

FOOD, HEALTH, FASHION: A ROOFTOP EXPERIENCE IN CHINA

by

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(Under the Direction of Brian Orland)

ABSTRACT

This thesis uses a market analysis driven by social media to explore the current trends of Chinese healthy diet industry, ultimately using design to provide a solution of relieving the limited access to fresh produce in China and changing people's eating habit. The target consumers of the market analysis are fashionable young people, who have great influence on the popularity. Considering the lack of land in China, this thesis explores the potentials of rooftops to be the new source of fresh produce. In order to eliminate the risks of transforming rooftops, container growing is adopted as the method to grow produce. The study of selection of vegetables contains growing requirements and fine recipes. Then a rooftop container garden design is proposed to enable people an urban farming experience, a farm-to-table experience, a healthy dining experience and a stylish rooftop garden experience.

INDEX WORDS: Market Analysis, Rooftop Garden, Food Safety, Healthy Eating Habit,
 Container Growing, Fashion, Social Media

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CHAPTER 1

INTRODUCTION

1.1 Background

In recent years, the Chinese people, especially those who have overseas life experience and fitness awareness, have begun to realize that a healthy diet is crucial for pursuing good health and staying in shape. However, conventional Chinese eating habits do not support a healthy diet. Driven by this increasing consciousness, the salad industry has emerged and has developed quickly in Chinese modern cities, like Beijing and Shanghai. Nonetheless, from my experience of living in Beijing and my hometown close to Shanghai, access to salad is limited and the price is higher than a normal meal. A lack of the source of fresh produce and narrow acceptance of healthy eating habits are leading to difficulties in its further development.

As a way for urban residents to acquire fresh produce, there is one practice widely adopted in Western countries: creating community gardens in neighborhood areas where fresh vegetables could be grown to support local markets and people could have easy access to them as well. Considering the scarce land sources and high population density, having community gardens in Chinese urban areas is impractical, but the high-density of buildings result in an under-utilized space, rooftops. Rooftop gardens and urban farming are becoming common all over the world. Achieving the balance between development and sustainability is a critical factor in China, and rooftops gardens would offer the additional benefit of providing access to valuable and rare nature experience.

Concerned about how broad promotion of such ideas might be achieved, I believe that fashionable young people could be the key to this concept revolution, especially with the important role social media plays in everyday life nowadays. Among the young generation, it has been reshaping the market and lifestyle. Fashionable young people, often called social media influencers, have large amounts of followers who affirm their taste and are willing to follow trends. At the same time, the fashionable young people can also be viewed as early adopters, since they are always looking for unusual, aesthetically pleasing, and healthy experiences to fit their stylish image as communicated via Instagram, Snapchat etc.

Therefore, this thesis has evolved almost as a business plan for stylish rooftop container gardens incorporated with haute cuisine dining. The containers and plants are used as aesthetic components to create a complete experience of growing, eating, and relaxing. The recipes in this thesis are built on trendy combinations of farm-to-table ideas and native Chinese fresh produce.

1.2 Research Questions

The main research questions are: (1) What is the potential of rooftops to be productive edible gardens? (2) How to promote rooftop gardens as both a commercial and aesthetic success?

To answer the questions comprehensively, the main questions are divided into three sub-research questions. (1) Who are the customers for a novel eating experience and what do they like? (2) How would the selected vegetables be grown? (3) What are the aesthetic possibilities that can be achieved within a typical rooftop garden and demonstration restaurant?

1.3 Limitations and Delimitations

1.3.1 Limitations

There are three main limitations. First, there is little published information about the economic production of salad vegetables that are suited to the Shanghai region climate. Second, there are few case studies to guide research. Third, there is a lot of uncertainty about the potential market, but this thesis might be a pre-cursor to more comprehensive study.

1.3.2 Delimitations

This thesis used Shanghai as a hypothetical site to focus this research. Shanghai took first place in the national catering consumption index (CBNData 2017) in China and the average income is also the highest nationwide, indicating that the market for developing a new catering industry is open and bright.

1.4 Research Strategy

This thesis is primarily a design study informed by contemporary Chinese social media within the limitations imposed by rooftop container fruit and vegetable gardening.

1.5 Thesis Structure

Chapter 2 analyzes the reasons behind the phenomenon of changing food taste in China and the existing situation of Chinese healthy diet industry as the background information of this thesis.

Chapter 3 discusses the serious food quality issues in China, including the food security issue and limited access of fresh produce.

Chapter 4 introduces the research strategy and provides the market analysis driven by social media

Chapter 5 proposes the rooftop to be a new source for fresh produce in urban areas and analyzes the pros and cons.

Chapter 6 illustrates the benefits of container growing, selects the growing species, provides the individual growing requirements, and corresponding recipes.

Chapter 7 lists the images and ideas which inspired the design.

Chapter 8 presents the rooftop container garden design

Chapter 9 Conclusion

List of references

CHAPTER 2

CHANGING FOOD TASTES IN CHINA

Recently, China has been experiencing a change of food tastes. A healthy diet is replacing the traditional heavily-laden banquet tables. An emerging industry specializing in salads has become fashionable in modern Chinese cities (Chun 2018).

2.1 The reasons behind the popularity of the salad industry in China

With the rapid economic development of China, more and more Chinese people are experiencing new and non-traditional foods and eating habits.

2.1.1 The influence of globalization

The accelerated development of transportation has brought great opportunities for the Chinese to travel abroad. Statistics show the number of Chinese outbound travelers rose 6% to 135 million in 2016 (UNWTO 2017). Being exposed to exotic food cultures has helped Chinese people learn more about it, so that these cultures could be accepted more quickly when they appear.

Meanwhile, China's friendly development policy has been attracting more and more foreigners who want a career in China (Ji 2017). The salad industry could provide them with the food they are familiar with.

2.1.2 The big wave of Chinese returnees

As well as the rapidly growing international tourism sector (UNWTO 2017), students studying abroad are anxious to return to China to enjoy the privileges of good work opportunities and high salaries (Chen 2017). Among this young and adventurous part of the population, it is

reported that 432,500 students returned to China after graduation from overseas universities in 2016, up 36.26% from 2012, according to a joint conference focusing on Chinese overseas students. The total number of Chinese returnees exceeded 2.65 million by the end of 2016 (CCG 2017).

As part of their overseas life experience, they have already realized that a healthy diet is crucial, and the traditional Chinese diet does not support that (Qiu 2016). Therefore, a new type of food industry which specializes in salad is emerging in China and young trend-setting people are the initial consumers.

2.1.3 The promotion of fitness awareness

In the past two decades, since the Chinese government opened China's economy to Western goods and investment, China has experienced a rapid economic development, accompanied with social and cultural change. People have been taking more manufacturing jobs and service related jobs instead of laboring jobs. These changes have had a strong influence on lifestyle: People don't grow food on their own, and they have reduced consumption of fresh vegetables, but increased the purchase of processed food. At the same time, their jobs require little physical activity and the recent highly developed technology has contributed to the reduction of physical activity as well. Consequently, Chinese people exercise less and eat less healthy food, which in turn has increased the rate of obesity (D'Arcy 2006).

It is reported that in 2014 about 43.2 million men (16.3% of global obese men) and 46.4 million women (12.4% of global obese women) were obese in China, compared with 0.7 million men (2.1% of global obese men) and 1.7 million women (2.5% of global obese women) in 1975. Besides, in 2014, slightly more obese men and women lived in China than in the USA, and even

for those with severe obesity, China moved from 60th place for men and 41st place for women in 1975, to 2nd place for both men and women in 2014 (Lancet 2016).

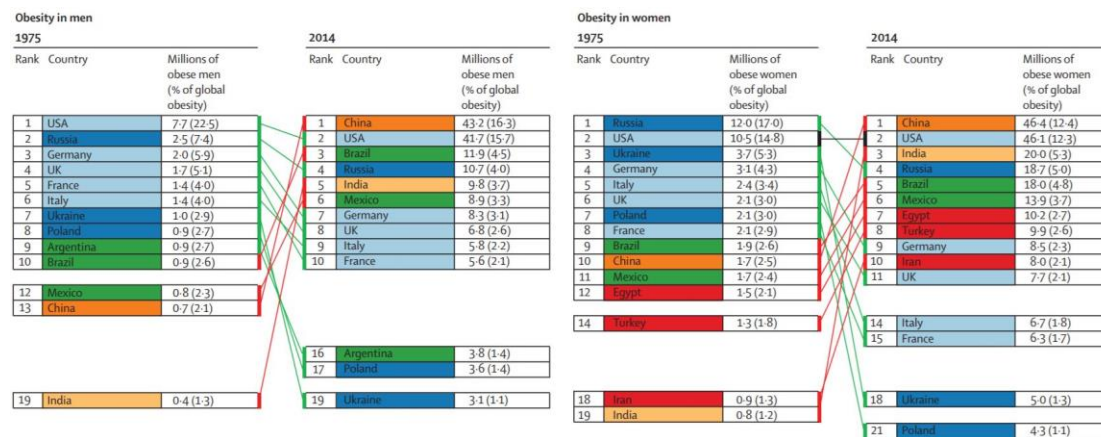


Figure 1 Ten countries with the largest number of underweight, obese, and severe obese men and women in 1975 and 2014

(Source: Lancet 2016)

As a result, an awareness of keeping fit is promoted and accepted widely, especially among the young generation who have less physical activity during their worktime and view fitness as a fashion. Commercial gyms and fitness clubs are blooming at the same time; the fitness industry had an annual growth of 10.4% from 2013 to 2018 (IBISWorld 2018). In addition to training in the gym, diet is another significant pillar of keeping fit and healthy, so the need for healthy and organic food has grown sharply in recent years, which has given a boost to the salad industry.

2.1.4 Catching the trends of fashion

Compared with common Chinese dishes, the packaging of salad represents something new and exciting, suitable for sharing it on social media which then creates a great platform for the promotion of a new and healthy way of life. Accordingly, the salad industry appeals to young women who are highly fashion-conscious and are the main users of social media in China (Baijiahao 2018).

2.2 Existing situation of the salad industry in China

2.2.1 The development history of the salad industry

Since 2014, China's salad industry has been expanding. At the end of 2016, there were 300-400 salad stores in Shanghai, compared with fewer than 50 in 2015. The amount of delivery orders occupied 5% of total orders in 2017 while the rate was less than 1% in 2016. Driven by the distribution of target consumers, most of the salad stores are located in big cities and their site selection is concentrated in commercial areas. Compared with other food industries, the salad industry has a considerable profit margin. One prominent Shanghai salad vendor, Meal Salad, operates several restaurants and a meal delivery service. It has experienced considerable growth and economic success with its founder reporting profit margins of 70%, well beyond the normal profitability for the food service sector (Yuan 2017).

2.2.2 The current operating strategies of the salad industry

Two main strategies have been adopted to operate the business: one is focusing on online delivery and another devotes efforts to managing physical stores (Wan 2016).

The advantage of the online strategy is the ability to control cost and reduce risk. This mode usually has consumers place the orders a day before so that they could have an accurate calculation of the needed materials, avoiding unnecessary waste. However, the poor dining experience and unstable quality of food due to transportation are the main disadvantages of this strategy (Wan 2016).

Compared with the online delivery strategy, the physical store has a superiority on user experience and it is easy to build its own brand image with impressive store designs. In addition, providing a gathering spot could be attractive to young people (Wan 2016).

2.3 The challenges and limitations of future development

Despite the fact that economists believe the salad trend won't disappear in a short time and the market for the healthy diet industry has an enormous potential, the salad industry is still facing some serious challenges (Caijingwang 2017).

2.3.1 Lack of acceptance of the health diet culture

Having a meal of cold vegetables is contrary to the traditional Chinese diet culture; this is the main obstacle of promoting the healthy diet concept. However, young people and travelers who have seen other ways of eating may be attracted to new ways and experiences.

2.3.2 Pricey product

There are cost differences. One very significant factor is the cost of transportation. In order to guarantee the quality of the salad that is available in the heart of cities like Shanghai, cold chain transportation is required which is more complicated compared with normal transportation. One salad meal costs 35-45 yuan while one meal of a common dish costs around 25 yuan (Caijingwang 2017). The higher price of salad has resulted from the lack of a source of fresh produce, leading to a challenge in attracting and maintaining repeat consumers.

2.3.4 Immature market and limited target consumers

One group of consumers of salad are mainly middle-class people who pursue a healthy lifestyle and are enthusiastic about fitness. They might insist on having salad as long as they continue their exercise, but if fashion trends shift away from healthy eating then the demand for salad might decline (Caijingwang 2017). Another factor is the readiness of the suppliers to meet the demand; in the daily peak periods of dining, consumers need to place orders two hours ahead and wait one hour before the food is delivered, the competitiveness of salad foods may decline (Wan 2016).

Salad recipes usually have few differences of flavoring which may also lead to consumers becoming tired of less flavorful food and returning to traditional diets—and new products inevitably suffer from a lack of brand loyalty to assure sales (Yuan 2017).

2.4 Summary and conclusion

This chapter analyzed the reasons behind the popularity and existing situation of the salad industry in China, providing a background for this thesis. The conclusion drawn from the chapter states that the salad industry as a representation of the healthy diet industry, is bound to take off in the future, but innovations and changes are required for further development

CHAPTER 3

THE QUALITY OF FOOD

As the previous chapter introduced the basic information of the Chinese healthy diet industry, this chapter will discuss the Chinese food quality issue, including the serious food safety situation and the lack of healthy food resources.

3.1 Serious situation of food safety in China

China has been facing severe problems with food safety for a long time. In 2008, the tragedy in which six infants died from poisonous milk powder shocked the world (zccw.info 2011). Since then, the public has lost confidence in processed food. It is reported that 51.25% of consumers hold a negative attitude towards the overall food safety situation in China (CCN 2016). One opinion which is shared widely is that the problem is produced from food processing (Association 2016).

Under the circumstance, fresh organic food is a better choice compared with processed food. However, the Chinese people are still worried about the produce they buy from the market and don't see it as safe because of the abuse of pesticides. The vegetables sold in Chinese markets are mostly from local individual farmers, who tend to use pesticides intensively due to a lack of knowledge and technology (Jing 2015).

3.2 Sources of fresh produce in Western countries

One solution to increase food safety is to grow food for yourself in a personal garden. For the Chinese people who live in urban areas, it is unrealistic to have a personal garden since the land in cities is limited and the majority of it is occupied by buildings (Sina 2017). Meanwhile, in

Western countries like the United States, community gardens and community-supported agriculture, referred to as CSA, are a popular source of fresh produce.

3.2.1 Community garden definition

A community garden is a piece of land shared by a group of people, using either individual or shared plots on private or public land. Vegetables, fruits and ornamental plants are the main crops to be grown. Community gardens can be found in residential areas, commercial areas, or some public areas (Gardeners 2016).

3.2.2 Benefits of community gardens

One of the advantages of community gardens is easy access to safe and nutritious food since the increased consumption of local food can reduce the exposure to pesticides. Also, without long-distance shipping, the local food is fresher (DeMuro 2013). In addition, community gardens can serve as an outdoor classroom for the young generation to learn valuable skills, like cooperation, communication, and the importance of environmental responsibility. Furthermore, community gardens can bring many benefits to the immediate vicinity where they are located, like adding beauty to the community and raising people's awareness for living things (DeMuro 2013).

3.2.3 Definition of community-supported agriculture

Community-supported agriculture, commonly known as CSA, is a system connecting the producer and consumers closely within the food system by allowing the consumers to subscribe to the harvest of certain farms. It is an alternative socio-economic model of agriculture and food distribution in which the risks of farming are shared by producer and consumer (Bryant 1992). The consumer receives either a weekly or bi-weekly box of farm goods. In-season fruits and vegetables are included, and sometimes the goods are expanded to dried goods, eggs, milk, meat,

etc. Often, farmers make some attempts to maintain the relationship with the subscribers by sending them weekly letters of what is happening on the farm, inviting them for harvest, or holding some open-farm events (DeMuth 2015). While these systems are unfamiliar in China, they may offer insights into what might be attractive and successful alternatives in the context of rapidly developing cities.

3.3 Lack of sources of fresh produce in China

The severe shortage of land sources in urban areas has made it harder to get easy access to fresh produce in China. Taking Shanghai as an example, at the end of 2016, the total cultivated area in Shanghai was around 150,000 acres (Shanghai 2018), 7% percent of the land area, while almost 46.7 % of the cultivated areas are in Chongming Island. Chongming Island is a developing suburban area approximately 113 km from the city center. The toll to cross the river is around 30-50 yuan (Shanghai 2018) and the lanes are limited, leading to poor access of the island. Therefore, looking for new sources suitable for growing fresh produce in city center areas is of great importance for future development.

Unlike the well-developed system of community planning in the United States, China doesn't have a similar one, and the Chinese really don't have a clear idea about the definition of community. These two words, "neighborhood" and "community" share the same Chinese word in translation although they are distinct indeed. Therefore, the concept of community garden is lacking in China. In typing community garden in English in the search bar of Google, 53,600,000 results are found while only 6,250,000 results are shown when typing 社区花园 (the translation of community garden) in the Baidu, which is the biggest search engine in China.

3.4 Summary and conclusion

This chapter introduced the existing situation of food quality in China and showed the severe lack of sources of fresh food. One solution to this challenge is to find new ways to provide fresh produce in urban areas.

CHAPTER 4

RESEARCH STRATEGIES AND MARKET ANALYSIS

The strategy of this thesis is unconventional, and at its core it is a design-based thesis shaped by a social media-based analysis of market forces, affecting both products and consumers.

4.1 Social media, fashion and influence

Currently, the digital influencers on social media are reshaping the market in various fields (Newton 2017). Since the young generation has been raised in this information age, the impact of the internet on them is profound, and at the same time, they are also the main consumers of the catering industry. According to the national catering data report, the post 90s (people born during 1990-1999) and the post 80s (people born during 1980-1989) generation account for almost 70% of the consumers in the Chinese catering industry (CBNData 2017). Therefore, the eating habits of the youth market are of great importance to the development of whole catering industry.

The bloggers on social media who have a large quantity of followers are viewed as the leaders of fashion trends, and since their followers trust them, everything they recommend is popular. It has been observed that besides their daily outfits and the products they are using, these bloggers are quite fond of posting stunning images of food on social media, and those food and restaurants would become fashionable and trendy as well (Bousquet 2014). However, what does research say about this phenomenon? What do the Chinese fashionable young people prefer to choose when they eat out? Where do they eat? What is the style of those restaurants? How do they describe their dining experience?

4.2 A social media examination of the market of Chinese Catering Industry

The strategy of this thesis is based on a market analysis driven by social media. The research source is from Mars app.

4.2.1 Resources of analysis

4.2.1.1 The selection of app

Mars (<http://www.yohomars.com/>) is a mobile app, serving as a guide to explore different modern cities and designed to recommend popular local spots to young people, including food, shopping, and service. The target users are those young people who have higher requirements of the quality of life and aren't satisfied with ordinary similar apps in the mass market. The top active users of Mars share some common characteristics, such as living in big cities, having strong purchasing power, excellent taste, and a strong educational background (Wang 2016).

Compared with compatible mobile apps on the market, Mars is more appealing to fashionable young people. Concerning to the content, the goal of Mars is to recommend those special spots users would never know about unless they used Mars. Alec Chen, the founder of Mars, affirms that young generation needs personal recommendations while the results coming from the huge-population-based statistics might not be suitable. Unlike other similar apps, Mars has a content creator team distributed around the world, looking for new interesting spots is their daily task. One of the content creators, who is living in New York, said that the way he discovers the spots other than by reading the existing travel guides is by riding a bike around Manhattan to see what is new and whether it's worth recommending to their users (Wang 2016). Another distinctive advantage of the Mars app is the interface design since the young generation appreciates it more than the old generation does (Meyer 2016). Figure 2 clearly shows Mars has a concise, user-

friendly and well-designed interface in comparison to similar apps, so the Mars is more attractive to young people when searching where to go.

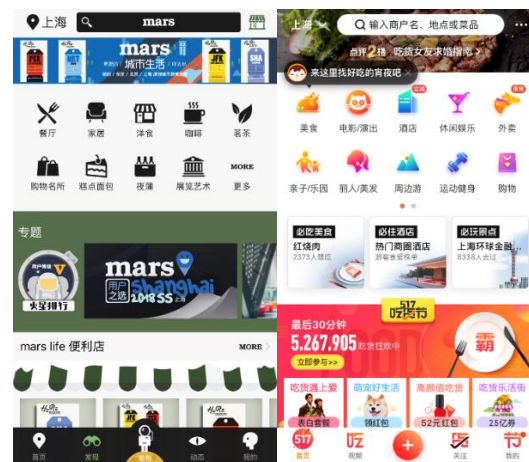


Figure 2 Left: Mars, Right: DaZhongDianPing
(Source: Mars, DaZhongDianPing)

4.2.1.2 The selection of the marketing analysis site

Currently, Mars covers 16 cities, and half of them are in China, indicating the site's focus on the lifestyle and interests of young Chinese people.



Figure 3 List of cities
(Source: Mars)

This thesis will use Shanghai as its site for the research since Shanghai took first place in the national catering consumption index (CBNData 2017) and the average disposable income in

Shanghai also ranks first (China 2017), which indicate there is a potential market for developing a diversified catering industry.



Figure 4 2016 City catering consumption index

(Source: CBNDData)

4.2.2 Marketing analysis

4.2.2.1 What they eat

As mentioned before, China is experiencing a change in food taste, and *healthier and better* are becoming the new eating trends. With consumption upgrade continuing in China, people are seeking natural, organic, low calorie, low carb and low sugar food. According to Nielsen's New Global Health and Ingredient-Sentiment Survey, around 70% of Chinese respondents said they follow a diet that limits or prohibits consuming some food or some ingredients, a higher percentage than that of the global average (64%). In addition, 82% of them said they are willing to pay more for food without undesirable ingredients, also a higher percentage than that of the global average (68%). Chinese consumers have also said they would like to see more all-natural and organic food on shelves, since they want to buy healthier food. Seventy percent of Chinese respondents prefer to shop at retailers where there is a variety of products for special dietary needs (57% globally). However, the growing demands are hard to meet; only 40% of the

respondents are satisfied with the current food choices in China (Nielsen 2016). Yan Xuan, president of Nielsen Greater China, said price will no longer be the key factor, while safety and healthiness have already become the top two attributes that affect consumers' decisions on what to buy. More room is created for the sales growth of food manufacturers and retailers (Nielsen 2016).

In addition to a concern for health, food from other diet cultures is another new trend. According to Figure 5, Western food has gained more popularity in those cities which were open early to Western investments and products, like Guangzhou and Shanghai. At the same time, Shanghai has shown a high acceptance to novel cuisine (Figure 6). In Shanghai's ranking list of the most popular spots on the Mars app (Figure 7), cafés have the highest popularity. In China, a quick Western meal like salad, fries and pasta is usually served in a café because it can offer more choices and appeal to the younger generation.

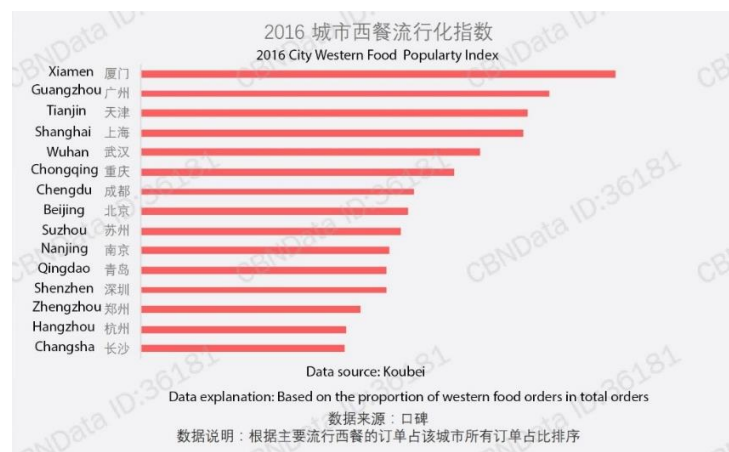


Figure 5 2016 Western Food Popularity Index

(Source: CBNData)

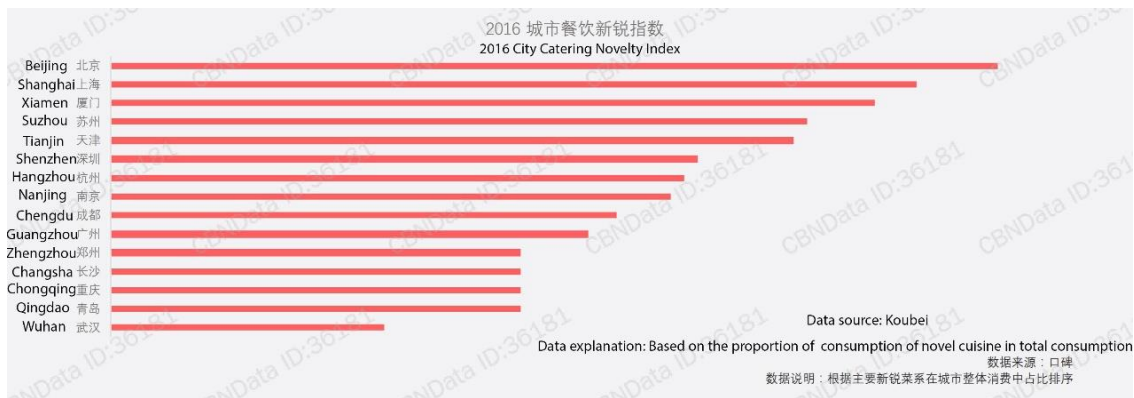


Figure 6 Catering Novelty Index

(Source: CBNDData)

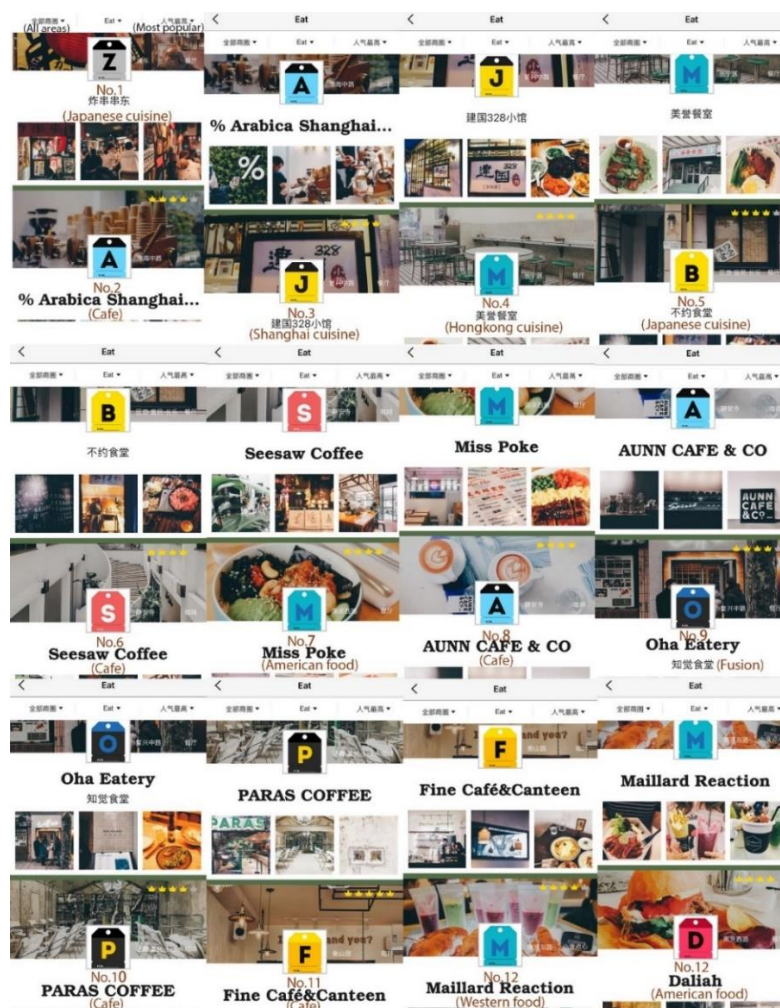


Figure 7 Popular Eating Spots Ranking List in Shanghai

(Source: Mars)

4.2.2.2 Where to eat

With the increase in eating out and eating as entertainment, the demand for distinctive dining experiences is increasing, especially for the younger generation. Different from previous years when choices and often food were limited, people have many options now so that restaurants have to compete for the market. From the ranking list of the most popular eating spots in Shanghai, it is evident that those restaurants share some similar characteristics: for example, high quality food, creative presentation, and featured environment.

4.2.2.2.1 High quality food

Currently, good tasting food is the precondition for the assessment of high quality food. Apart from the good taste, there are several key factors making the restaurants distinctive.

1. Healthy and nutritious

Unlike the past, young people are tired of tasty but high-calorie foods, especially when fitness has become a major fashion trend. Health and nutrition are taking priority over other factors when young people choose where to eat. Research shows that younger consumers are most willing to pay a premium for healthy food (Nielsen, Nielsen Global Health and Wellness Report 2015).

2. Transparency

The increasing consciousness of healthiness and food quality have brought more attention to the ingredients and the food process. Consumers want to know as much as possible about the process of the dish. How is it raised? Is it organic? Where is the food grown? The more the restaurants can tell about the process and ingredients, the better the consumers will feel (Mealey 2018).

3. Presentation

Currently, other than the good flavor and taste of the food, a visual feast is also expected by consumers when they go out to eat. David Wynne, Culinary Art Instructor at The Art Institute of Seattle, said *we eat with our eyes first* (Ray 2015). A creative and elegant food presentation is of great significance in appealing to the younger generation. For example, one of the restaurants on the ranking list (Figure7), Maillard Reaction, has an outstanding food presentation. They don't just put a steak on a plate--they use cups and cones to serve it and there is fresh juice in the bottom of the cups (Figure 8). Due to its photo-friendly food presentation, Maillard Reaction took off within a short time (Mars, 2018).



Figure 8 Maillard Reaction

(Source: Mars)

4.2.2.2 Creative menus

Restaurant menus are similar to fashion in that single and unchanged menus might lead to losing the youth market share (Mealey 2018). A limited time offer (LTOs) is a smart strategy for entrepreneurs since it appeals to young consumers and keeps the brand in the forefront of the customers' minds, according to Mary Chapman, director of product innovation at the research

firm Technomic (Morrison 2014). A seasonal limited offering is another way to incorporate the LTO into the menu because it gives the consumers a sense of getting into the season and a fear of missing out on this offer. Additionally, it raises the value of the product and motivates the public to choose it (Morrison 2014). What's more, LTO is an efficient way to try out new recipes before branching out to the permanent menu because entrepreneurs can get precise feedback about the acceptance of the new recipe. If the limited-time offering is a huge success, the restaurant owners could consider moving it to the permanent menu.

4.2.2.3 Featured design

It is obvious that the overall look of a restaurant's interior does have an impact on the dining experience (Chesters 2017). It seems that taking photos and posting them on social media before ordering or enjoying the food has become a common practice. Social media are reshaping the restaurant industry and shifting the way people discover new spots to eat, so it comes as no surprise that restaurant design has been pushed to a critical position (Newton 2017).

Outstanding restaurant design means restaurants use some elements as a hook to draw customers. Floor, furniture, graphic walls, even the overall tone--all of them can be the social media triggers. As a result, entrepreneurs have started to make more of an effort in seeking unique interior designs and in taking each small detail into consideration in order to make their restaurants a social media magnet (Newton 2017). For instance, Paras Coffee, one of the cafés in the ranking list of Shanghai's popular eating spots, is famous for its distinctive design. Their florescent green stairs are viewed as the hook, and almost everyone who has been there takes a photo of it (Figure 9).



Figure 9 Reviews of Paras Coffee

(Source: Mars)

4.2.2.4 Multiple Functions

Another trend emerging in the Chinese catering industry is the idea of incorporating other functions into the restaurants (Winshang 2015). For example, a café can also serve as a bookshop or a restaurant could be a bar at night. Multi-function can bring diversity and freshness to consumers and can also help build the reputation of the brand.

4.2.2.5 Selling the lifestyle

The idea of selling modern lifestyle as to appeal to young customers has been put into practice by some pioneers. For example, Wagas is a brand selling casual Western food and has 36 chain stores in Shanghai. They have their own magazine--*Journal*. In addition to the information about their dishes, news and relevant knowledge about popular lifestyles are included in the magazine as well (Figure 10). Despite the fact that extending the brand this way is questioned by some, its market potential is positive (Ma 2016)



Figure 10 *Journal*, Published by Wagas

(Source: http://www.sohu.com/a/54541865_310877 accessed: 5/5/2018)

4.3 Existing Design Ideas

4.3.1 Green & Safe (Shanghai)

4.3.1.1 Introduction

Green & Safe (<https://www.green-n-safe.com/>) is a deli and grocery store, incorporated with a casual restaurant where each dish is prepared with ingredients sourced from their own organic farm. In the grocery side of the store, produce raised at their farm in Kunshan is for sale; Green & Safe has made a great contribution in popularizing the concept “from-farm-to-table” in China (Figure 11).



Figure 11 Green & Safe

(Source: Baidu)

4.3.1.2 The hook

Green & Safe is located in Shanghai's former French Concession district where upmarket dining areas and high-end residential areas are nearby, providing easy access to the target consumers. Its modern industrial-style loft and iconic market decoration make it more attractive. Also, the organic farm operated by Green & Roof meets the requirement of allowing consumers to know the process of each product and to relieve the stress of worrying about food safety.



Figure 12 Produce raised at their farm

(Source: Baidu)

4.3.1.3 Reviews (from Mars app)


	<p>This user affirmed the environment and decoration, which make Green & Safe look like a European market.</p> <p>However, the user also complained that it's too crowded and noisy at weekends, and the products are a little bit overpriced as well.</p>
---	--

Figure 13 Review of Green & Safe

(Source: Mars)

	<p>This user liked Green & Safe a lot because the exterior is special and it has so many various products. The grocery section is highly recommended by this user because consumers can buy organic ingredients and do not have to worry about the abuse of pesticides.</p>
---	---

Figure 14 Review of Green & Safe

(Source: Mars)


 <p>Jerry K 2016-07-17 ★★★★★ CNY 150 /人</p> <p>用餐環境很舒適、餐點吃起來很舒服爽口，調味方式不會過渡油膩，即使在炎熱的夏天都很開胃。餐廳內同時販售有產地認證的有機蔬果，有不少人正在進行採買，在這個食安日益受到重視的時代，這也許是生意這麼好的原因。</p>	<p>This user appreciated the organic produce in Green & Safe because it is labeled with the place of origin. This user also thought that Green & Safe is very popular because food safety has become increasingly important.</p>
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Figure 15 Review of Green & Safe

(Source: Mars)

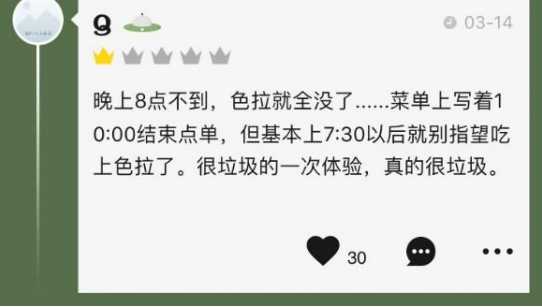
 <p>晚上8点不到，色拉就全没了.....菜单上写着10:00结束点单，但基本上7:30以后就别指望吃上色拉了。很垃圾的一次体验，真的很垃圾。</p>	<p>Unfortunately, this user had a terrible experience. They ran out of salad after 7:30 PM that day while the menu says closure is at 10 PM.</p>
---	--

Figure 16 Review of Green & Safe

(Source: Mars)

Food safety and a fine environment are the high-frequency words shown in the reviews, and convenient access to organic produce is also affirmed by its customers. Meanwhile, there are some complaints about the overcrowded dining section and the overpriced food.

4.3.2 by CHLOE

4.3.2.1 What it is

by Chloe (<https://eatbychloe.com/>), a vegan restaurant chain based in New York, aims to redefine what it means to eat well by sharing 100% natural and plant-based food with the public. The menu features locally-sourced ingredients which have a positive impact on its clientele (Figure 17).



Figure 17 by Chloe

(Source: Google)

4.3.2.2 The hook

Its huge popularity comes from its unprecedented vegan concept and playful branding. by Chloe adopted a design idea which is inspired by pop art and vintage advertisements, and this idea has made the food photogenic and has helped build its visual identity successfully (Figure 18). Additionally, the founders applied innovative ideas not only to the logo, but also to the signage, packing, menu and the exterior of the store.



Figure 18 Playful branding of by Chloe

(Source: Google)

4.3.2.3 Reviews (from yelp app)

<p>★★★★☆ 1 month ago</p> <p>I LOVE that this place is vegan, and the food is good. I like the aesthetic of the space, their interior and graphic designer did a very great job! I think the prices are a bit higher then I'd like, but I get it, good food costs \$\$\$.</p> <p>Here's the deal though: I used to go 2-3 times a week, not it's about 1 or 2 times a month and here's why:</p> <p>I don't love that they only take Credit Cards, that's a system stinks, I py by cash for almost everything, this is how I manage my money and keep my CC bills in check. This policy of "no cash" only pushes our entire society more toward a global government/ corporate takeover where they have tabs on what you spend and where. It's very "big brother/under his eye" Sadly I won't be coming nearly as often as I did because of this. It's literally become my almost last choice of vegan places to go.</p>	<p>The user appreciated the aesthetic of the place and liked both the interior and the graphic design a lot.</p>
--	--

Figure 19 Review of By Chloe

(Source: Yelp)

<p>★★★★☆ ⚙️ 1 📷 2 1 month ago</p> <p>Heard about Chloe for a while and finally went for brunch one day. I like the location and the facility. The aesthetics are super cute and the place is very clean. I like that you order, pay and then find a place to sit. FYI they only take credit cards, no cash. It's very laid back and it's a perfect place to catch up with friends over a meal. We order both entree and dessert. I am bias but I loved the dessert more. Order the old fashion chocolate chip cookie, it super chewy, moist and nutty. The cupcake was good but not as moist. As for the food I liked the guac burger and the taco quinoa salad (huge, great to share). It's filling but light cause all the food is vegan. I also tried the Mac and cheese with shiitake mushroom, it was okay nothing special and I wouldn't order that again.</p>	<p>This user was attracted to the aesthetics when visiting it.</p>
--	--

Figure 20 Review of by Chloe

(Source: Yelp)

<p>★★★★★ 9 months ago</p> <p>This place was packedddd i was a party of one and could not find a single seat. so i took my food to go. I came across this place on an Intstagram post, being a designer I was drawn by the well branded items and of course delicious looking food. I had the Pesto Meatball - italian meatballs made of portobello + veggie, marinara, sweet peppers, basil pesto, cashew mozzarella, almond parmesan, potato sub. you honestly cant really tell this isn't meat. Beet Ketchup is waay better than regular ketchup too bad thats not more common, the chipotle sauce is also good even with left over fries the next day haha. pricy, wait, but worth trying.</p>	<p>This user is a designer and came across by Chloe on Instagram. A high evaluation of the well branded items was given in this review.</p>
--	---

Figure 21 Review of by Chloe

(Source: Yelp)

<p>★★★★☆ 7 months ago</p> <p>By Chloe is a fantastic option to try once if you're looking for a vegan version of Shake Shack or trying to convince your carnivore friends to join the green side. However, after about the second or third time trying it, the appeal starts to wear off.</p> <p>The good:</p> <p>The place is very nicely designed and very trendy. The food is full of flavors and tastes good.</p>	<p>This user used <i>trendy</i> to describe the place.</p>
--	--

Figure 22 Review of by Chloe

(Source: Yelp)

<p>★★★★★ 11/19/16</p> <p>Chef Chloe is a marketing genius. I love the the design of the menu, the coloring book and crayons. Everything is so cute. Now a flatiron location. She's doing big things.</p> <p>So now the food, I came for breakfast - I got the mornin' glory with the gluten free option. I haven't had a breakfast sandwich like this ever! The tomato, avocado, sausage and scram melted in my mouth. I had to get a fork to eat the pieces that fell out. They have coffee too.</p> <p>The menu lunch/dinner options are similar to the west village location. Breakfast is definitely a win.</p> <p>Service was good. There was plenty of seating.</p> <p>Definitely recommend.</p>	<p>This user loved the idea of using coloring books and crayons, and thought Chef Chloe is a marketing genius.</p>
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Figure 23 Review of by Chloe

(Source: Yelp)

Many customers are impressed by the innovative branding ideas and delicious food even though they are not vegetarians. The outstanding aesthetic has helped it gain increasing popularity.

4.3.3 Max & Salad

4.3.3.1 What it is

Max & Salad (https://weibo.com/u/1639922930?profile_ftype=1&is_all=1#_0) is a salad brand in Shanghai, and it provides around 50 ingredients and 10 sauces in each store.

4.3.3.2 The hook

The way customers order salad is quite novel: customers pick their desirable “poker chips” which represent different ingredients and have corresponding calories on them (Figure 24). After they take their poker chips to the counter, a personal salad is served and the nutrition facts are printed out on the receipt. Unlike food in America, food in China usually doesn’t have nutrition facts on its packaging so that people have no sense of how many calories they take in every day. Therefore, this concept is creative and welcomed by the customers who are on diet.



Figure 24 Poker chips used to order

(Source: Mars)

4.3.3.3 Reviews (From Mars and Bon! App)

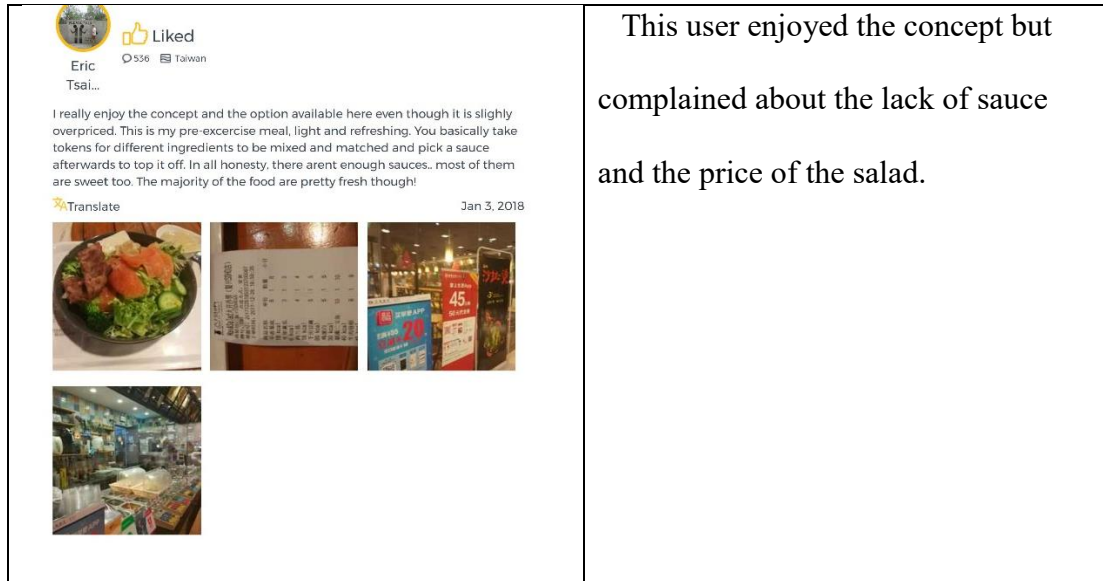


Figure 25 Review of Max & Salad

(Source: Bon! App)

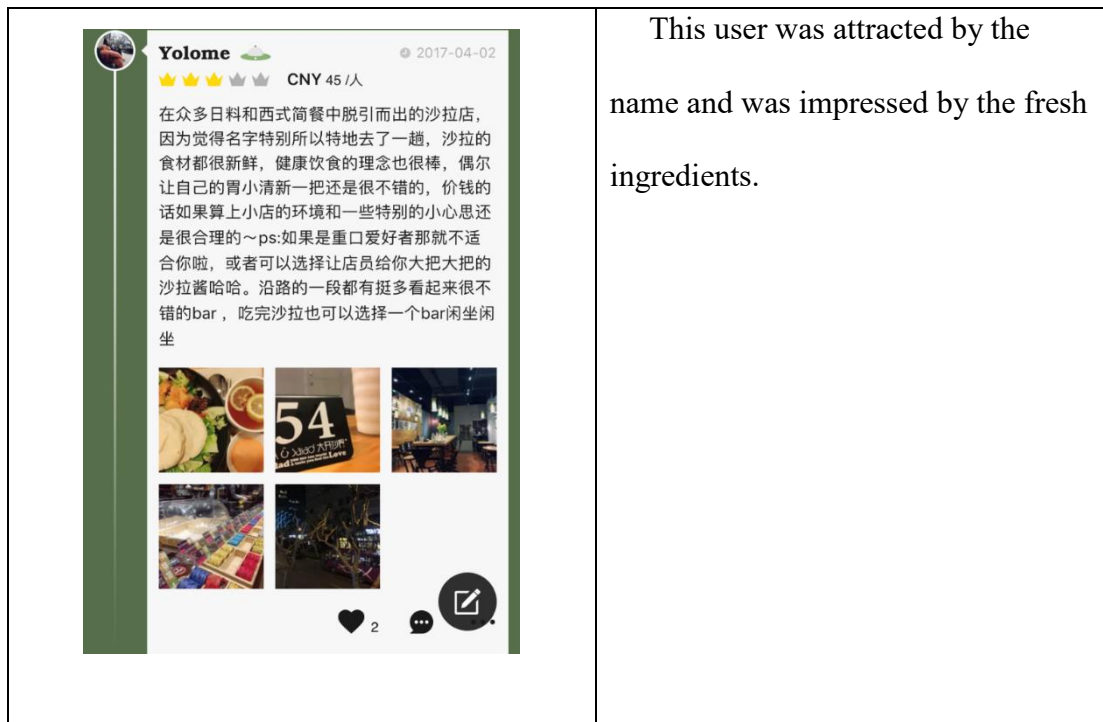


Figure 26 Review of Max & Salad

(Source: Mars)

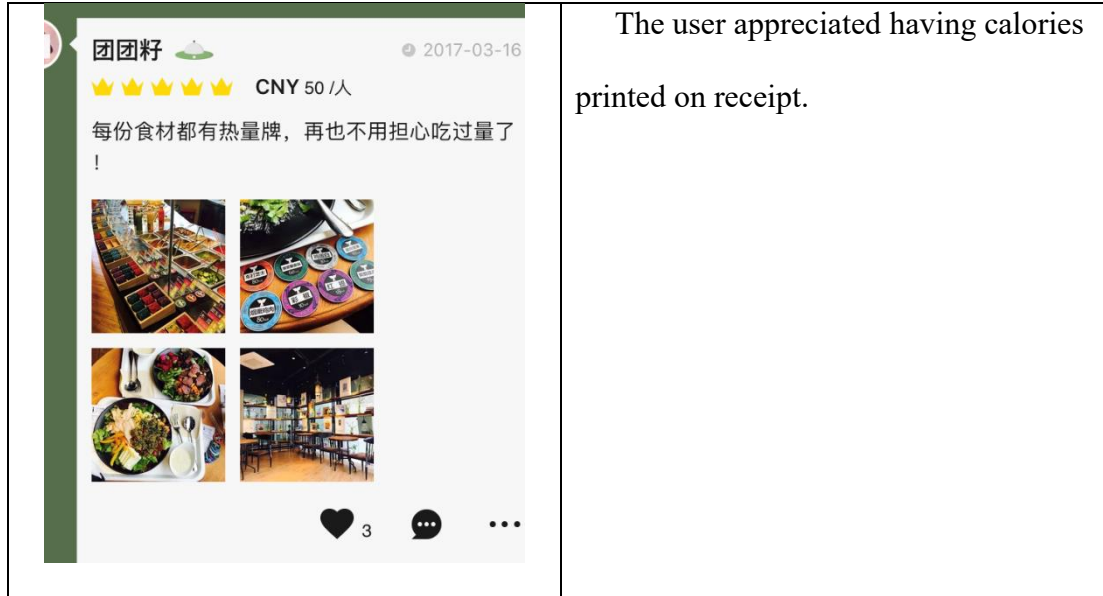


Figure 27 Review of Max & Salad

(Source: Mars)

4.4 Summary and conclusion

This chapter introduced the research strategy of this thesis, a market analysis driven by social media. According to the market analysis, the high quality of food and innovative branding ideas are playing a vital role in the current catering industry.

CHAPTER 5

ROOFTOPS HAVE GREAT POTENTIAL

Chapter 3 has suggested that finding new ways to get fresh produce might be the key to increase the situation food quality issue in China where there is a severe lack of land. This chapter will discuss the potentials of rooftops to be a new source of fresh produce in Chinese urban areas.

5.1 Potential sources in urban areas

It is estimated the world population will reach 9.7 billion by 2050 and half of the people will live in cities (Nations 2015). With the growing number of people and the constrained supply of food in urban areas, finding a new and sustainable way to generate food is vital (Puri 2017). As it now stands, the majority of the land in China is occupied by buildings. According to Figure 28, it is obvious that compared with white spaces the green spaces are minuscule. However, on the other hand, the high density of buildings also brings an unparalleled, barely utilized and neglected space source--rooftops.

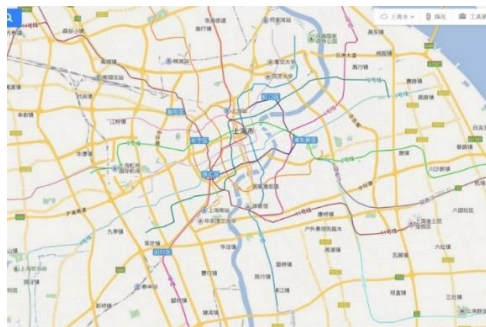


Figure 28 Map of Shanghai

(Source: Baidu)

5.2 Key factors of utilizing rooftops

Three key factors need to be considered before the development of rooftops can take place: roof types, roof access, and weight.

5.2.1 Roof types

Generally, there are two types of roofs, flat roofs and pitched roofs. It is obvious that the pitched roof is not suitable for food production, so the research for this thesis takes the flat roof into consideration only. Currently, the structural load capacity, existing roof materials and drainage system of many modern residential buildings are qualified for developing rooftop gardens. Rooftop gardens could also be readily incorporated into plans for new construction (Kirberg 2014).

5.2.2 Roof access

Rooftop access is a decisive factor in developing rooftops. Many buildings in China don't have access to their rooftops because originally the developers were ignorant of the potential uses of rooftops. However, the construction of new residential buildings can readily be adapted to provide access.

5.2.3 Weight

Some rooftops might not support the weight of a rooftop garden because the soil and water load are quite heavy (Kirberg 2014). Therefore, finding different methods which have a low weight coefficient and can be adapted to roofs to grow fresh produce is of great significance. In spite of the fact that these conditions may not be feasible for existing buildings, but they are easily incorporated into new construction with customized design (Kirberg 2014).

5.3 Benefits of developing rooftops

5.3.1 Economic benefits

Developing rooftops into a new source for fresh produce in urban areas can bring many economic benefits. Harvesting fresh food from rooftops can eliminate long-distance shipping, cut down on transportation costs, and bring fresh produce to market within a few hours. The lower prices resulting from the simplified process will make the local produce competitive and enhance urban food security (Puri 2017). Although the capacity of a typical residential building roof may not be enough to feed all residents living there, it can still offer information and insights that encourage people to seek out healthier food. Additionally, a new industry means a new market with numerous job opportunities so that it might relieve China's stressful employment situation. As it is reported that there will be 8,200,000 graduates in 2018, which will make the current Chinese employment situation more severe (Daily 2017).

5.3.2 Environmental benefits

Rooftops designed for food production can also have a positive effect on stormwater management and can help boost energy efficiency. A rooftop garden can reduce the peak runoff volume stormwater and purify it as well. Because of the vegetation layer on the roof, direct solar heat could be prevented in summer and heat loss could be minimized in winter (Berner 2017).

5.3.3 Social benefits

5.3.3.1 Public physical health

Some people see the overpriced products and the limited access to them as the main obstructions in spreading the concept of healthy diets in China (Zhu 2017). However, if people can acquire fresh produce from their own rooftops or neighborhood rooftops, they might value this eating habit, and this effort can make an important difference in public health (Puri 2017).

Even if the amount of these kinds of rooftops is tiny in the beginning, it can also urge people to eat healthier and improve their connection with nature.

5.3.3.2 Public mental health

Apart from strengthening public physical health, another contribution could also be made to public mental health. With transformation and development, rooftops can serve as a living space for gathering, recreation and relaxation, improving relationships, and meeting new friends (Molla 2015). As we all know, urban loneliness and social isolation have become a modern-day epidemic across the world (Harris 2015). Creating additional open space could relieve stress and provide comfort and joy, combating urban illness (Kondo 2018). Implementing green roofs and rooftop gardens would be a great learning tool as well, since this green space can be used as an outdoor classroom, gardening space, urban farming, or for research (Yurek 2013).

5.3.3.3 Aesthetic value

One universal problem shared by modern cities is their lack of urban green space. Compared with asphalt and concrete which can be an eyesore, green roofs can offer aesthetic appeal, increase the value of the property, and create a sense of pride and civic participation (Vegetalid 2015).

5.4 Disadvantages and limitations

Developing rooftop gardens may also have some negative effects.

5.4.1 Increased humidity

For people who live in the southern part of China, humidity is a seasonal problem. Applying a plant layer on the roof means more water is required for irrigation and more water is stored by the soil, which can aggravate the humidity issue and influence the quality of life.

5.4.2 Attracting insects

Not everyone feels comfortable living in a place surrounded by various insects and birds, and the lush greenery might put the residents at a risk for an invasion of those creatures. Regardless of the plant selection, vegetated roofs inevitably attract insects and animals since they encourage biodiversity (GSA 2011).

5.4.3 Vegetable safety

Growing plants in urban areas means making them exposed to polluted air, which might be a threat to the plant safety. For instance, China is currently facing severe smog pollution which might reduce the amount of sunlight necessary for a good yield.

5.5 Rooftop sources in Shanghai

A preliminary scoping study of mixed commercial and residential areas in Shanghai indicated the proportion of flat on those buildings that might be available for developing rooftop gardening. The selected area (Figure 29) is located in the city center of Shanghai, and is combined with old residential areas, high-end new residential areas, commercial areas, and public green space. The access to the site is convenient, bringing immense popularity to the place; therefore, it is an ideal site matching the research of this thesis. The total area of this site is about 455,000 square meters, and the area of the existing flat roofs indicated in yellow is about 54,750 square meters, so the ratio is around 12%. The area currently occupied by open green space is 8% so that the addition of roof gardening could significantly increase the overall amount of green space as well as contribute to the fresh food supply and improved stormwater management.



Figure 29 Map of mixed area in Shanghai

(Source: Baidu)

5.6 Summary and Conclusion

This chapter discussed the potentials of rooftops to be a new source of fresh produce in Chinese urban areas, including the advantages and limitations. The conclusions from this chapter were that flat rooftops are qualified for developing rooftop gardens and they can bring multiple benefits to the society. Also, Shanghai has sufficient rooftop source for future development.

CHAPTER 6

WHAT TO GROW AND HOW TO GROW

Chapter 5 has introduced the potentials of rooftops to be developed into a new source of fresh produce in Chinese urban areas. This chapter will state the benefits of container growing, selection of vegetables with their growing requirements and creative recipes.

6.1 Container growing

As mentioned in chapter 5, weight is a crucial factor which might constrain retrofitting a roof. It is important to consider not just the load produced by the plants when they are planted but the weight at their maturity, as these would be significantly heavier over time (Guide 2015).

Considering that rooftop gardening is still at the early stage in China, so the weight loading of most existing buildings cannot meet the requirements of development. Meanwhile, it is crucial to spare enough room for the air conditioner units and other required structures. To minimize the constraints of two issue, container growing is a better solution for this thesis.

6.1.1 Benefits of container growing

6.1.1.1 A variety of growing combinations

Vegetables can be planted close to each other even though they have different soil requirements so that more growing combinations can be created.

6.1.1.2 Mobility and flexibility

Container can be easily moved and rearranged, allowing for different activities within the garden and for convenient maintenance.

6.1.1.3 Easier pest control

Chemical spray is not required for container-grown plants to control pests because of the easy access to the individual plants. There are several methods to solve the pest issue for container growing: handpicking larger insects, using the hose to get rid of many insects that inhabit the tender parts of plant, or dunking the plants in tepid water to drown away undesirable soil organisms (Patterson, Natural Living Ideas 2016).

6.1.1.4 Adjustable growing conditions

It is easy to provide suitable growing conditions to the container plants. For example, when there is seasonal difference in light intensity, plants can be rearranged accordingly to meet their particular requirements (Patterson, Natural Living Ideas 2016).

6.1.2 Top vegetables for container growing

Vegetables are very adaptable to growing in the containers if given some basic requirements, like well-drained soil, full sun, and consistent water. Here is the list of the top vegetables for container growing (Palmier 2016).

- Tomato
- Lettuce
- Bean
- Artichoke
- Eggplant
- Beet
- Celery
- Pepper
- Carrot
- Radish
- Arugula
- Garlic
- Broccoli
- Kale
- Herbs

6.2 Selection of vegetables

Local and *seasonal* are the two main principles of selection.

6.2.1 Eating locally

Apart from connecting the consumers and producers in the same geographic area more firmly so that a self-reliant and resilient food network could be built, eating locally can also bring various benefits to the environment, economy, and community (Feenstra 2002).

6.2.1.1 Community benefits

The shortened supply chain can enable consumers to obtain fresher and safer produce conveniently; Green & Safe has proven this fact. Also, educational and social opportunities can be offered as well. Eating locally can bring back the key opportunities of learning to connect agriculture, good nutrition, healthy lifestyles, and environmental consciousness to the whole society (N. Meyer 2015).

6.2.1.2 Environmental benefits

Eating locally can help reduce the distance food travels (food miles) and cuts down on associated fossil fuel consumption, air pollution, and greenhouse gas emissions (Science 2017).

6.2.1.3 Economic benefits

Eating locally can have a direct positive impact on the local economy, in that more investments can be promoted and more jobs can be created, boosting the local economic development and relieving local employment situation (Science 2017).

6.2.1.4 Popular local vegetables in Shanghai

The Shanghai XINGHUI Company (<http://www.shxinghui.cn/>) is the biggest vegetable supplier in Shanghai, with about 5,000 acres of farms, providing 200,000 tons of fresh produce to local markets every year. It is located in the Fengxian District, approximately 40 kilometers

from the Xuhui District, which is the city center of Shanghai. The main produce of the Shanghai XINGHUI Company is listed below.

- Bok choy (*Brassica chinensis* L.)
- Lettuce
- Celery
- Spinach
- Cabbage
- Cauliflower
- Garlic Chives (*Allium tuberosum*)
- Pea Sprout
- Tomato
- Eggplant
- Radish
- Carrot
- Broccoli


6.2.2 Eating seasonally

Eating seasonally has multiple benefits, including greater taste, higher nutrition value, and lower price. Eating seasonally is also environmentally-friendly because the demand for out of season food can be reduced which means less transportation, less refrigeration and less hot houses (Georgiou 2015).

6.2.3 The selection of vegetables

In addition to the nutritional and commercial values of the chosen vegetables, in this case one goal of the rooftop gardens is to be attractive to the young generation, so the aesthetics of the plants should be taken into account as well. For this purpose, vegetables were chosen for their compact growth, variety of color and interest. Based on the list of Shanghai local vegetables and the list of top vegetables for container growing, and taking the aesthetic value into consideration, the final list of vegetable selection is below.

6.2.4 List of vegetables

Broccoli	
Lettuce	
Eggplant	
Tomato	
Arugula	
Kale	
Celery	





Carrot	
Radish	
Beets	
Herb(Basil/Thyme/Rosemary)	

Figure 30 List of vegetables

(Source: Google)

6.3 Vegetables as ingredients in fine dining

High quality food plays an important role in the success of restaurants, which requires both good taste and creative presentation (Ray 2015). Many Chinese believe that salad can't gain broad public popularity because of its similar and monotonous taste; thus, creative and tasty recipes using salad ingredients are necessary to improve this situation (Zhu 2017).

6.3.1 Innovative recipes for fashionable salad eaters

The Broad Fork (Acheson, 2015) is a vegetable-centric guide to seasonal offerings. It is organized in seasonal sequence and four recipes accompany each vegetable. The author wrote the book based on the climate in Athens, Georgia, where the geographic coordinates are

33.9519° N, 83.3576° W, similar in latitude to Shanghai, 31.2304° N, 121.4737° W. In the book, a lot of local vegetables are covered since the aim of this book is to connect people with the local food community closely.

This thesis cites recipes from The Broad Fork, because Shanghai shares a similar climate with Athens so that the majority of local vegetables grown in Athens can also be grown in Shanghai (Figure 31).

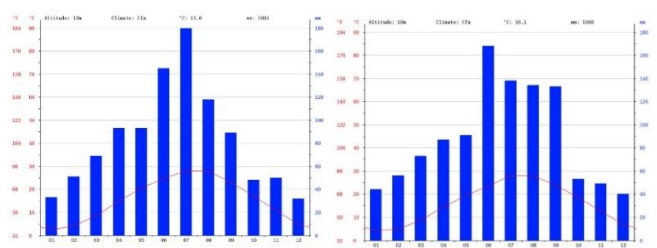


Figure 31 Climate of Athens and Shanghai
(Source: <https://en.climate-data.org/>)

6.3.2 The recipes selected from The Broad Fork (Hugh Acheson, 2015)

Vegetables suitable for container growing and the core ingredient of potential restaurant dishes are highlighted in bold text.


<p>Arugula-Spaghetti with arugula pesto</p> 	<p>Ingredients (Serves 4)</p> <p>Sea salt</p> <p>3 tablespoons pine nuts</p> <p>4 cups arugula leaves (1 small bunch)</p> <p>1 garlic clove</p> <p>1 cup finely grated parmigiano</p> <p>Reggiano cheese, plus more for shaving</p> <p>½ teaspoon freshly cracked black pepper</p> <p>3 ice cubes</p> <p>1 teaspoon grated lemon zest</p> <p>1 pound spaghetti</p> <p>2 ounces salami, cut into matchsticks</p>
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Figure 32 Arugula recipe
(Source: The broad fork)


<p>Beet-Roasted beet soup</p> 	<p>Ingredients (Serves 4)</p> <p>1 pound small beets (5 small bunches) 1 ½ tablespoon olive oil 2 tablespoons unsalted butter 1 cup minced onion 1 cup minced celery 2 springs fresh thyme 2 bay leaves 2 springs fresh flat-leaf parsley 4 hard-boiled eggs ½ teaspoon lecithin powder</p>
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Figure 33 Beet recipe

(Source: The Broad Fork)

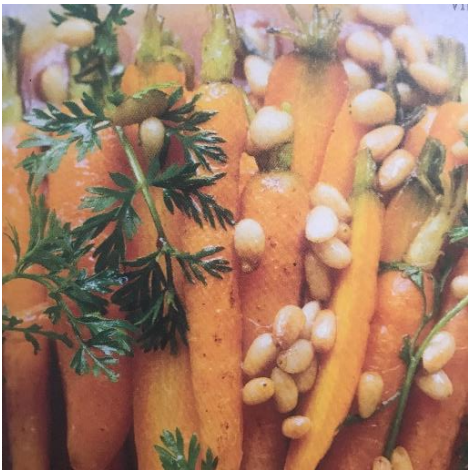
<p>Carrot-Sauteed carrots</p> 	<p>Ingredients (Serves 4)</p> <p>1 ½ pounds young carrots (6 small carrots) 1 tablespoon plus 1 teaspoon olive oil 2 tablespoons pine nuts 1 tablespoon unsalted butter Sea salt 1 tablespoon sorghum molasses 1 tablespoon malt vinegar</p>
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Figure 34 Carrot recipe

(Source: The Broad Fork)

Radish-Poached shrimp over radish	<p>Ingredients (Serves 4)</p> <ul style="list-style-type: none"> 1 pound shrimp 1 teaspoon olive oil ¼ cup dry vermouth 3 cups chicken stock ¼ cup unsalted butter 1 spring fresh thyme 12 small radishes ½ cup minced celery ¼ cup salsa verde
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Figure 35 Radish recipe

(Source: The Broad Fork)

Tomato-Tomato salad	<p>Ingredients (Serves 4)</p> <ul style="list-style-type: none"> Kosher salt ½ cup farro 2 cups peanut oil 2 pounds heirloom tomatoes (2plants) Roasted tomato-miso vinaigrette 2 cups fresh purslane 2 cups arugula leaves (1 small bunch) Freshly ground black pepper
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Figure 36 Tomato recipe

(Source: The Broad Fork)


<p>Celery-Celery root salad</p> 	<p>Ingredients (Serves 4):</p> <p>$\frac{3}{4}$ pound celery Buttermilk dressing 1 cup pomegranate seeds 1 cup fresh flat-leaf parsley leaves 1 cup peeled and shaved celery (1 plant) 1 tablespoon extra-virgin olive oil 1 teaspoon freshly squeezed lemon juice Kosher salt</p>
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Figure 37 Celery recipe

(Source: The Broad Fork)

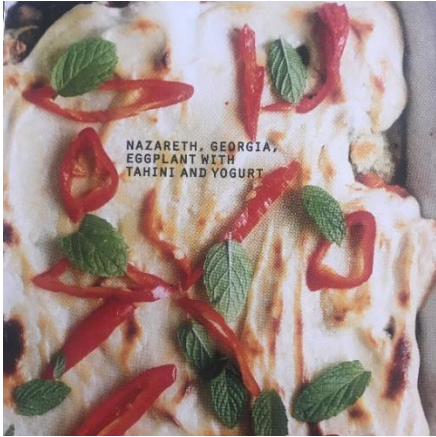
<p>Eggplant-Crisp eggplant with yogurt tomatoes and basil</p> 	<p>Ingredients (Serves 4):</p> <p>1 cup whole plain Greek yogurt 1 teaspoon freshly squeezed lemon juice Kosher salt 2 pounds mixed heirloom tomatoes (2 plants) $\frac{1}{2}$ teaspoon freshly ground black pepper 2 tablespoons extra-virgin olive oil 1 tablespoon red wine vinegar $\frac{1}{4}$ cup fresh basil leaves 1 medium globe eggplant (1 plant)</p>
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Figure 38 Eggplant Recipe

(Source: The Broad Fork)

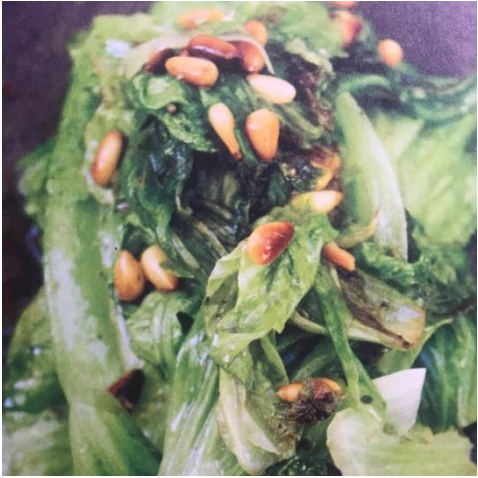
<p>Lettuce-Seared lettuce</p> 	<p>Ingredients (Serves 4)</p> <p>1 large head romaine lettuce (1 plant) 2 tablespoons unsalted butter Kosher salt 2 tablespoons chicken stock 1 teaspoon freshly squeezed lemon juice 2 tablespoons fresh pine nuts</p>
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Figure 39 Lettuce recipe

(Source: The Broad Fork)


<p>Broccoli-Broccoli soup</p> 	<p>Ingredients (Serves 4)</p> <p>2 tablespoons kosher salt 1 pound broccoli (2 heads) Unsalted butter 1 large onion ¼ cup chopped celery ¼ cup chopped leek 2 garlic cloves 1 quart chicken stock 2 cups heavy cream</p>
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Figure 40 Broccoli recipe

(Source: The Broad Fork)

Kale-Sauteed flower kale



Ingredients (Serves 4)

1 pound flower kale (5 large stalks)
1 tablespoon olive oil
1 **garlic** clove
 $\frac{1}{4}$ cup chicken stock
Kosher salt
 $\frac{1}{2}$ lemon
1 tablespoon unsalted butter

Figure 41 Kale recipe

(Source: The Broad Fork)

6.4 Growing requirements

Species	When to Grow	Sunshine Requirement	The height of soil	The height of plant	Spacing	Others
Beets	Jan 28 - Feb 11	8 hours	8 inches	4-5 inches	9 plants/sqft	
Carrot	Feb 11 - Mar 10	6 hours	6 inches	12 inches	16 plants/sqft	
Arugula	Early Spring	6 hours	8 inches	6-12 inches	4 plants/sqft	
Radish	Feb 8 - Apr 7	6-8 hours	6 inches	6-18 inches	16 plants/sqft	
Tomato	Jul 15 - Jul 30	8hours	12 inches	72 inches	1 plant/sqft	Tomato cages are needed to support
Basil	Late spring	8hours	8 inches	12-24 inches	4 plants/sqft	Seed starting is needed
Lettuce	Sep 8 - Oct 8	4 hours	8 inches	12-15 inches	4 plants/sqft	
Eggplant	Jul 10 - Jul 25	8 hours	12 inches	24-48 inches	1 plant/sqft	Tomato cages are needed to support
Celery	Late summer	6 hours	8 inches	18 inches	1 plant/sqft	
Broccoli	Feb 25 - Mar 10	8 hours	10 inches	36 inches	1 plant/sqft	
Kale	Early Summer	8 hours	8 inches	24-36 inches	2 plants/sqft	
(*Growing seasons are for latitude around 33° N, for other locations growing season will differ.)						

Table 1 Growing requirements

6.5 Growing vegetables in polluted air

Air pollution is considered a serious threat in urban farming. People believe that plants absorb harmful gases from traffic emissions and are unsafe to eat. In fact, although the growing season of plants and their ability to produce fruit can be affected by those poisonous gases, there is no research confirming the fact that the health of a person eating them would be harmed (Lovell 2013). With regard to productivity and the growing season, the scale of research in this thesis is small and has flexibility in adjusting the growing conditions.

Besides the greenhouse gases, acid rain is another major problem for plants in urban areas; the pollutants in acid rain alter the pH of the soil, binding and dissolving the vital minerals. Also, the rain that falls on the leaves can take away the waxy layer of tissue and effect the photosynthesis. The most effective way to protect plants from acid rain is to prevent rain falling on them (Waterworth 2018). For this thesis, covered porches can be adopted to reduce this influence. Also, soil testing is a good solution to call attention to this problem, so adding necessary minerals could be used to keep plants healthy (Waterworth 2018). In addition, smog is also viewed as a serious threat to plants in China since it can reduce the amount of necessary sunshine. However, as there are still some farms in Shanghai, like Shanghai XINGHUI Company, which can provide a large quantity of vegetables to the local markets, existing air quality is qualified for a normal yield.

6.6 Summary and conclusion

This chapter illustrated the benefits of container growing and presented the selections of vegetables with the corresponding growing requirements and creative recipes.

CHAPTER 7

DESIGN INSPIRATIONS

This chapter will present the images and methods which motivated the rooftop garden design in the next chapter.

7.1 Images and Ideas

7.1.1 Square Foot Gardening

Square foot gardening is a method of creating small, organized and intensively planted vegetable gardens. The basic concept is that divide the growing bed into a grid of 1-foot squares and plants seed of each kind of vegetables in one or more squares (Bartholomew 2013). Square foot gardening is known to produce high amount crops and encourage a variety of different crops over time, which is suitable to apply in urban areas (Stephanie 2017).



Figure 42 Square foot garden

(Source: Google)

7.1.2 Lego®

Lego® pieces reminded me that there are numerous possibilities of configuration by using basic units.



Figure 43 Lego®

(Source: Google)

7.1.3 Natural environment



Figure 44 *Saturdays Surf NYC - Coffee Bar*

(Source: Pinterest)

The image (Figure 44) above is the backyard of *Saturdays Surf NYC - Coffee Bar* where wooden planters and wooden desks are provided for outdoor activities. A lot of influential artists in New York are attracted to this place for the special experience of hanging out in a natural environment in such a high-density city.

7.1.4 Moveable planter



Figure 45 Moveable containers

(Source: Pinterest)

The green containers in the left image (Figure 45) are impressive because of the wheels on the bottom, which indicates that it is convenient to rearrange the balcony space by moving them. The earth box (right image) is a planter whose shape is similar to the green containers, allowing for moving and rearranging. The size of the earth box is around 24.5x20.5 inches, it has an overflow hole on the bottom for drainage, and a water reservoir under the soil layer for keeping the soil moist.

7.1.5 Integrated dining area



Figure 46 Backyard of *The Musket Room*

(Source: Pinterest, Google)

The Musket Room (<https://www.musketroom.com/>), an haute restaurant in New York city, presents a successful example of integrating the tiny edible garden with its dining section, adding aesthetic values of the restaurant and serving as a source of fresh produce.

7.1.6 Flexible equipment



Figure 47 The backyard of *Olmsted*

(Source: Pinterest)

As the image taken from the *Olmsted*, a neighborhood restaurant in New York city, shows (<http://www.olmstednyc.com/>), some moveable wooden equipment installed on the edges of planters are used as temporary tables for people to enjoy the outdoor dining experience.

7.1.7 Multiple layers



Figure 48 Multiple layers

(Source: <http://holtwoodhipster.blogspot.com/2013/09/confessions-floral-meets-garden-shop.html> accessed 5/23/2018)

Figure 48 is the outside look of *Mant*, a store in Copenhagen. It uses different heights of containers to create multiple floral layers, making the store visually impressive and attractive.

7.1.8 The power of color

Color plays a vital role in daily life, especially in branding and marketing. It is reported that people make a decision within 90 seconds while 62-90 percent of their assessment is based on color alone (Singh 2006). Additionally, as the Impact of Color on Marketing shows, increased appetite, enhanced mood, and distracting consumers from waiting can be achieved by using appropriate colors (Singh 2006).

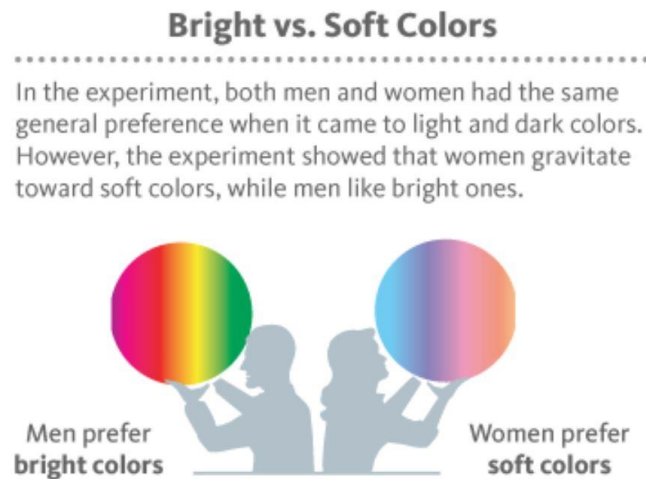


Figure 49 Different color preference between men and women

(Source: Kissmetric)

This thesis assumes that women are more likely to be attracted to fashion trends, and according to Kissmetric, there is a disparity for color preference between men and women. The image from Kissmetric (Figure 49) illustrates that when it comes to shades, tints and hues, women seem to prefer soft colors. Meanwhile, studies also confirm that women have an increasing decision-making force in relationships so that catering to their demand is of great significance in marketing (Taylor 2010).

7.1.9 Utilization of color



Figure 50 Digital drawing of Tishk Barzanji

(Source: <http://www.tishkbarzanji.co.uk/index/> accessed:4/19/2018)

Tishk Barzanji, a visual artist, makes surreal and dreamy urban landscapes by applying high saturation colors. His works motivated me to use appropriate colors to create a sense of future (Figure 50).

7.2 The utilization of social media

As mentioned in chapter four, social media are crucial sources for this thesis. Nowadays, social media are also reshaping the way people think and get inspiration. Instagram and Pinterest are two examples used in this chapter. One way to discover aesthetically pleasing and distinctive spots for eating is going through those social influencers' Instagram, and finding the images about food and restaurants. As long as they have numerous followers and are viewed as trends, the places they post on their Instagram are representative of their taste and can be attractive to the young generation. For instance, one account I follow, @moouooooopse (<https://www.instagram.com/moouooooopse/?hl=en>), has 12.1K followers, and the images posted

on her Instagram are artful and impressive. As a follower, I truly believe in her taste and am willing to follow her footsteps. When she shares an image related to food or a restaurant, the geotag is usually attached so that the information can be found easily (Figure 51).

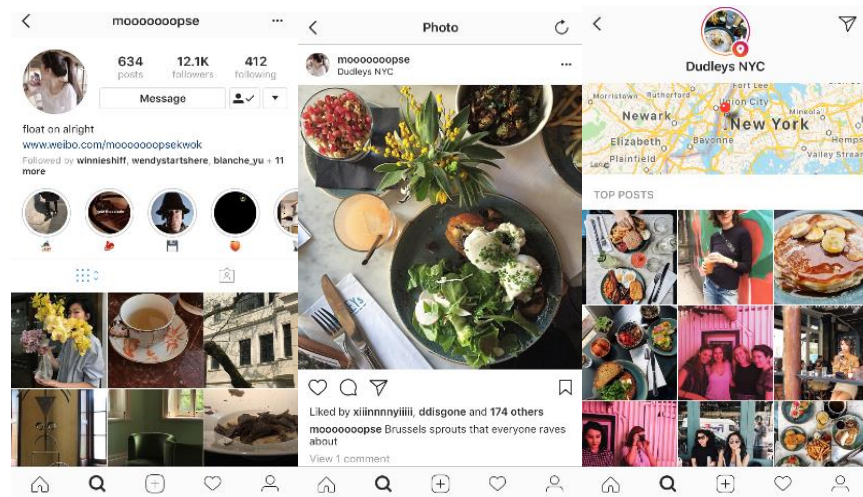


Figure 51 @ Mo00000o0pse

(Source: Instagram)

Pinterest is more like a catalogue of ideas rather than a social network, many ideas can be found when typing key words in the search bar. When users find an inspiring image, there would be a lot of relevant images shown below, and the users can easily discover other related contents. Take Figure 52 as an example: when typing “rooftop garden,” the green container image appears with many similar images below.

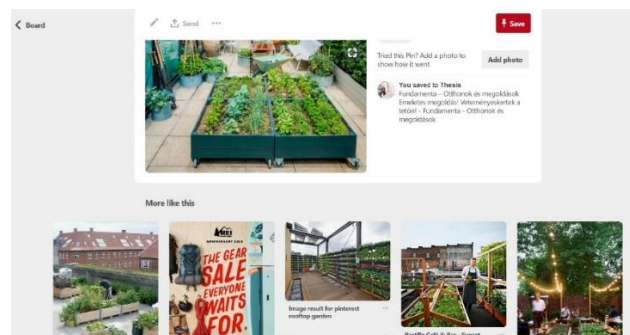


Figure 52 Pinterest

(Source: Pinterest)

7.3 Summary and conclusion

This chapter listed all the design inspirations found from social media and networks, like Instagram and Pinterest, providing ideas for the following design.

CHAPTER 8

DESIGN SOLUTIONS

Based on the research of previous chapters, the purpose of this chapter is to use design as a response to achieve the goal of thesis, that find a new solution to relieve the limited access to fresh produce and promote the healthy eating habits in Chinese modern cities.

8.1 Dimension

As mentioned previously, the sample area (Figure 53), which locates in the city center of Shanghai and is a popular spot for gathering, has various land uses: new high-end residential areas, commercial areas, public green space.



Figure 53 Land use of sample site

(Source: Baidu)

The average dimension of the rooftop on a high-end residential building is 39x14 meters (1535x551 inches), and it is assumed that one third of the rooftop could be utilized for developing. The reason of using the dimension of a high-end residential building as the sample is to make sure the aimed site can have sufficient quantity of people visit.

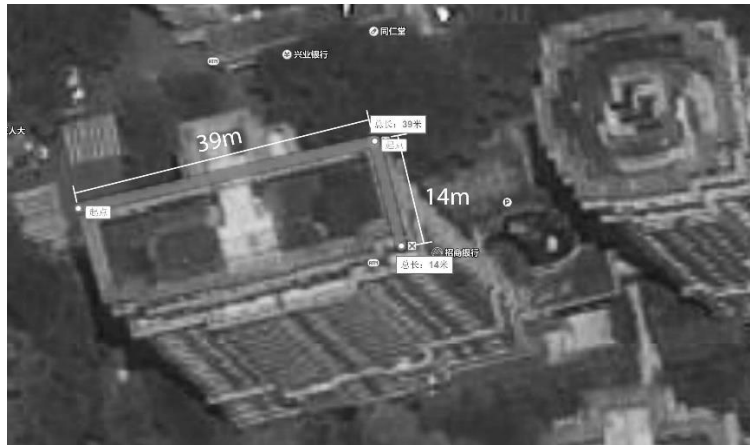


Figure 54 Measurement of residential building

(Source: Baidu)

8.2 Statement of design

The design aims to create a stylish container rooftop garden incorporated with a high-end restaurant, so that it can provide customers with an urban farming experience, a farm-to-table experience, a healthy eating experience and a stylish rooftop garden experience. Instead of focusing on the economic value of vegetables, this thesis is using rooftop gardens as a promotion. Considering the space requirements of various events, a re-configurable site plan is provided to add the flexibility of the rooftop garden by using moveable containers. With regard to the color palette, a fashionable color scheme is adopted to create a trendy and relaxing environment. According to the previous measurement, this thesis used 13x14 meters (512x551 inches) as the dimensions of the rooftop garden.

8.3 Container design

Based on the concept of square foot gardening and various growing requirements, there are four different size containers provided (Figure 55): 48x24x6 inches, 48x24x8 inches, 48x24x10 inches and 48x24x12 inches. For easy moving, caster wheels are installed under the containers, and the wheels can be fixed.

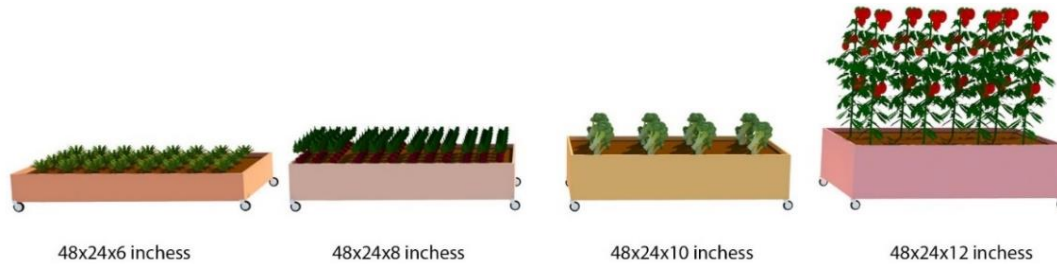


Figure 55 Container design

As this section shows (Figure 56), each container has one outflow hole, one layer of growing media, one layer of water reservoir and one layer of aeration screen. Growing media can eliminate poor soil conditions and diseases, the water reservoir can prevent plants from drying out, while proper oxygen can be provided by an aeration screen.

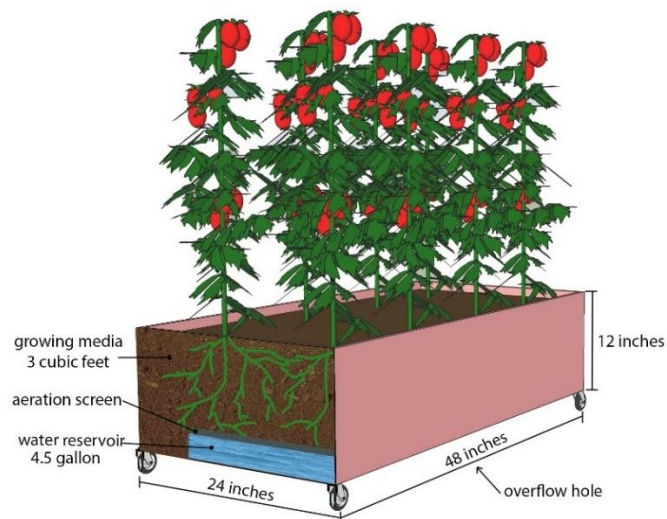


Figure 56 Section of a container

In addition to the water reservoir, drip irrigation is also adopted for watering. A drip irrigation system can apply water slowly and directly to the roots, eliminating the harmful fluctuation when the soil is moist. In a drip irrigation system, a backflow prevention device, a filter, a pressure regulator and a compression fitting are required (Figure 57). The back flow prevention is used to keep the irrigation water from flowing back into household water lines; the filter is used to trap particles which might clog the emitters; the pressure regulator is used for lowering the water pressure to fit the level of drip irrigation, and the compression fitting connects the tubing to the pressure regulator (Bressan 2017).



Figure 57 Drip irrigation system

(Source: Pinterest)

8.4 Site plan

A re-configurable site plan is provided to add the flexibility of the rooftop garden.

8.4.1 Plan A

Plan A presents a normal layout, the glasshouse serves as the main dining area where people can taste those seasonal and ingredients-driven recipes. The aim of planting tomatoes and eggplants on the edges of the rooftops is to use their required supporting system as fence, so that it can prevent people from some safety issue. In the daytime, customers can see a multi-layer arrangement of colorful containers with sitting areas distributed around them. In the sitting areas, they can have a farm-to-table experience, tasting the delicious dishes made from the produce in the containers. If consumers are satisfied with the dishes and want to cook them at home, they can buy a take-out box which contains the necessary ingredients harvested from the garden and the specific recipe. This sitting area is suitable for two to three people relaxing, chatting with each other, and getting close to nature, but if someone comes here alone, an undisturbed experience can be provided as well. At night, this garden can also function as a bar with overhead lighting brightening the garden. Also, people can have a great view to enjoy the shiny city in the nighttime. Furthermore, people can have a chance to learn about urban farming and do some basic farming by hand.



Figure 58 Site plan of plan A



Figure 59 Night view of plan A



Figure 60 View from entrance of plan A



Figure 61 Perspective of plan A

8.4.2 Plan B

The layout of plan B is prepared for some small events, like a birthday party, a private wedding or a family gathering; therefore, a centric open space is created by moving containers together at various heights. Surrounded by containers with various colorful vegetables, people can have seasonal food together, dancing, and celebrating good things in a natural and relaxing

atmosphere. This kind of experience can make up for the lack of green space in Chinese urban areas, bringing exciting outdoor experiences to people, taking them closer to nature.



Figure 62 Site plan of plan B



Figure 63 Night view of plan B

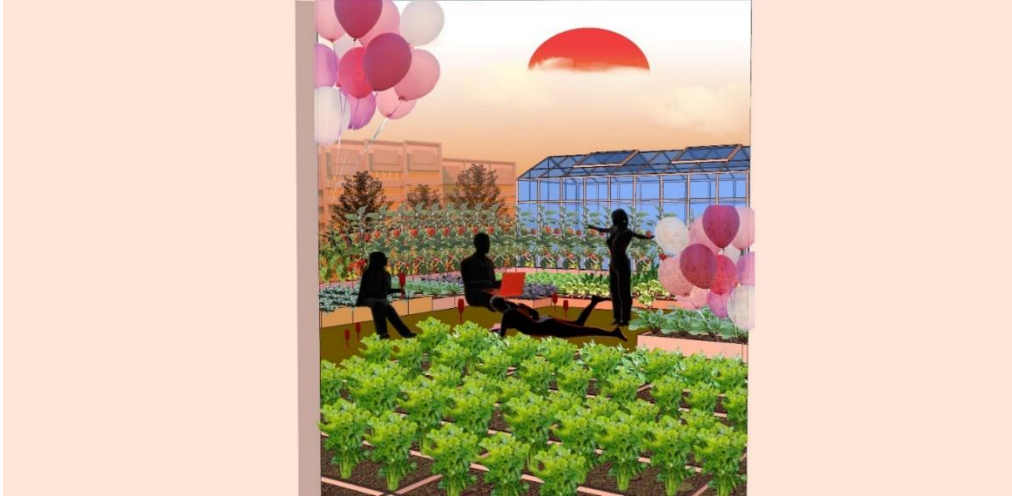


Figure 64 View from entrance of plan B

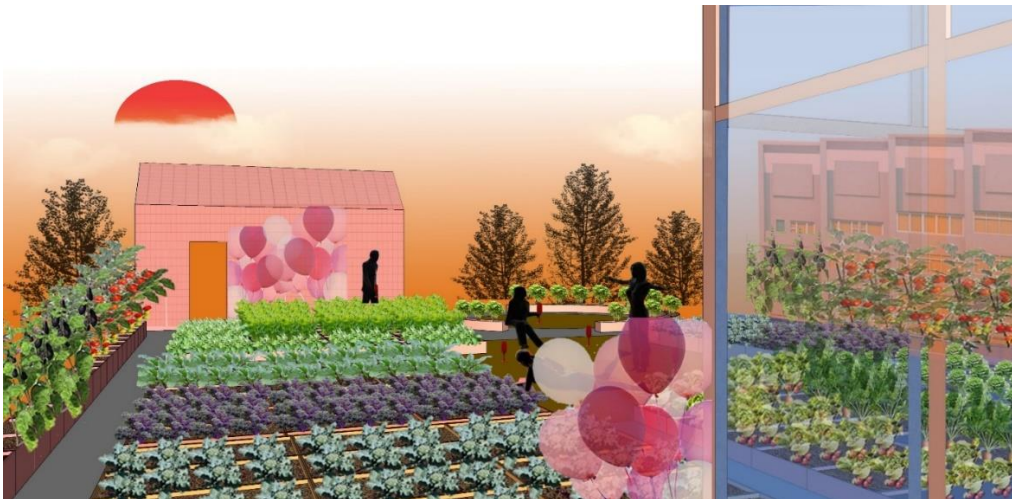


Figure 65 Perspective of plan B

8.4.3 Plan C

The purpose of plan C is to create various scale spaces by rearranging the containers, because the scale of the space will shape the way people perceive the site. In order to meet different needs, some of the space is created as an intimate space to connect people closely, while some of them is used as a gathering place, holding groups of people. Those colorful containers can prevent people from being interrupted by others. An outdoor brunch event is suitable for this configuration; unlike having brunch indoors, the outdoor brunch will take consumers into direct

contact with the food supply and make them have a clearer sense of the significance of farm-to-table. Additionally, outdoor brunch is catching the trend of the popularity of novel dining experience so that it can be attractive to the young generation.



Figure 66 Site plan of plan C



Figure 67 Night view of plan C



Figure 68 View from entrance of plan C



Figure 69 Perspective of plan C

8.4.4 Plan D

Plan D would be applied when the restaurant is closed or when holding some educational events. Consumers can walk among all the containers, irrigating, fertilizing, and maintaining the health of the vegetables during the educational events. Convenient access to an individual plant can let consumers learn more about how the container and the drip irrigation system work.

Moreover, this is a place where children can have fun, gain some knowledge with their parents together, and help them cultivate healthy eating habits from a very young age.

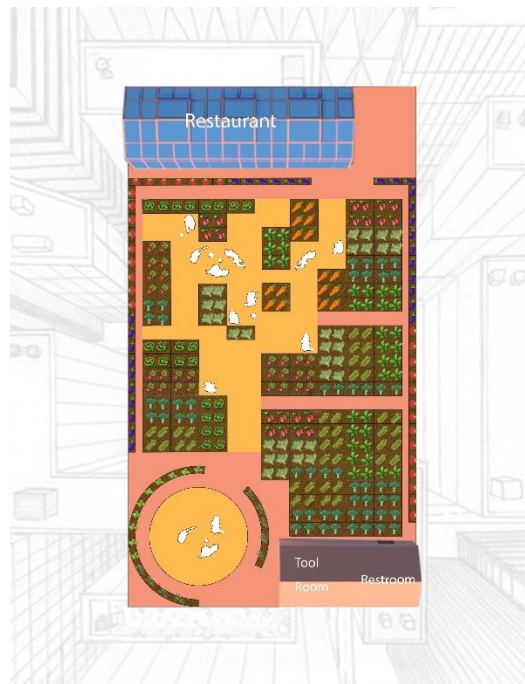


Figure 70 Site plan of plan D



Figure 71 Aerial view of plan D

8.5 Detail design

8.5.1 Portable tables

The portable wooden tables which can be fixed on the edges of the containers are provided when holding some events like an outdoor brunch. Figure 72 shows a scene in which these tables are used to hold wine glasses so that people can dance and talk to each other freely. Furthermore, these portable tables will not take up too much space to be stored when they are not needed.



Figure 72 A scene with portable wooden tables

8.5.2 Seasonal menus

The goal of the menu design is to give consumers a clear sense of the current season, by using the faint frames of the four site plans as background, and distributing the representative vegetables on them. Bright and high saturation colors are adopted to create an intense visual impression (Figure 73).

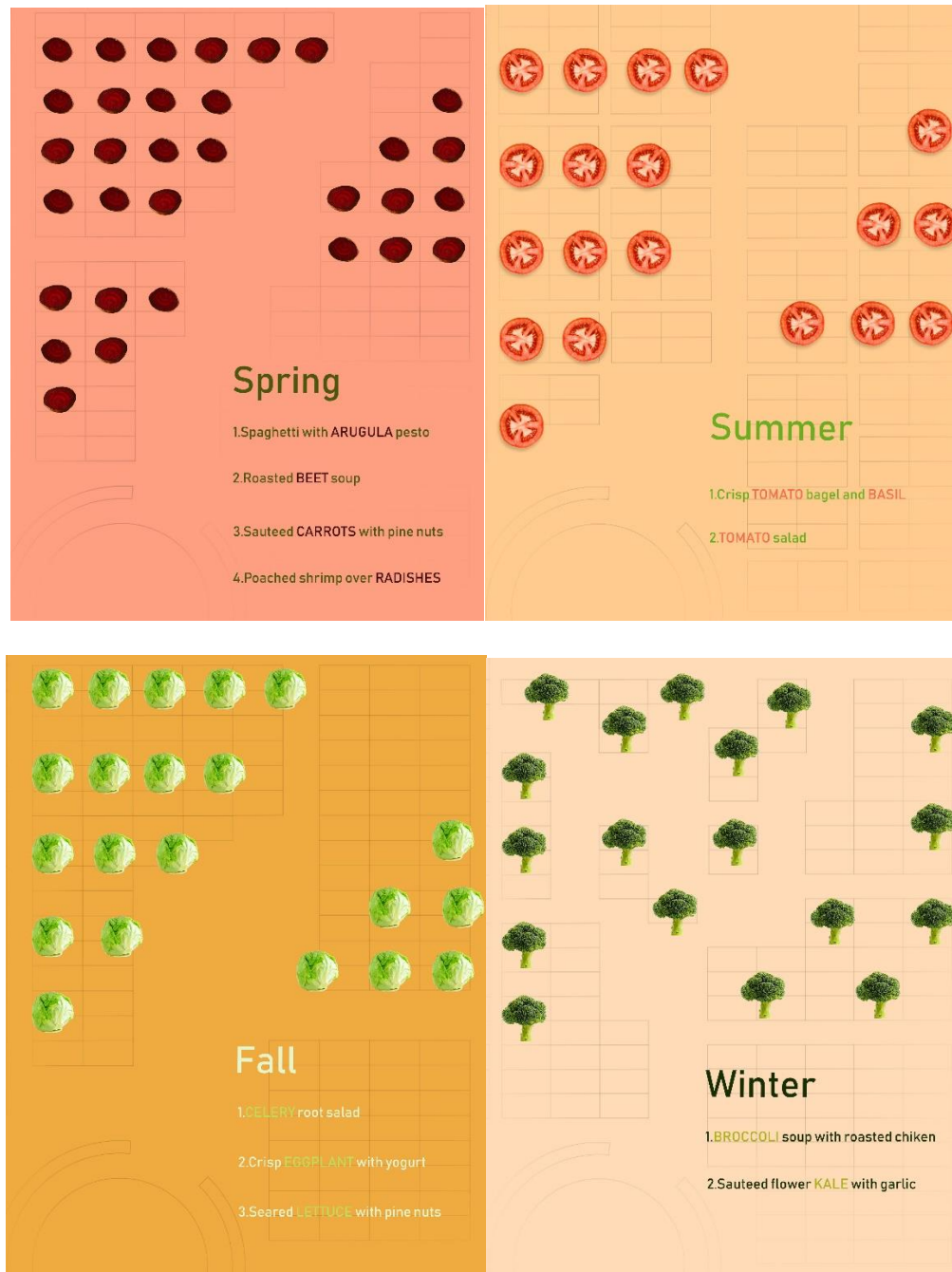


Figure 73 Menu design

8.5.3 Take-out box design

The take-out box (Figure 74) is designed to let consumers enjoy these delicious, ingredient-driven recipes at home. Specific recipe and necessary ingredients which are sourced from the

garden are contained in the box. The packaging uses the same color scheme, keeping the consistency of the whole design. The aim of the take-out box is to make cooking easy so that people are encouraged to cook more by themselves at home instead of consuming too much processed food.



Figure 74 Take-out box

8.6 Recycling and storage

Considering the issue of waste, since the whole garden is located on the rooftop so there might not be enough room for installing a machine to deal with everything. One solution is that cooperating with a local compost company, they can provide large carts, compostable bags and pick-ups, gathering them to make compost. It can be very economic and environmental friendly, promoting recycling of the whole community.

Besides the recycling issue, the limited space of rooftop may lead to the storage issue. Where and how to accommodate these tools when they are not needed is another problem. This issue depends on the building, and this thesis assume that new residential buildings can have enough space to support the necessary storage.

8.7 Summary and conclusion

This chapter represented the design solutions based on the previous research, including four site plans, the design of containers, and some detailed designs.

CHAPTER 9

CONCLUSION

The goal of this thesis is to create a new solution to relieve the limited access to fresh produce in Chinese modern cities so that it can help further develop the healthy diet industry, promote the concept of healthy eating habits and change people's tastes. The strategy adopted in this design-based thesis uses a social media-based market review to lead the research because social media are playing a vital role in daily life, upgrading people's knowledge of the world, leading fashions, changing people's preference and reshaping the way people live. Having a thorough understanding of the current trends was of great significance to achieving the goal of this thesis.

Inspired by the recent popularity of salad diets and changing food tastes in China, this thesis first investigated the reasons laying behind the phenomenon, then analyzed the current situation of the healthy diet industry, and analyzed obstacles and opportunities for its further development as well. Increasing consciousness of the benefits of pursuing a healthy lifestyle is motivating a new healthy diet industry in China. Nonetheless, a lack of the knowledge about fresh produce and their creative recipes, overpriced products and limited access all led to difficulties for the future development of Chinese healthy diet industry.

In addition, the serious situation of food safety and poor access to fresh produce, which is resulted from scarcity of land and people's limited acceptance, has spurred the Chinese to find new ways to obtain fresh food in urban areas. Although high-density buildings take up much of the land that might be for green space, they do obscure an unutilized space: rooftops. Currently,

developing rooftops into gardens is common all over the world, and indicates that rooftops in Chinese cities might have a great potential and bring many benefits to society.

One of the best ways to promote a new movement is to make it the subject of fashion discussions among young generation. Mars, on which the market analysis of this thesis is based, is a popular mobile app guiding people to explore interesting spots in modern cities. It covers several cities, but Shanghai was selected as the site to do the research because of its highest consumption catering index, which means the amount of money people in Shanghai spend on catering is the highest nationwide. The market analysis focused on research of the most popular eating spots, including what people eat, where they prefer to go and the nature of the dining experience. The conclusion drawn from the market analysis is that healthy and stylish food is a new trend in China.

Transforming a rooftop into a stylish edible garden incorporated with a restaurant is a possible solution to the challenges of this thesis. Considering the weight issues of the existing construction, container growing is an ideal option since it can avoid the risk of ruining the building and most of the vegetables are suitable for it. The selection of vegetables to be grown is derived from the selections of creative menus from high-end restaurants, the list of the top vegetables for container growing, and the list of local vegetables that are popular in Shanghai. Therefore, except for research about the growing requirements of vegetables, an exploration of the corresponding suitable recipes is crucial as well. This thesis cited the recipes from The Broad Fork, a vegetable-centric cookbook based on Athens, where the climate and main produce are similar to that of Shanghai.

In order to create a stylish rooftop garden, the design solution of this thesis was based on the images collected from popular social media, uses a fashionable color scheme, and offers a re-configurable site plan with various flexibilities.

Although this thesis was set in the context of the climate and current eating trends in Shanghai, the process and the strategy can be applied to other locations by changing species cultivated to accommodate climatic differences, and making other design changes to adjust to local preferences which can be available through social media. Utilizing rooftop space in urban areas to create room for growing local fresh produce and to bring young people into direct contact with their food supply can have a positive influence on people's lifestyle and increase the aesthetic value of the city. Integrating health, design, and knowledge of market dynamics is of great importance for ensuring future sustainable development.

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