?

- For non-commercial use (individual/household)—to Q25-6)
- For commercial use –to Q25-7)
- Combination use (Describe) _____ –to Q 25-6)

6) For non-commercial use, how do you deal with your production?

- Family/Community consumption
- Donation/Charity
- Neighbourhood exchange/gift
- Other (Describe) _____

7) If commercial, how much can you acquire from your urban agricultural practices annually?

- Under \$1000
- \$1000-\$2000
- \$2000-\$5000
- Over \$5000

8) Within your annual income, what percentage is derived from urban agricultural practices?

- Under 1%
- 1%-5%
- 5%-10%
- 10%-20%
- Over 20%

9) How much does it cost you to undertake the urban agricultural practices annually (For example, buy the seed, fertiliser, and other accessories)?

- Under \$100
- \$100-\$200
- \$200-\$500
- Over \$500

10) What is the approximate percentage of urban agricultural cost of your annual expenses?

- Under 1%
- 1%-5%
- 5%-10%
- Over 10%

26. Are you familiar with any kind of public (government) written or unwritten rules and regulations about urban agricultural practices?

- Yes, very familiar –to Q27
- Yes, some familiar –to Q27
- Know nothing about – to Q28

27. Which of the rules and regulations have you heard about? **Choose as many as is applicable.**

- It is not proper to have urban agricultural practices in the public space without the government permission

- The municipal government encourages the establishment of urban farms in Kunming
 The adaptation of public green or vacant space is not allowed
 Describe other rules and regulations you know _____

28. Are there any kinds of urban agricultural rules that applied within your household? Such as the growth methods, placement and types of practices.

- Yes, describe the rules _____
 No

29. Are there any kinds of urban agricultural rules that applied within your apartment/residential complex? Such as the growth restriction, placement of activities, waste management etc.

- Yes, describe the rules _____
 No

30. Are there any kinds of urban agricultural rules within your residents' association/community group?

- Yes, describe the rules _____
 No

31. What categories of urban agriculture do you grow? **Choose as many as is applicable.**

- Vegetables
 Herbs
 Flowers
 Fruits
 Raise animals
 Hybrid/Other (Describe) _____

32. Why do you choose the specific categories of urban agricultural practices? **Choose as many as is applicable.**

- Household consumption need (healthy or organic food)
 Hobby
 Spiritual, enjoy the practice
 Sale need
 Just random, no specific reason
 Other (Describe) _____

33. How do you undertake the urban agricultural practices?

- Do it by yourself/household
 - Hire workers
 - Other (Describe) _____
-

34. Do you have any professional skills and knowledge when undertaking the practices?

- Yes, describe _____
- No

35. How long does it take you to undertake your own urban agricultural practices every week (Average)?

- Under 5 hours
- 5-10 hours
- 10-20 hours
- 20-40 hours
- Above 40 hours

Appendix C: Questions for Semi-structured Interview

Key topic areas to guide interviews are:

- How do stakeholders view urban agriculture in the village in the city and the wider city?
- What is the motivation of various stakeholders who undertake urban agricultural practices?
- How do stakeholders negotiate and understand the related rules and regulations of urban agriculture?

The interview will have three main sections. The following are the examples of the interview questions in each section:

Section A: General opinions and motivations

- What is your main interest in urban agriculture?
- How do you view urban agriculture? Advantages and disadvantages?
- What drives you to been involved in urban agricultural practices? Why?
- What has been your history of involvement in urban agricultural practices in Kunming?

Section B: Views and perspectives about urban agriculture

- What are the advantages and disadvantages for you in undertaking the urban agricultural practices?
- Do the practices meet your needs?
- How – get examples and what are those needs?
- What is important to you about each practice?
- What do you see as the purpose or objectives of your urban agricultural practices?
- Is there any change in your role in urban agricultural practices in the last five years?
- Do you think governance of urban agricultural practices in Kunming has been successful? Why or why not? What would make it more successful?
- When you think about the governance of urban agricultural practices that were successful, what ways are you defining ‘success’?
- Can you give me examples of practices that were successful or not successful?
- What is the impact on practices of written or unwritten rules and regulations?
- How do you negotiate the written or unwritten rules and regulations related to urban agriculture? Such as government or community based.
- Is there any seasonal impact on the practices? (Including the species, seasons, skills, etc.)

Section C: Views about the outcomes

- What do you hope can be achieved through urban agricultural practices in the future?
- Is there any conflict/disagreement about the outcomes of the urban agricultural practices? If so, what is it about? What is the source of the conflict?