



A dissertation submitted to  
Tongji University in conformity with the requirements for  
the degree of Master of Art

**Study and Application of systemic design to  
cooking system in vegetarian restaurant**

**——LOHASTIME as an example**

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## **ABSTRACT**

Kitchen waste is a kind of misplaced resources. Nowadays, each city in China produces at least 6000 tons kitchen waste each day. It contains lots of protein and grease from animals and vegetables with high nutrient value but hard to recycle because of the high percentage of water and also, it is easy corrosion. Restaurant is one of the main sources of kitchen waste. Unjustified cooking process and simple recycle way of different quality of kitchen waste produce problem. I choose “LohasTime” vegetarian restaurant as research object and applicate systemic design method aiming to find a systemic view of solving problem.

The methods used in the thesis include literature review, field investigation method and data analysis. Literature review provides a summary of studying backgrounds and systemic theory; Field investigation helps to collect useful information and data of linear situation; Data analysis used to analyze the situation supports for the systemic approach.

The result of investigation after analysis shows out a number of water and kitchen waste do not transform into resources efficiently. It increases operating costs of restaurant and a big waste. Systemic design method helps to analyze kitchen system qualitatively and quantitatively, refine flow of kitchen system and recycle kitchen resources according to its own qualities. Also, it enhances the relationship between restaurant and other local companies. Systemic approach not only achieves “zero emission” goal but also increases the economy benefits significantly. It provided a new business model of restaurant running.

The application of systemic design method into vegetarian restaurant kitchen system helps to find out an enforceable scheme for solving the kitchen waste problem in systemic view; Searching a new possibility to localize resources though establishing relationship between restaurant and local environment; And giving an example to other systemic project by providing a systemic design flux.

**Key Words:** systemic design, refine kitchen system, localize resources, economy evaluation

Catagory

<b>ABSTRACT</b> .....	<b>II</b>
1.1RESEARCH BACKGROUND .....	6
1.1.1Development and Characteristics of Chinese Catering Culture .....	6
1.1.2Kitchen Waste Collection and Treatment .....	14
1.2 RESEARCH OBJECT AND SCOPE.....	19
1.3 RESEARCH PURPOSE AND SIGNIFICANCE .....	20
1.4 Architecture of Thesis .....	21
 <b>2. System Design Theory Overview.....</b>	 <b>23</b>
2.1 System theory .....	23
2.1.1 The Transformation of Thinking Paradigm: From Mechanical Determinism to Systematic Theory .....	23
2.1.2 Features of Real Systems: Taking Social and Cultural Systems as Examples .....	28
2.1.3 Method for describing the system: system cycle diagram and plumbing diagram.	30
2.2 System Design Overview and Application Area .....	33
2.3 System design patterns and principles .....	36
2.4 System design method.....	39
2.5 System Design Role and Significance .....	42
2.6 System Design Limitations and Challenges.....	43
2.7 Summary of this chapter .....	45
 <b>3 Design Research Methods .....</b>	 <b>46</b>
3.1 field survey .....	46
3.1.1 Observation .....	47
3.2 Questionnaire .....	52
3.2.1 Questionnaire Classification .....	52
3.2.2 Questionnaire Design - Problem Design .....	54
3.2.3 The advantages and disadvantages of the questionnaire method.....	55
3.3 Service System Design Principles.....	56
3.3.1General Principles of Service Design .....	57
3.3.2Process Design Principles for Service Design.....	59
3.3.3Organizational Design Principles for Service Design .....	60
3.3.4Information Design Principles for Service Design .....	61
 <b>4 Case Study and Analysis of System Design .....</b>	 <b>62</b>
4.1 Coffee residue system design case analysis .....	62
4.2 XINGBAO nursing home service system design research case analysis.....	65
4.2.1Research Method .....	65
4.2.2Tool box and research method .....	65
4.2.3Blue Print and Touch point collect of XINGBAO .....	66
4.2.4Conclusion .....	71

---

4.3 Fruitful Enzyme Production Case .....	72
<b>5. Research of Lohas vegetarian restaurant.....</b>	<b>74</b>
5.1 Field observation method .....	76
5.2 Expert interview .....	76
5.3 Questionnaire .....	77
5.4 Menu settings and vegetable sources .....	77
5.5 Kitchen Equipment and Measurement Data.....	81
5.6 Restaurant kitchen staff and management.....	83
5.7 LOHAS restaurant restaurant flow.....	85
5.8 Lohas and Ecology Farm.....	88
<b>6 Conclusions and Prospects .....</b>	<b>89</b>
6.1 Conclusions .....	89
6.2 Direction of further work .....	90
<b>Acknowledgements .....</b>	<b>91</b>
REFERENCES .....	93
Appendix I LOHAS Winter Purchase List .....	98
Appendix II Lohas Research Outline and Questionnaire .....	99
Questionary of LOHAS stuff.....	104
Questionary for LOHAS Customer .....	107
Appendix III Interview Record of LOHAS .....	113

## 1 INTRODUCTION

### 1.1 RESEARCH BACKGROUND

#### 1.1.1 Development and Characteristics of Chinese Catering Culture

##### History

China has a vast territory, a large span from north to south, rich products and diverse climates. After a long history of changes in the dynasty and historical changes, a profound Chinese food culture has developed. From an extensional perspective, China's food culture can be classified in terms of times and techniques, regional and economic, ethnic and religious, food and utensils, consumption and levels, folk customs, and functions. It shows different cultural tastes and reflects different use of value.

The Zhou and Qin Dynasties were the shaping stages of China's diet culture, with cereals and vegetables as staple foods. The introduction of a large amount of raw materials for fruits and vegetables and cooking methods in the Western Region has greatly enriched the variety and culture of diets. New cooking and by-products production began to appear. People began to use vegetable oils. Tofu was also invented in the Han Dynasty by Liu An, a Huainan king. The bean meal served as a staple food in the Han Dynasty.

The Tang and Song dynasties were the peak period of Chinese food culture. Based on the diet of the Han Dynasty, they greatly enriched the way of cooking and variety of dishes. Ming and Qing Dynasties was another peak in the diet culture. It was the continuation and development of the Tang and Song food customs. At the same time, it was mixed with Manmeng characteristics. The dietary structure has changed a lot.

Staple food: glutinous rice has been completely eliminated and the pockmarks have been eliminated from the staple food lineup. With crushing oil, the bean meal is no longer a staple food and becomes a dish. The proportion of wheat in the northern Yellow River Basin has increased greatly, the surface has become the staple food in the north after the Song Dynasty, and it has been introduced on a large scale again in the Ming Dynasty. Potato, sweet potato, and vegetable cultivation have reached High standard and become the main dish. Meat: Artificial livestock and poultry become the main source of meat. The Manchu delegation represented the highest level of food culture in the Qing Dynasty.

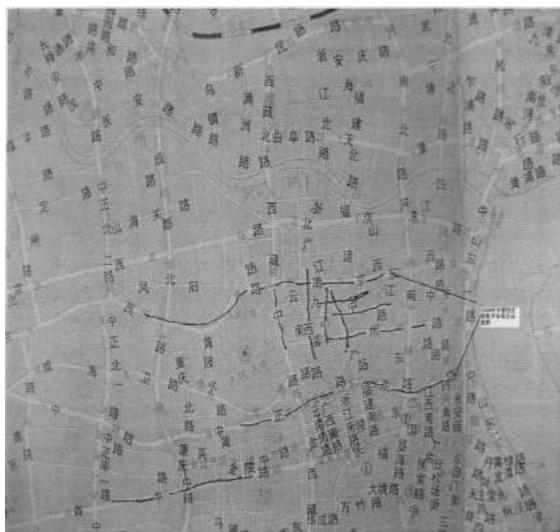
### **The eight major components of Chinese cuisine**

The cuisine of Chinese food culture refers to a set of self-contained cooking techniques and flavors formed in a certain area due to the differences in climate, geography, history, production, and dietary customs. Recognized local dishes.

As early as the Shang and Zhou dynasty, China's dietary culture had taken shape, with Taikoowang being the most representative, and during the spring and autumn and the Warring States periods of the Qigong period, the flavors of the food culture in the South and the North showed differences. In the Tang and Song dynasties, the southern food and the northern food each formed a system. In the Southern Song Dynasty, the pattern of the North Salt of Nantian was formed. When it developed into the early Qing Dynasty, Shandong cuisine, Sichuan cuisine, Cantonese cuisine, and Su cuisine became the most influential local dishes at the time and were called "four major cuisines." By the end of the Qing Dynasty, the four major new and regional cuisines of Zhejiang cuisine, leeks, Hunan cuisine, and Anhui cuisine were formed separately, which together constituted the "eight major cuisines" of Chinese traditional diet.

## **Shanghai Restaurant and City Life**

The development of modern Shanghai restaurant industry is closely related to the development of Shanghai as a whole. With the prosperity of Shanghai's industry and commerce, the diet is booming. The influx of various food restaurants is largely due to the fact that local populations gather in Shanghai in order to meet the needs of different groups of people. The distribution and development of Shanghai restaurants are closely related to the prosperity and development of Shanghai cities. In the 19th century, Shanghai's cities were centered on the county seat and the concession, and they expanded from south to north and from west to east as industrialization expanded. The development of cities has promoted the formation of urban zoning. Shanghai cities are gradually divided into functional areas: industrial areas, commercial areas, residential areas, and cultural areas. The catering industry is mainly located in the business district.



*Fig 1.1 : A map of the concentrated distribution of Shanghai Chinese restaurants in 1949*

Shanghai's diverse restaurants also reflect the changes in Shanghai's social and economic environment over time. In the 19th century, in Shanghai, Suxi, Ningbo, and Anhui restaurants were the first, followed by Beijing-Tianjin-Hebei cuisine in Shanghai,

and Cantonese, Sichuan, and amaranth were flourishing. It was not until the 1920s that Shanghai's local cuisine began to evolve into a kind of cuisine from the popular food on the streets. The local cuisine is characterized by "Liquor Red Sauce", which is sweet and salty, oily but not greasy, and fully combines Suxi cuisine with sixteen local flavors. Shanghai cuisine

The development of local cuisine has a fish-water relationship with the local economy and culture. The development of Shandong cuisine is related to Confucius. The development of Anhui cuisine is related to Anhui merchants. In modern Shanghai, due to the concentration of industry and commerce and cultural people, internal and external exchanges. Frequently, Shanghai's food culture is widely available and gradually becomes the meeting point of domestic and foreign food culture.

Shanghai cuisine constantly absorbs the strengths of foreign dishes, especially Suzhou tin dishes. In the middle of the 20th century, it has formed a variety of fresh materials, medium variety, and moderate taste. Many local restaurants have created housekeeping dishes and cultivated a group of local gangs. The chefs greatly improved the taste of the local cuisine. The dishes are thick, thick and marinade penetrated into the interior of the dishes, especially tasty, but there is no lack of light and elegant, fresh and beautiful. Shanghai, as an international metropolis, has been developing with the development of the times and has gradually formed a blend of Chinese and Western cultures and is compatible with the Shanghai culture.

The traditional Shanghai cuisine uses only a single seasoning such as soy sauce, salt, and MSG, and the modern Shanghai cuisine uses a variety of compound seasonings in addition to the black peppers and butter in Western cuisine, the red pepper in Sichuan, and the awkwardness in Xinjiang. The dishes have more novel flavors. In fact, the

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essence of Shanghai-style cuisine lies in compatibility and development and development in improvement. The new Shanghai cuisine is not a traditional dish. It is based on the mature local cuisine. It widely absorbs local flavors at home and abroad and improves development to form unique Shanghai cuisine. Shanghai is an immigration city with a large population and mixed tastes. Its new Shanghai cuisine will surely adapt to this feature.

### **Shanghai Vegetarian Restaurant**

In the 19th century, Chenghuang Temple was Shanghai's economic and religious center, and Shanghai's first vegetarian restaurant was also opened here. Shanghai's vegetarian restaurant is open mainly to counties and concessions. 1920-1930 was the period when the Shanghai food market started its vegetarian restaurant. First, because of Shanghai's economic recovery in the 1920s, and second, the rapid development of Buddhism in Shanghai. Many Shanghai's social celebrities in the same period advocated the concept of healthy food, making the opening of the vegetarian restaurant reach its peak in the 20th century. Nevertheless, by 1947, the number of vegetarian restaurants in Shanghai was only 34, accounting for 2.87% of the total number of restaurants. (Tang Yanxiang, 2008)

So far, there are more than 100 vegetarian restaurants in Shanghai, mainly in the four regions of Huangpu, Pudong, Jing'an and Xuhui. Among them, the most concentrated are the vegetarian restaurants near Huaihai Road and Beijing West Road. Beijing West Road is one of the main arteries of the former Shanghai Concession West District and is also a famous commercial district in Shanghai. The prosperous economic environment and the historical background of the development of vegetarian culture have contributed to this phenomenon. Shanghai's vegetarian restaurant has a long history of traditional vegetarian restaurants such as Kung Lin and Ju Ling. Small and

refined are the characteristics of most vegetarian restaurants. The research object of this thesis “Lok livelihood and humanistic comfort museum” has two branches in Shanghai. This research takes Pudong shop as a research object and conducts on-the-spot observation and measurement.

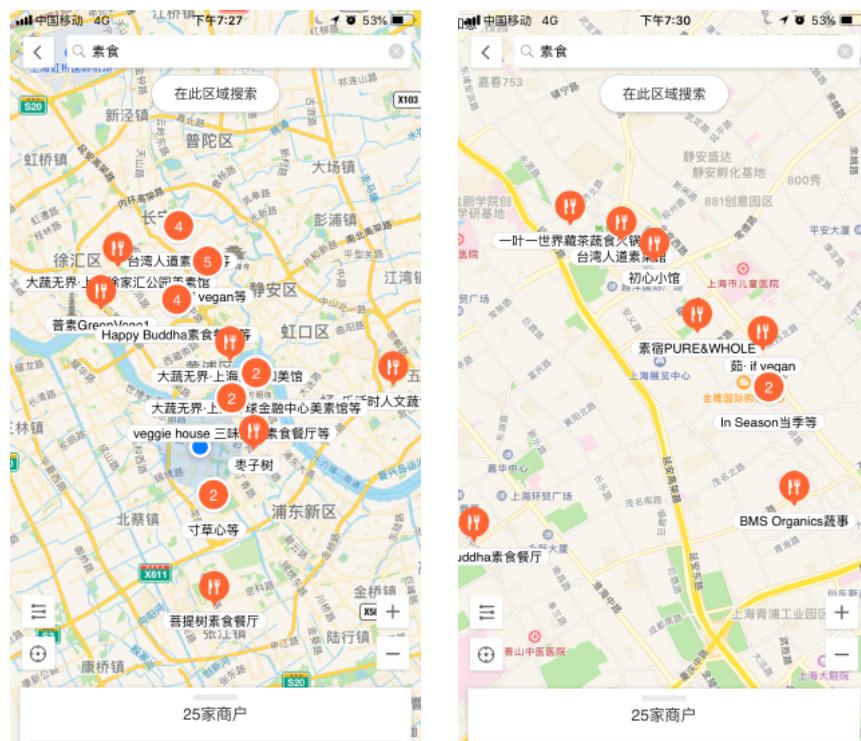


Fig 1.2 : Shanghai's vegetarian restaurant distribution in 2018

### Catering industry development and issues

The development of China's food culture has a long history and a wide range of varieties. In 2016, the national catering revenue was 3.5779 trillion yuan, accounting for 10.8% of the total retail sales of social consumer goods (combined with the China Chamber of Commerce for Industry), which was an increase of 0.1% from 2015. The tertiary industry accounted for 21.02% of China's GDP in 1978, and it accounted for 48.1% in 2014. (From Yujia, 2016) The catering industry, as the mainstay of the tertiary industry, has played an important role in improving the quality of life of the nation, absorbing employment, and industrial linkages. In order to seek greater profit margins, the

restaurant has changed from a simple food provider to a provider of experience and service, and has continuously improved its management and service capabilities. The catering industry has demonstrated its diversified, personalized, informational and popular market characteristics. . In China, public catering accounts for 85% of the overall catering industry and is the mainstream of catering consumption. Shanghai, as China's economic center, has increased the number of public catering units from 38,354 in 2008 to 45,463 in 2013, as shown in Figure 1.1 below. In the integrated shopping mall, the proportion of catering stores reached 40%, and the catering industry flourished. With the continuous development and expansion of the catering industry, the problems in the operation and management of the industry are also becoming increasingly prominent:

*(1) Inappropriate handling of kitchen waste causes waste of resources and environmental pollution*

Kitchen waste refers to the kitchen waste and waste oil generated during the daily life of the residents and the catering industry (Liu Guosheng, 2016). 56% of urban kitchen waste comes from the food and beverage industry. A medium-sized hotel produces about 400 kilograms of food waste per day, including 50% of waste generated during food processing and 50% of waste food left on the table. (Zhang Qingfang, 2012) Food and kitchen waste contains a lot of oils, proteins and nutrients, which are of great value. At the same time, food waste from kitchens and garbage is high, and recycling is difficult. Improper sorting may also cause secondary pollution to the environment. Obviously two sides. The output of urban kitchen waste increases with the population growth and other reasons, and the problems are also becoming increasingly prominent.

*(2) Restaurant kitchen management is not standardized*

Due to the huge market of China's catering industry, the supervision and management system is still not perfect, and the construction of kitchen facilities for some small and medium-sized catering enterprises is not standardized. The staff of the restaurant staff has a large mobility, weak sense of recycling and use of waste, and confusion in management, which makes the restaurant's back kitchen operation less standardized. In addition, the cooking habits in our country are different from those in the West. There are many kinds of dishes, and there are great geographical differences. The cooking habits vary from person to person, which makes it more difficult to quantify recipes and standardize operations. Each step in the kitchen operation will generate a certain amount of food waste. The non-standard cooking process will result in a greater degree of waste of resources and increase restaurant operating costs.

*(3)There is no complete industrial ecology of food waste recycling*

Urban food waste is large in production, complex in composition, and difficult to recycle. The recycling of restaurant kitchen waste is a systematic process. Only improving the strength and technology of a certain link in the system cannot solve the fundamental problems. Japan has established a close relationship with the local economy in the process of resource recycling and harmlessness of kitchen waste, and established the correlation and interaction between related industries to form a localized recycling loop. In Yokkaichi, Mie Prefecture, a number of universities, companies, and citizens have joined forces to build a food residue recycling chain in the city. After raw materials such as vegetables and fish are processed, a large amount of waste is produced. The proper amount of fermentation enzymes added to the waste can be used to process the waste into feed for further livestock breeding. In Kanagawa Prefecture, food processing plants, food stores, restaurants, and supermarkets in the city are linked to feed and fertilizer users such as cleaning companies and farmers to form a food resource

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recycling network and ecological community. (Meng Yingying, 2008) Realizing the interaction between industries can not only make people responsible for waste disposal, but also reduce the waste disposal costs of individual enterprises, realize timely and correct treatment of food waste, maximize the use of resources, and reduce environmental pollution.

#### *(4) Influenced by traditional cooking and eating culture*

China's food culture stresses "fine," "beautiful," "emotional," and "courtesy." In addition to the appearance and taste of the dishes, it also has sociality. On the dining table, friends and relatives push cups to exquisitely pay attention to a "love" word, while Chinese table manners also pay attention to a "ceremony" word. On different occasions, consumers have different requirements for tables and dishes. The rich style of table dishes has greatly improved people's living standards, but at the same time, food and kitchen waste has also increased. China's dietary tradition is worthy of respect, but the waste of resources is not worth promoting. Different areas of food culture, different types of vegetable and food, making food and kitchen waste content and properties are not the same. Kitchen food waste in cities in the northwest and southeastern regions of China is high in oil content, and kitchen waste in the eastern and southern coastal cities is more contaminated (Wang Pan, 2013). The reduction and recycling of food waste should be based on local culture and characteristics.

### **1.1.2 Kitchen Waste Collection and Treatment**

#### **Kitchen waste definition**

China's food waste is rich in organic substances such as starch, fat, protein, and cellulose, nitrogen, phosphorus, potassium, calcium, and various trace elements; toxic

and harmful chemical substances (such as heavy metals, etc.) have little content and are of high utility value. However, food waste is extremely perishable and carries bacteria, which can easily cause secondary infections. Shanghai is located in southeastern China. It has a complex diet structure and produces a large amount of food waste. Compared with the coastal cities in the south, it has high oil content and less impurities, and has huge recycling value.

### **Food Waste Treatment Technology and Status Quo**

In Shanghai, Xining, Ningbo, Suzhou and other places, some restaurant wastes implement fixed-point recovery policies, timely recovery, sorting, processing of kitchen waste, avoiding waste of resources and secondary pollution of the public environment. However, the coverage of this policy is small and the cost of transportation processing is high. At present, most small and medium sized food and beverage outlets in Shanghai are still adopting a unified management system of discarding and recycling. Food and kitchen waste recycling is not timely. It is mixed with residential garbage, and it is difficult to sort and reduce the value of recycling. There are three main technologies for the treatment of urban solid kitchen waste: incineration, landfill, and microbial fermentation. The three methods are relatively mature, but each has its own drawbacks.

Incineration is the combustion reaction between flammable solid wastes and oxygen in the air at high temperatures, which causes oxidation and decomposition to achieve capacity reduction, detoxification, and energy recovery. Large incineration volume, good volume reduction, and heat generated by the incineration process are used to generate electricity to enable the energy of the waste. (Lin Guipeng, 1999) But there are many deficiencies in the incineration technology to deal with the kitchen. First of

all, due to the fact that the moisture content of food waste in China is more than 70%, the utilization of heat energy is low. Secondly, food waste contains a large amount of lipids. During the combustion process, an important factor for the production of dioxins is formed under the catalysis of heavy metals. More serious secondary pollution is caused. Third, the treatment of restaurant-kitchen-garbage increases the consumption of incinerated fuel and increases the processing cost. Fourth, the incineration investment is too high, the operating cost is high, and the management level and equipment maintenance requirements are high. Less domestic application experience.

(Zhang Qingfang, 2012)

Landfilling method is the main method for municipal solid waste disposal in various countries in the world. It disposes domestic garbage underground, and degrades macromolecules into small molecules using aerobic microorganisms, facultative anaerobic microorganisms and anaerobic microorganisms. , 2003). As a traditional waste disposal method, landfill treatment is widely used due to its large amount of processing, no pretreatment, low operating cost, and simple process and technical operation. However, landfill disposal also has the disadvantage of occupying a large amount of land and having limited processing capacity. Food and kitchen wastes have high moisture content and are easily corroded. Landfills are liable to form leachate and pollute groundwater and soil and produce odors, causing irreversible secondary pollution to the surrounding environment. (Zhang Qingfang, 2012) Microbial fermentation is divided into aerobic composting and anaerobic fermentation.

The aerobic composting technology can hardly increase the composting temperature to the optimum temperature when the moisture content of the kitchen waste is higher than 70%, and the decomposition rate is obviously reduced. The water content of food waste in China is relatively high, so it is not suitable for aerobic composting technology;

anaerobic fermentation Treatment technology uses anaerobic bacteria to decompose organic matter into clean energy, which is divided into normal temperature, medium temperature and high temperature fermentation. Fermentation technology is low in difficulty, but there are cases where pathogenic bacteria are not stable and the quality is difficult to guarantee.

The exploration and development of restaurant food waste disposal in foreign cities takes longer, and the classification, collection, treatment and industrial ecological construction of food wastes are more mature than in China. The main treatment methods for restaurant-kitchen waste in foreign countries are shown in Table 1.4 below. Japanese nationals have a strong awareness of the separation of kitchen waste and food. Kitchen wastes are strictly sorted and discarded at the source before they are harvested. This greatly increases the utilization of food waste. France encourages people to compost at home. The fertilizer produced was used to add fertilizer to the urban soil and effectively reduced the weight of food waste.

Kitchen waste recycling requires the support of a complete industrial system

The harmlessness and resource utilization of food waste requires systematic industrial chain support. In the entire process of discarding-sorting-transporting-pretreatment-processing, kitchen waste requires not only government support and perfect system, but also needs the cooperation of all stakeholders. Stakeholders in the kitchen waste recycling process are shown in Table 1.5 below. First of all, it is necessary to raise the awareness of all stakeholders and environmental protection; secondly, based on the material links between local industries, a complete industrial ecological chain is formed to realize the material circulation within the system.

## Necessity and Significance of Recycling Kitchen Waste

As a super-sized city, Shanghai has a population of 24.15 million people. The huge output of kitchen waste is scattered and the cost of recycling is high, making it difficult. The quality and purity of food waste recycling directly affect the efficiency and safety of subsequent recycling. If not handled properly, not only will there be a lot of waste of resources, but it will also cause damage and pollution to the residents' health and the environment.

The resource utilization of food waste is a systematic project. Only from the perspective of the system, the quality and safety of food waste in every link of the resource system can be ensured to ensure the harmlessness and maximum use of food waste. Sustainable urban development is of great significance.

Through the author's research, it was found that half of food and kitchen waste was generated from food and vegetable waste generated from food processing, and half of it was from food waste after processing. However, 83% of the current literature is focused on discarding, recycling, sorting, and disposal of food waste, and less than 20% of the food waste generated during food processing is studied. The high-quality food scraps produced during the processing of ingredients are discarded together with the rest of the kitchen waste, causing unnecessary waste. The author will use the method of system design to analyze and research the process of restaurant-kitchen garbage production and provide a new perspective for the resource utilization of food waste.

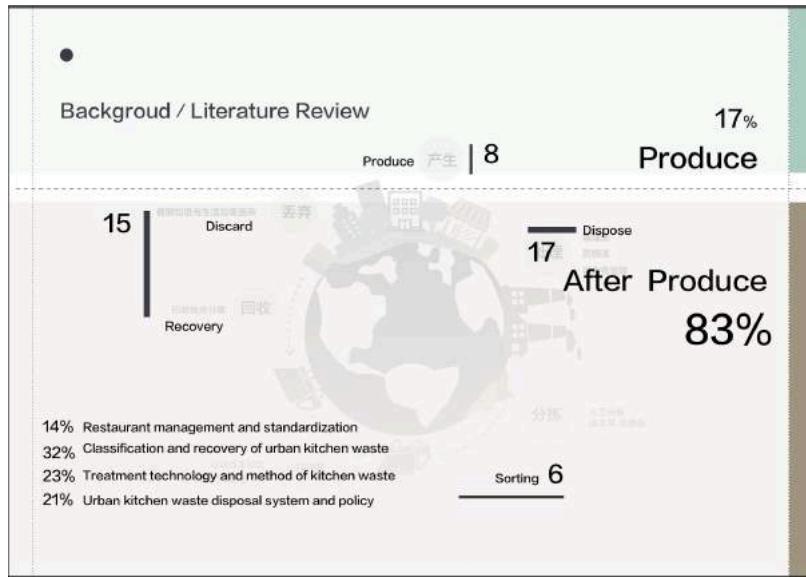


Fig 1.3: Literature Review

## 1.2 RESEARCH OBJECT AND SCOPE

System theory is a methodology for understanding the world. It uses the world as a system and puts concrete problems on the system level to analyze qualitatively and quantitatively. It finds out the root causes of problems in the system and changes them through the optimization and design of the system. The mode of operation of the system to find new ways to solve the problem. This article will use systematic theory as a guiding ideology, through the qualitative and quantitative research on the process of cooking in the vegetarian restaurant, using the systemic design method to explore a new model of urban food waste maximization and food waste processing.

This series of articles focuses on the LOHAS vegetarian restaurant. The small vegetarian restaurant has a sound kitchen equipment and management system. It has a smaller body and is relatively easy to research. It provides a typical case for exploring the maximum utilization of kitchen food waste resources in the city and the new model of food waste disposal. Compared with common food waste, vegetarian food waste is

relatively simple, providing the possibility of qualitative and quantitative analysis of food waste. The LOHAS boasts a more advanced system management philosophy. The restaurant has a strong sense of environmental protection and sustainability. In the future, it will prepare to cooperate with an ecological farm, establish links with the surrounding ecology to reduce costs, and establish a new economic profit model. This provides the possibility for systemic design applications.

This series of articles systematically researches the process of the kitchen cooking process in the restaurant, analyzes the fruit and vegetable materials and water resources in the restaurant's cooking process qualitatively and quantitatively, and finds the reasons that lead to the low utilization rate of resources. Through the method of systemic design, the restaurant's kitchen process is optimized to achieve "zero emissions"; the connection between LOHAS and the surrounding commercial ecology is established; the systematic solution for vegetarian kitchen waste is explored. Through the economic evaluation of the old and new systems of LOHAS, find out new economic growth points for restaurant operations and quantify systemic design results.

### 1.3 RESEARCH PURPOSE AND SIGNIFICANCE

This series of articles will use the system theory as the guiding ideology, through the qualitative and quantitative research on the restaurant's cooking process, using the systemic design method to explore the new optimization model of restaurant kitchen waste resource utilization. The structure and quality of the system determine the output of the system. The problem of urban kitchen waste arises from the linear production model of urban catering industry. This series of articles use the systemic design method to determine the reasons for the low resource utilization rate through the qualitative and quantitative analysis and research of the kitchen process. The systemic design optimizes

the flow in the kitchen, maximize resource utilization, reduce waste, and realize “zero emissions”. This series of articles will also explore the new economic model of cooperation between urban catering systems and related systems by strengthening the cooperation between vegetarian restaurants and neighboring ecological farms, and provide catering industry operations. Strengthen regional co-association, provide new models and new methods for the systematic treatment of urban kitchen waste, and through the economic evaluation of the system, find new economic growth points and quantify design results.

With the accelerating process of urbanization in China, the urban population has grown rapidly, and the city's food waste has become huge and difficult to handle. Urban food waste is "misplaced resources." The systematic treatment of food waste can not only reduce environmental pollution, but also bring new profit models by strengthening the links between local companies.

Through the exploration of systematic solutions for urban food waste in the city, people will bring new perspectives to solve problems, change the linear thinking paradigm, and shift people's attention to “quantity” to attention to “quality”, to “part” to “system”. As a part of the world system, human beings can only continue to develop in accordance with the rules of the world's system.

## 1.4 Architecture of Thesis

This thesis is the first part of the whole project “Study and Application of systemic design to cooking system in vegetarian restaurant——LOHASTIME as an example” which focus on clarify background of the project from culture and historical view. And

use methodologic of service and systemic design for collecting and recording qualitative and quantitave data for further analysis.

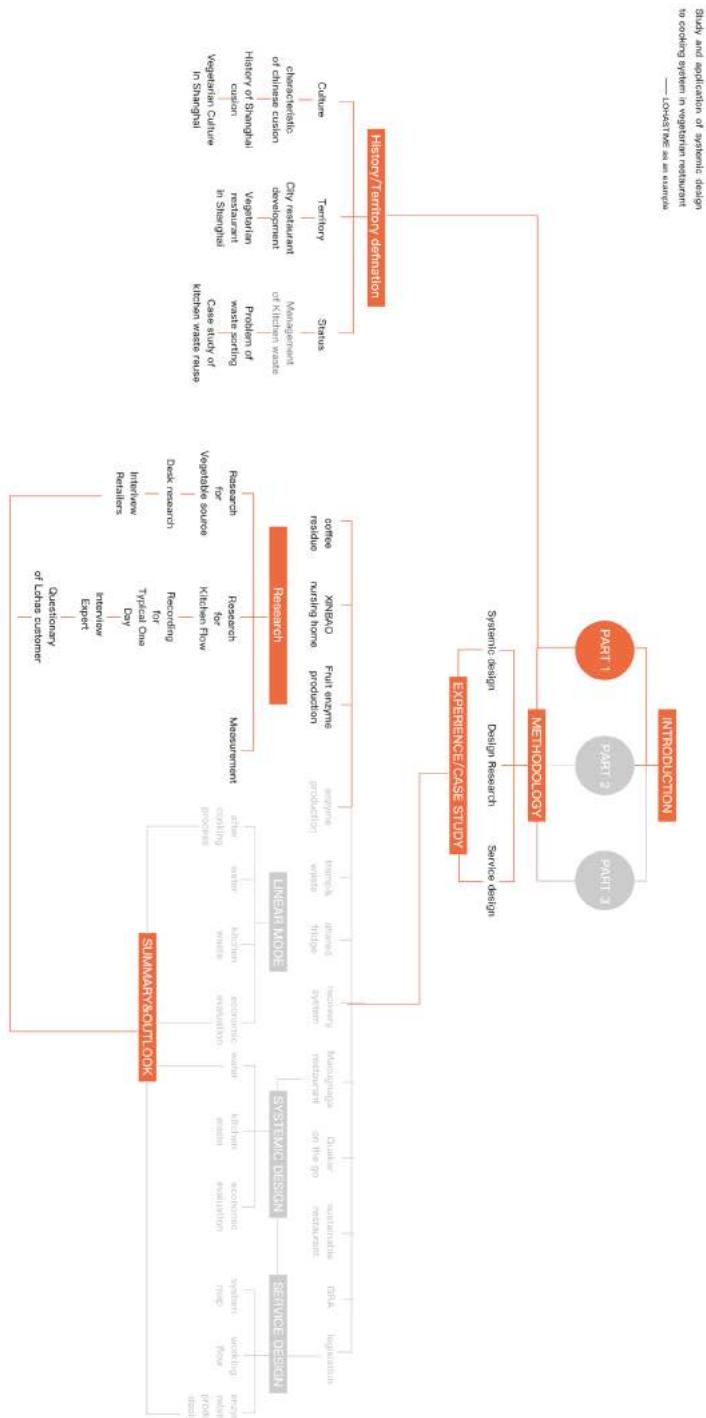


Fig 1.4 Architecture of thesis

## 2. System Design Theory Overview

### 2.1 System theory

#### 2.1.1 The Transformation of Thinking Paradigm: From Mechanical Determinism to Systematic Theory

System theory is a kind of epistemology. It is a way of thinking that considers the object of understanding as a system, comprehensively examines the object of understanding from the interaction and interaction between system and elements, elements and elements, system and environment. (Huang Xiaoyu, 2014) Systematic thinking is based on systematic theory and is a comprehensive way of understanding the nature of the world and analyzing the structure and laws of the world. Since ancient times, people have never given up on the exploration and understanding of the nature of the world. They have also been trying to use systematic thinking to explain and understand the world. Oriental philosophy emphasizes the importance of "relationship" and believes that man and nature should be in harmony and unity, and that human beings can only respond to the law of heaven and be able to survive forever.

The "One" and "Tao" proposed in The Tao Te Ching are the embodiment of the Eastern System View. Aristotle, the western philosopher, believes that "partial summation is greater than the sum of the whole," which is the origin of western system thinking. In order to better explain and analyze this complex world, 16th century Descartes pioneered the method of analytical thinking, breaking complex phenomena into simple parts and trying to understand the overall behavior from the part of nature. With the establishment of a classical model of thermodynamics, people gradually

understand the world as an accurate perfect machine. They believe that the dismantling and partial research of complex things can reveal the overall laws. Mechanical determinism has become the main way for people to think about the world. With the development of biotechnology and technology, classical mechanical models have been unable to explain the problems in dynamic systems. In the 19th century, biologists first put forward the idea of vitality and opposed to simplifying and decomposing the organism into parts of research and understanding. In the 1920s, the discovery and discovery of quantum physics made people have more questions about mechanical determinism. In the 1940s, Norbert Wiener proposed cybernetics to study the state and changes of dynamic systems. Cybernetics first introduced the concept of a feedback loop, arguing that there are causal links between system elements and elements. These causal associations are divided into:

(1) *Enhanced loop (positive feedback loop/s): The system operates according to the enhanced loop, and the current status of the system is enhanced.*

(2) *Regulating loop (negative feedback loop /o): The system operates according to the regulation loop, and the current state of the system is relatively weakened.*

The system is composed of complex reinforcement loops and conditioning loops. The reinforcement loops reflect the purpose of the system, and the adjustment loops adjust the stability of the system. (Dennis Sherwood, 2014) Classical cybernetics has introduced a feedback mechanism for systematic research, through the feedback mechanism to achieve system regulation and control. The development of cybernetics in the theory of large systems has evolved from a simple linear control system to a complex control system with many factors (such as macroeconomic systems, resource allocation systems, ecological and environmental systems, and energy-absorptive

systems). In the 1960s, the American Austrian theoretical biologist Bertalanffy (Ludwig von) proposed the general system theory, the general law and structure of the top-down research system. Bertrancifi's method of analysis against mechanical determinism emphasizes the characteristics of the system:

(1) *Integrity*

The system is not simply a collection of several things. It also reflects the relationship between the whole and the parts, the whole and the hierarchy, the whole and the structure, the whole and the environment. This means that the system reveals its overall characteristics from the relationship between the whole and its elements, hierarchy, structure, and environment. With certain organizational structures interrelated, the elements of interaction can be called systems. The concept of integrity is the core of general systems theory.

The system is an organic collection of elements. The nature and laws of the system are based on the nature and laws of the elements. Through the correlation and structure of elements, the nature and characteristics of the elements are not reflected. The characteristics of such systems are called " Emerged." Elements can only reflect the significance of their elements in the whole. Once they lose the basis of the whole, they are not the elements of the system. (Jen Keming, 2009)

(2) *Open/dynamic*

The organic relationship of the system is not static but dynamic. The internal structure of the system changes with time and the system must exchange the material, energy, and information with the external environment. The systems that actually exist are open systems, and dynamics are an inevitable manifestation of open systems. (Beta Langfi, 1974)

(3) *Orderliness*

The system has a stable structure, level and its dynamic direction. The higher the orderliness of the system, the stronger the organization, and the more stable the system; the complete disorder of the system indicates the disintegration of the system.

(4) *Purpose*

The development direction of a system depends not only on the actual state of accidents, but also on its own, inevitable direction. This is the purpose of the system. (Pan Yongxiang, 1996)

In contrast to the closed system, Beta Longfi proposed the concept of an open system. Open system refers to a dynamic system that is relatively independent of the external environment, exists boundaries, and has energy, information, and material flows with the external environment. The system relies on the input of external energy and substances to keep the system active and stable. The proposal of open system theory leads people to begin to pay attention to the external environment of the system. The introduction of Bertranfe's general system theory has raised the system theory to the scope of the scientific field, and system thinking has regained the attention of people. However, he emphasized too much the integrity and orderliness of the system and denied the disorder and randomness within the system. With the discovery of chaos theory and dissipative structure, the Santa Fe Institute proposed a complex adaptive system theory in the 1990s, which is different from Betalurfy's general system theory. The complex adaptation theory studies a group with no center On the decentralized control, it is believed that the simplicity of the individual implies the complexity of the system, recognizes the disorder and randomness within the system, and suggests that the complex system exists only on the “edge of chaos”, and that chaos and disorder are the system complexity. The root cause, while adaptability maintains the complexity of

the system.

With the development of time, the interdisciplinary application of system theory has received increasing attention and improvement. In the 1970s, biologist Humberto Maturana developed the theory of self-organizing systems. The self-organizing system is a feature of all living systems and has the following features:

- (1) *Self-organization: The system has a relatively stable structure and pattern, reflecting the nature and purpose of the system. The system can use self-generated elements, self-organization, and develop and evolve in a certain direction.*
- (2) *System boundary: The system has a boundary. The boundary belongs to the part of the system. It consists of the elements within the system and is relatively independent of the external environment.*
- (3) *Open system: The system is an open system. There are exchanges of substances, information and energy through the borders and the outside world.*
- (4) *Feedback loop: There is a feedback loop inside the system. The system status can be adjusted through the external environment and maintain the relative stability and purpose of the system.*
- (5) *There is material, information, and energy exchange with the outside world: The system relies on the exchange of substances, energy, and information provided by the external environment to maintain the system's functionality and stability. Once the system is disconnected from the environment, the system will stop operating.*

The introduction of self-organization theory reveals the general characteristics of living systems, and provides an important theoretical basis for the description and modeling of real-world complex systems. The system design methods and tools used in this paper are also based on the self-organizing nature of the system.

System theory is a methodology for people to understand and understand complex

dynamic systems. Through the analysis of the structure and properties of complex systems, the system is optimized and regulated. From mechanical determinism to systemic theory, the paradigm of people's perception and thinking of the world has undergone a fundamental transformation: people are no longer merely focusing on parts, but are more concerned about parts and parts, parts and systems, parts of Between the environment and the system and the environment. Humanity has entered a new era in the information society. All scientific and technological activities constitute an unprecedentedly complex and mega-system. The application of system thinking will enable us to better deal with the complex issues and dynamic changes in the social structure, use system tools to draw and express the system model, and use the model to analyze and optimize the system.

### **2.1.2 Features of Real Systems: Taking Social and Cultural Systems as Examples**

All real systems are self-organizing living systems with dissipative structures. The system is organized by the elements within the system, forming a complex intertwined circuit, between elements and elements, between elements and systems, between systems and the environment, reflecting the characteristics and attributes of the system. The system exhibits relatively stable structure and properties, has borders, and can self-organize and iterate. The system is relatively independent, but carries out energy, material, and information exchanges through the boundary and the external environment, and achieves dynamic balance with changes in the external environment. The real system is a multi-threaded and open adaptive dynamic system. Unlike the mechanical system, the real system is always iterating and developing in a certain direction, showing a certain purpose. The mechanism of the iterative and evolution of

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the real system not only comes from external stimuli, but also from internal complex dynamics. For example, the social system we live in is a complex real system. If the elements of the mechanical system are seen as "energy related," the elements of the socio-cultural system are "information linkages." The socio-cultural system can almost be regarded as a set of elements formed by the interconnection of information. It is an organization formed by the meaning emerging from the individual's interaction network. (Jamshid Gharajedaghi, 2014) Understanding the socio-cultural system requires first understanding the concepts of culture and social learning. Knowledge is the image of people based on the understanding of the real world and abstraction. Images are unified into meaningful mental models and form a world view. Imagery connects people and the environment and influences each other. The spread of knowledge through language has formed a general consensus among some people, and this part of the people has been organized together through unique structures and formed a common cultural background. The social and cultural system is formed by intertwining small systems with different cultural backgrounds. The exchange of knowledge and information between different small systems maintains the dynamic stability of the system and develops and iterates in a certain direction. Culture is the blueprint for the development of the system. It determines the direction of system development from the structure and is an internal factor in system iteration. When thinking about and optimizing social and cultural systems, it is a key to thinking about the cultural background and defining the system boundary.

### **2.1.3 Method for describing the system: system cycle diagram and plumbing diagram**

The real world is a large and complex open self-organized living system. For any realistic problems, the research on the background and system that is out of its place will lose its practical significance. Systematic thinking based on system theory is a methodology and toolkit that helps us better deal with problems in complex dynamic systems. Systematic thinking is mainly based on the four basic dimensions of social and cultural systems, overall thinking, operational thinking, and design thinking. Tools in system thinking: System cycle diagrams help us build system models and find causal associations within the system:

#### **- Define system pendulums and define system boundaries**

Through the above-mentioned theory, we already know that the analysis of the problems from the environment and background of the system is not of practical significance. When analyzing system problems, we introduce the concept of "hanging pendulum" to define the system boundary of the research problem. Hanging in the system acts as a target, policy, external driving force, or system result (Dennis Sherwood, 2014). In theory, the world is a complete system, but the study of all factors does not help us to better solve the problem.

#### **- List the elements within the system**

After finding the nature of the system problem and defining the system boundary, analyze and identify all the system factors related to the system problem.

#### **- Establish intra-system linkage to form a feedback loop**

After finding out the relevant factors of the system, based on the real system, the factors within the system are related and a loop is formed. There are only two types of relationships between elements in a real system: s-type associations and o-type

correlations.

S-type associations: moving in the same direction between interconnected factors

O-type association: moving in the opposite direction between interconnected factors

These causal connections are interconnected to form a feedback loop (described in 2.1.1), and the feedback loops are interwoven to form the entire system. The system cycle diagram is basically completed, and the visual graphics make the complex system problems more intuitive

#### **- Exchange of system and external environment**

The self-organizing system maintains its own stability and operation through the exchange of energy and materials with external systems. Analyze the external environment of the problem system and the internal relationship of the system, and find out the energy or material flow of the system is the last step to complete the system cycle diagram.

Compared with language, system cycle diagram can describe the association and change in the system more intuitively and dynamically. It helps us to analyze the mode and causality behind the dynamic complexity of the real system and solve the problem better. The real system consists of a positive feedback loop and a negative feedback loop intertwined with each other, which together determine the system's purpose and stability. Take the global warming as an example. The system cycle diagram is shown in Figure 2.1:

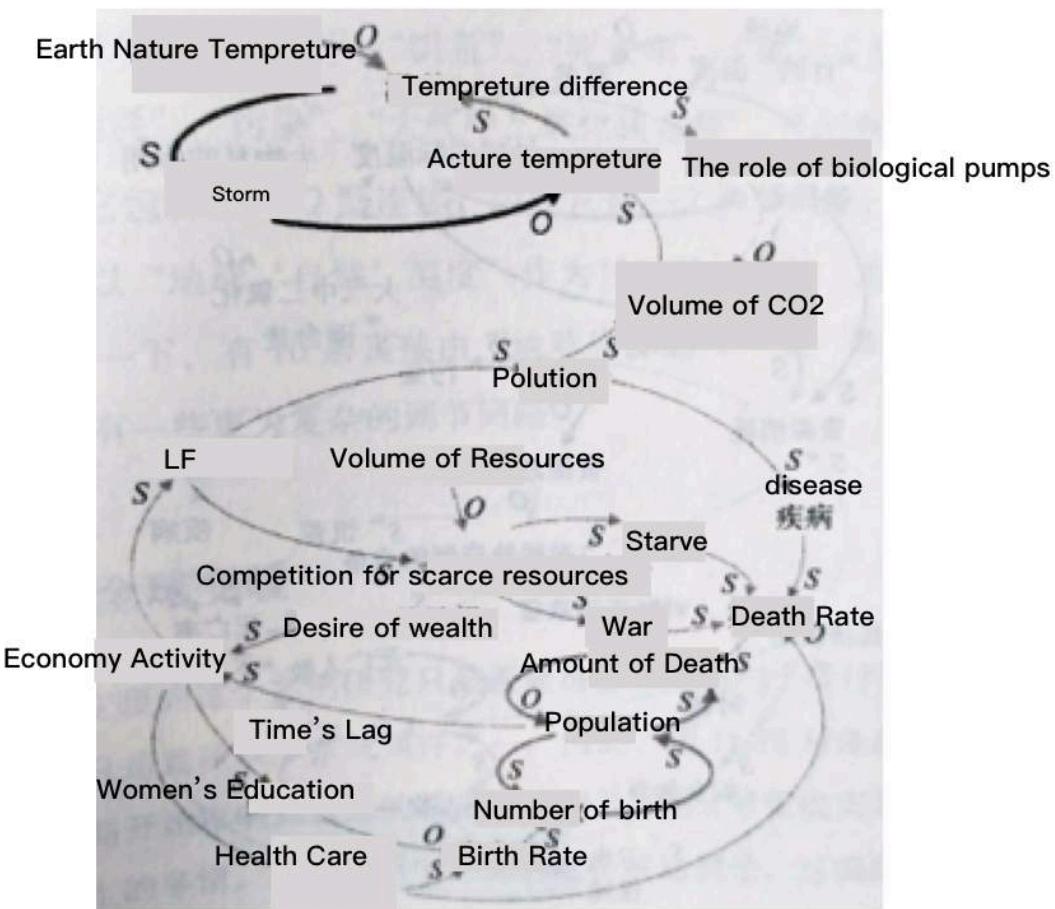


Figure 2.1 : Global Warming System Cycle Diagram

(Source: <Seeing the Forest for the Trees: A manager's Guide to Applying Systems thinking>)

It is worth mentioning that the establishment of the system cycle diagram is related to the user's mental model. The system cycle diagram reflects the perspective of the user looking at the system. Modeling the same system by different people will produce different system cycle diagrams. But regardless of the language used to describe the system, the nature of the system will not change.

With the development of information technology, people began to use computer modeling technology to simulate the real system and analyze the dynamic changes of stock-flow in the static system cycle diagram, which is called system dynamics. A

plumbing diagram or "stock-and-flow diagram" depicts how the system changes over time. As shown in Figure 2.2 below:

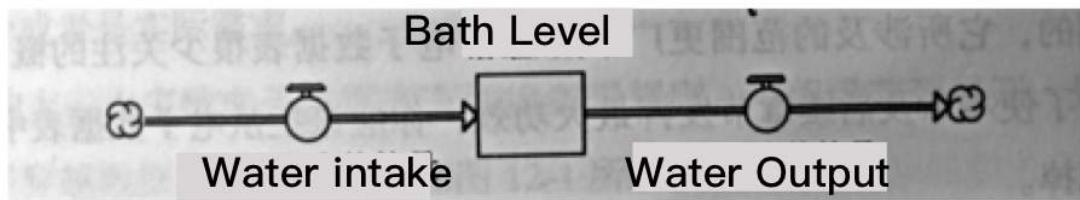


Figure 2.2 Stock-flow diagram example

(Source: <Seeing the Forest for the Trees: A manager's Guide to Applying Systems thinking>)

## 2. 2 System Design Overview and Application Area

System theory as an interdisciplinary epistemology, system design is based on the system theory design method, is widely used in anthropology and economic management related research. As shown in Figure 2.3. The system design follows the system characteristics proposed by the system theory, analyzes the problem system, finds the key issues, and aims to optimize the material flow within the system through the means of design, and strengthen the stakeholders and the local materials and energy in the system. Relevance, promote cooperation among stakeholders, establish a complete material and energy loop within the system, realize the healthy circulation of resources within the system and the system's "zero emissions".

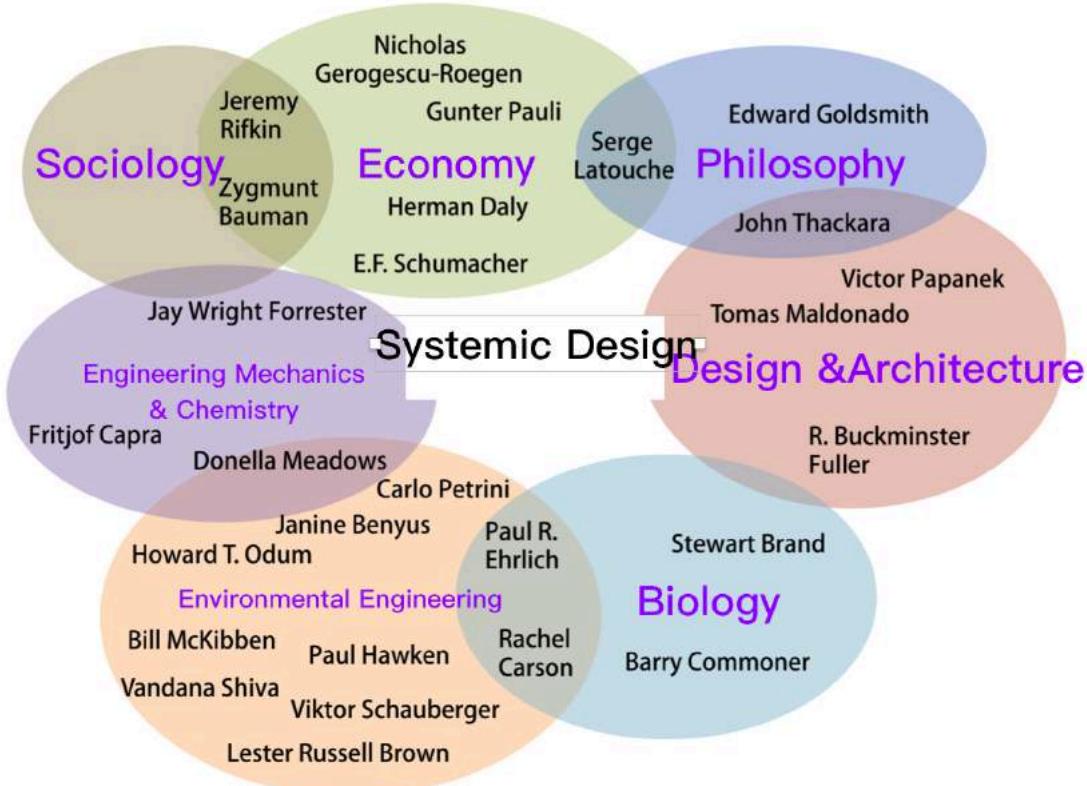


Figure 2.3 System design is a comprehensive discipline  
(Source : Turin University of Technology Courseware Revision)

In modern social life, we are faced with various environmental problems such as air pollution, rising global temperatures, single urban ecology, and reduced arable land. These problems are rooted in modern linear production thinking and patterns. According to the Gaia Theory, the Earth is an extremely complex self-organizing living system. The system has the nature of self-repair, and the complexity of the system keeps the system relatively stable. However, human linear creation activities fail to follow the laws of natural material circulation. After a large number of open uses, the material is shelved and wasted as waste. This linear manufacturing model violates the operating rules of the system and undermines the stability of the system. Second, the material is over-exploited. Under the background of a globalized economy, resources are over-exploited and produced as commodities and shipped to the rest of the world to satisfy people's desires and demands. In order to continue to expand the market, blindly

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pursuing economic effects, the setting of the useful life of goods is even more intensified. The waste of resources. This kind of market law has also led producers to pay more attention to the quality and quantity of the commodities themselves, while ignoring the impact of the production process on the quality of the environment; furthermore, the global economy has liberated the global market and promoted the economic development, but it has also ignored it. The localization of resources and the regional nature of culture. Through the introduction in the previous chapter we already know that the activity of the system depends on the external environment and the internal environment and the circulation of energy. In the human social and cultural system, the cultural background is also crucial. The process of globalization has destroyed the circulation and circulation of materials within the local system, resulting in the convergence of global commodities and the loss of regional culture. It has caused pollution and waste in the process of transportation. Finally, it failed to form a local production ecological chain. The current linear production model blocks the intercommunication of material and information between various links. The remaining substances in one production chain can be used as resources for recycling in another production chain. This can not only strengthen the recycling cooperation among local production, but also can effectively reduce the emission and waste of resources and reduce the pressure on waste treatment.

The development of human social civilization depends on the stability of the ecological environment. The structure and mode of the system determines the quality and output of the system. In order to achieve sustainable development, change the current state of the environment in modern society, change the linear production thinking, systematic design and transformation of the current production system is imminent. System design is based on system theory, follows system characteristics, emphasizes the importance of local resources and culture, emphasizes the connection

between matter and matter, uses design methods to build system tools, and analyzes the flow of matter and energy in modern linear production systems. With optimization, establish an effective link between the various elements within the system and achieve "zero emissions" of the system.

## 2.3 System design patterns and principles

System design is a method of designing a system. Through the systematic design of modern linear production systems, the links between elements and elements within the system, the external environment of the system and the material energy exchange are reconstructed, the self-organization characteristics of the system are restored, and a virtuous circle of material and energy resources within the system is realized. Maximize utilization. System-based system design has a complete set of guiding principles:

### **Change the output of one system to the input of another system**

Turn the output of one linear production line into the input of another production line. Because the linear production model does not follow the principles and characteristics of the system operation, the large amount of waste generated during the processing of resources is treated as waste disposal or disposal. Turning the output of one production line into the input of another production line enables the timely and effective use of waste resources, avoiding the waste of resources and the pollution of the environment, and even lowering the cost of the enterprise and realizing more resource sharing.

### **Focus on the local environment and culture**

Global production opens the global market for commodities. A Chinese-style porcelain may have its origins in China, but it is produced in Japan and eventually sold

to the United Kingdom. This globalization process has promoted the development of the global economy and has also spawned a rich commodity culture. Products are produced according to market demand, purchased by consumers worldwide, and eventually abandoned. With the smooth flow of logistics and information, the acquisition and consumption of resources no longer follow the principle of localization. This has separated local production from the relationship with the local environment and other enterprises, and increased the transportation costs and energy consumption of production. Caused unnecessary waste of energy and environmental pollution; on the other hand, the cultural meaning of local production has gradually disappeared. Production is out of the local context and forms a closed linear system. Strengthening the link between production and local contexts and establishing local production ecological chains can not only reduce environmental pollution, make effective use of resources, but also increase local economic income by creating new opportunities.

### **Concern for individuals and concern for relationships**

Systematic thinking emphasizes the relationship between elements and elements, between elements and systems, between elements and the external environment. The mutual relations and combination of elements in the system determine the mode and nature of the system. Only by changing the system's mode can the nature and output of the system be changed. The linear production thinking that pursues yield and efficiency pays more attention to the product and production itself, while ignoring the correlation and impact between the production system and the environment and the social system. The production system referred to here includes not only industrial production systems but also agricultural production systems. For example, farmers use chemical pesticides to spray on crops in order to reduce pest rates. During this period of time, it did reduce agricultural damage and increase crop yields. However, the use of long-term chemical

pesticides not only pollutes crops and land, causing food safety hazards. Pesticides can also infiltrate into groundwater, causing a wider range of pesticides along with ecological cycles. Pollution. (Rachel Carson, 1962) Nothing is isolated. Think of the problem in the context of the system to better reveal the nature of the problem and find a systematic solution.

### Build an open system

Using system design thinking and design methods, in the local environment, the exchange and correlation of the material and energy between the system and the system is reconstructed. The openness of the system not only ensures the system's activity, but also enriches the cooperation model between systems and creates new economic values.

### People-centered

Modern production systems are centered on consumption (products). Products are given meaning. When people purchase products, they consume not only the functions of products, but also the symbol of their personality and status. As shown below:



Figure 2.4 Human centered  
(source : Turin University of Technology Courseware Revision)

The system design emphasizes the people-centered consumer culture, emphasizes the connection between people and the natural environment, and the local context, emphasizing the real needs and quality of life of people. Different regions have different living habits and needs. Respect for geographical differences and cultural design can truly meet the needs of people in different regions. The system design proposes to change the "consumer" to "participant". Consumption is no longer the end of the cycle, but it is part of the cycle to participate in the operation of the system.

## 2.4 System design method

The system design method is based on the guidance of system design principles, based on the analysis of linear systems, auxiliary system tools, and the use of design methods to optimize the flow of substances within the system and achieve "zero emissions" of system resources. Such as the system cycle diagram and the plumbing diagram (introduced in 2.1.3), the system design also has a set of tools and procedures for describing the system:

### *(1) Define System Territory (Territory)*

The area of the system is the material and cultural background of the research system. Through the study of the external environment's natural conditions, types of resources, traditional culture, living customs, and other aspects, the system area is defined and system problems are studied in the geographic context.

### *(2) Analyze all elements related to the system and related substances and energy flows (Matter/Energy Flow)*

Identify all relevant actions in the system, the substances and energy flows flowing through each action in the system, define the input and output of the system as a whole, analyze the sources and places of substances and energy flowing into the system, and

establish the system and external environment. The association, understanding the system overview. For example, in an agricultural planting system, actions such as preparation, seeding, growing, fertilizing, removing insects, harvesting, etc. may be divided into actions. Water flows through each action as a resource, runs through the entire system, and is ultimately filtered and returned to groundwater by mud.

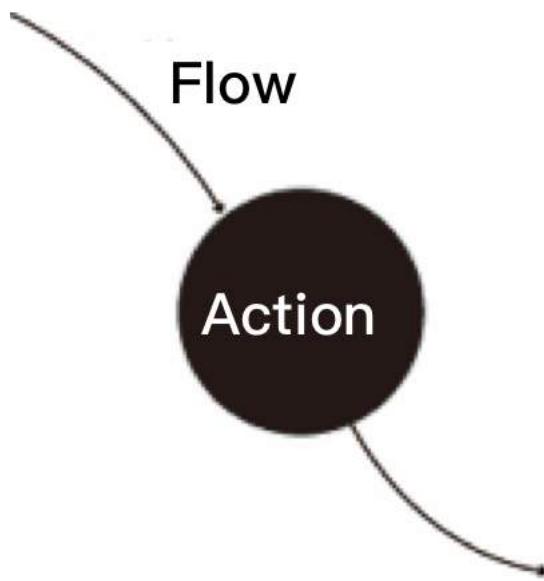


Figure 2.5 : Action and flow (Source : Drawn by writer)

(3) Establish the input and output of each action and establish the system association.

The analysis of the input and output of matter and energy is performed separately for each action in the system, and the associated actions are connected in the order of circulation of the substances to establish a system model.

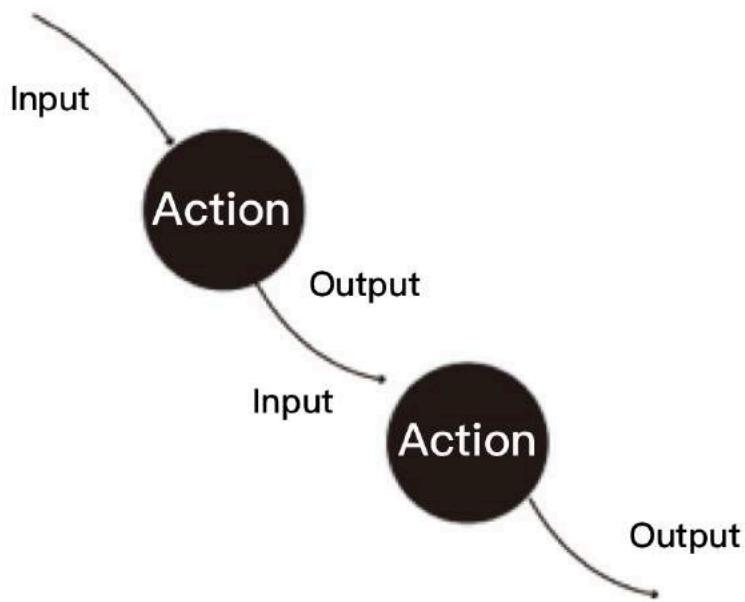


Figure 2.6: Inputs and Outputs (Source: Author's Drawing)

(4) Qualitative and quantitative analysis of the system diagram to find out the system problems of the linear system (Linea System)

Based on the established system correlation, the quality of the material flow in the system is classified and numerically estimated and brought into the system for further adjustment. Mark the existing problems with the linear system and identify the key issues.

(5) Systematic optimization of the system

Analyze the problems existing in the linear system, consult the data to find the best solution, and systematically design and optimize the linear system: 1. Maximize the use of resources 2. Improve the output quality of the system. 3. Strengthen the system and the local association, the system's output into another system's input.

(6) Systemic design

## 2.5 System Design Role and Significance

The role of system design is mainly reflected in:

- (1) Redesign the flow of substances in the system to allow substances to flow from one system to another, follow the characteristics of the self-organizing system to carry out the metabolism of the material, and realize the optimization of the system and the maximum use of resources.
- (2) Establish a local open system, strengthen the linkage within the system and the system, make the production system become part of the ecosystem, and enhance the system's activity and stability. The cooperation and interaction of local companies, combined with the use of local resources, reduced production costs and promoted local economic development.
- (3) Strengthen the connection between people and the environment. Turn "consumer" into "participant" and make product purchase and consumption a part of the system cycle, and increase people's sense of participation and environmental responsibility. Guide people to pay more attention to their relationship with the local environment, pay attention to the quality of life and their true needs. As part of the social system, man realizes the sustainable development of the system.
- (4) Provide a system perspective for solving social problems. The problem of modern society is rooted in the linear system model of society. The system design provides a systematic perspective of problem solving. The problem is placed in the analysis of the system context. On the one hand, material circulation and utilization between various systems are strengthened, waste of resources and pollution of the environment are reduced, and on the other hand, strengthening the local area The correlation of the production system with the local environment, the flow of material between the system and the system creates new production modes and opportunities. As a part of the system,

consumers will jointly promote the sustainable growth and development of the local economy and the environment. System design is an interdisciplinary design method based on systems theory and provides a new solution to the problem of social systems.

## 2.6 System Design Limitations and Challenges

System design is currently used in systematic research and optimization of industry, agriculture, animal husbandry, catering and temporary events. By optimizing the flow of substances in the system, system problems are solved and the sustainable development of the system is achieved.

At present, the research and application of system design are mainly concentrated in Europe and the United States. On the one hand, system theory has a long history of development abroad, and people are more receptive to system design. On the other hand, Europe and the United States have little geographical spread and a low population density. Urban development is more mature and the application of system design is more clear. The development and application of systematic thinking in our country is late. People's acceptance and research of system thinking are still developing. China's more complex regional culture and characteristics also increase the difficulty of system design and promotion. Taking Shanghai as an example, Shanghai has a population of 24.15 million, of which 9.96 million are resident in foreign countries, accounting for 41% of the permanent population. These people come from all over the country and together form the complex cultural background of Shanghai. In hyper-sized cities like Shanghai, the consumption of agricultural products comes partly from cultivated land around Shanghai's cities, and more depends on the global market. In such a situation where the use of land is strained and the city's living materials are dependent on imported cities, how to follow the actual situation and do not violate the system design

principles will require an in-depth study based on the actual situation.

The research of this topic is based on the optimization of the after-kitchen process in vegetarian restaurants. Investigate the sources of materials for vegetarian restaurants and maximize the use of resources by optimizing the kitchen system. Enhancing the material exchange between vegetarian restaurants and related industries in Shanghai is also a key and difficult issue in this study. An attempt to establish a local production ecological chain and build an open system can not only promote material flow, reduce the generation of waste, and reduce the pressure of urban waste disposal. It also enhances new products and new opportunities brought about by the interaction of enterprises, and can also reduce business costs and increase economic income. . However, people's acceptance of the new model brought by the system design is still relatively low. The communication between the author and related companies is very important. In system design and research, qualitative and quantitative research is an important parameter for system optimization. The focus and classification of quality is the focus of system design. However, the reality system is complicated and cannot be completely observed in actual operation. This requires the researcher to find the solution as much as possible. By calculating the quantitative and qualitative aspects of the material and comparing the economic indices of the linear system and the systematic system, we can quantitatively evaluate the economic effects of systematic design.

System design brings a systematic thinking perspective and a new economic model for the modern linear production model, bringing new possibilities to the sustainable development of modern society. System design is an interdisciplinary applied science. Its promotion and application require the support of all parties and time verification.

## 2.7 Summary of this chapter

This chapter explains the theoretical background of system design through the introduction of the history of system theory development, the theory of system theory, the characteristics of real systems, and the methods of describing systems. Then through the introduction of system design guidelines, design methods, roles and significance, as well as limitations and challenges, a comprehensive introduction to the system design method. System design is the main design method used by the author in this study. The application of the system design in the cooking process of the vegetarian restaurant is a new attempt. Through the optimization of the restaurant's cooking process, the cooperation between the restaurant and related companies is strengthened, and a systematic plan for urban restaurant kitchen waste disposal is explored.

### 3 Design Research Methods

#### 3.1 field survey

Field research is relative to desk research and is a collective term for conducting market research activities in the field. In some cases, the desk investigation cannot meet the purpose of the survey. When the collection of data is not timely and accurate, it is necessary to conduct timely field research to solve the problem and obtain first-hand information and intelligence so that the investigation can be carried out effectively and smoothly.

(1) The “access law” refers to the method of investigation in which the matter to be investigated shall be inquired in person or by phone or in writing to obtain the necessary information. It is the most commonly used field survey method. The hallmark of the interview method is that the entire interview process is a process in which the investigator and the respondent interact and interact with each other, and it is also a process of interpersonal communication. It includes interviews, telephone interviews, letter surveys, meeting surveys, and online surveys.

(2) The observation method refers to the method by which an investigator observes and records the situation of the respondent from the side to collect market conditions. It differs from the access method in that the latter asked the inquirer to feel "I was under investigation" while the observation method of the former does not necessarily make the respondent feel it, but only through the investigator's behavior against the respondent. Observations of attitudes and performance are the result of guessing questions. Common observation methods include direct observation surveys and actual trace measurements.

(3) The experimental method is the most formal one. It refers to the control of one or more factors under the controlled conditions to determine the relationship between these factors. Its purpose is to capture causality by excluding the competitive interpretation of the observations. Relationships, in the investigation of causality, experimentation is a very important tool. It mainly has product testing and marketing experiments and other methods. In the general field surveys, the most widely used question and answer questions are written.

### 3.1.1 Observation

#### The four dimensions of the observation method

##### (1) Environment

Real environment: Real users use the real environment of the product.

Human-made environment: It is carefully arranged and transformed by researchers. It may be an office, a cozy living room, games or other simulated scenarios.

##### (2) Whether structured

Unstructured observations: Observing methods are usually qualitative researches that, through observation, reveal a large number of users' behavior and performance. At first, the researchers did not know whether the behaviors and impressions were of value. The best way is to record them all, and then gradually select them later.

Structured Observations: Observations can also be used as quantitative research methods. Before a large number of observations are made, some pre-observations are performed and then the observed behaviors are coded and classified (observation table).

In formal observations, all observers (researchers) are trained so that each observer understands the definition and scope of each behavior and avoids ambiguous behaviors that do not know which code is recorded.

### *(3) Openness of Researcher Identity*

Observed subjects do not know they are being observed and their behavior will be more natural and true. However, some projects need the cooperation of the observers, and they need to sacrifice the natural state of a certain observer.

### *(4) Level of participation of researchers*

In many observations, researchers need to directly intervene to observe the completeness of the event. This is called participatory observation. Because observers are to some degree engaged in research as a member of the surveyed subjects, when the final public identity is revealed, the participants are resistant.

The way to ease the conflict of emotions is to look at all the information for the participants and make them decide whether they can use, which ones they can use, and which ones they cannot use, and sign confidentiality contracts at the same time.

## **Observing the steps**

### *(1) Explicit observation direction (who did what in what scenario?)*

The topics of research generally include: the object of the study, the problem of the study, a specific situational condition, and possibly the target of the study.

For example, it is necessary to study the “day-to-day work flow of staff at the time of LOHAS”. The object of the study is the staff at the time of the Lohas. The research question is related issues such as the work flow, and the specific situation can be limited to the Houchu at LOHAS.

Defining research topics is particularly important for unstructured observations. It allows researchers to distinguish what is valuable for research and what is interesting but not worthwhile.

### *(2) Develop an observation plan*

Once the research direction has been clarified, an observation plan is started. The

observation plan includes: observing the description of the object, the place of observation, the method used, the equipment and equipment, the number of observations, and the content to be collected.

- Observed: The observer needs to have a clear and defined scope.
- Other observational sampling factors: In addition to limiting the scope of the observer to a full sampling, other factors need to be considered. The amount of sampling often depends on the objectives of the study. For example, the number of people playing in a park will be affected by other factors such as the working day.

#### *(3) The way of observation*

- Decided to use structured or unstructured observations?

If it is an improved design, the researcher is very familiar with the research object, product, and scenario. As long as the effect of certain factors on the product is considered, structured observation is more appropriate.

If it is an innovation-oriented project, or the researcher is not familiar with the subject, unstructured observations are more appropriate.

#### *(4) The framework of observation*

Different design research teams use different methods. For example, the POEMS framework guides the observer in designing observations, what to observe, how to record, and consider the later collation analysis.

**p** represents people, who are observed;

**o** represents objects, the objects seen during the observation, especially the objects related to the observed persons, such as the products themselves and the objects involved in operating the products;

**e** stands for "environments" and refers to the environment in which the content is observed;

**m** stands for messages and refers to information that may be relevant during the operation of the observer. For example, when the TV is turned on, the red light of the switch is on

**s** stands for services and refers to the services that may be involved when the observer is operating. For example, cafés need wifi, wifi is a service

### **Make a watch**

Before starting to observe, you need to customize the watch. If the observer is not familiar with the situation of the study, then the watch must be general and versatile. If you want to develop a more specific observation record table, you need advanced observation.

### **Observe**

Into the scene, first select the observation position, followed by the object does not affect the observation, do not communicate casually with the observation object.

Researchers should pay attention to seeing, listening, asking, thinking, and remembering:

**Watch:** All behavioral reactions and phenomena related to the purpose of observation are carefully watched

**Listen:** The sounds found on the spot must be heard, especially the observations of the observer

**Question:** Observers can ask questions about the subject to see face to face. For example "What do you think about this question?"

**Thinking:** Think about and analyze the acquired information and gradually form your own initial thoughts.

**Record:** Although it can be recorded with a video camera, it still emphasizes on-site recording. The record must be accurate first. Respect the facts, what to remember. Second, it must be comprehensive. Do not lose some of the phenomenon casually. The

last record must be ordered and recorded according to the sequence of events. If there are conditions, there may be a master observer, on-site handwriting records, an auxiliary observer, filling out a pre-designed form, and a maintenance camera device as a supplement.

### **Post-observation and analysis**

People's memory fades quickly, so it's best to find a quiet place to organize within an hour. If the amount of data is small, you can save it according to the time sequence of the observation records; if there are many items to observe, you can store them in categories.

### **Observed advantages and disadvantages**

#### **Advantage**

- The collected data and data are rich and complete, often breaking through the original knowledge accumulated by the researchers;
- Less communication with the researcher, less influence on the researcher, and the most realistic and natural data;
- The information is directly observed on the scene, does not depend on the memory of the observed person, and is more objective and truthful;
- Can be observed for those who cannot answer questions. Such as children, animals, disabled people and sick elderly people;

#### **Shortcomings**

- In almost all methods, it takes the longest time, the highest human and material costs;
- Records are made by people and are screened and evaluated by the researcher, so the process will receive the subjective influence of the researcher.

The author hopes to pass an on-the-spot interview and research on the “Luxurious and Comfortable House in the World”.

1. Understand the division of work and day-to-day work of post-kitchen chefs in

LOHAS;

2. Observe the kitchen partition and layout and the daily food and vegetables of LOHAS staff: the entire process of procurement - processing - processing, record and analyze problems;

3. Observe and accurately measure and count food waste and water resources during the music

4. Basic understanding of the composition of diners and the purpose of vegetarian food  
According to the purpose of the writer, the author needs to observe the work flow of the staff without disturbing the daily work of the staff at the time of LOHAS, and after the end of the observation, conduct basic interviews with the staff.

I need to use field observation

## 3.2 Questionnaire

### 3.2.1 Questionnaire Classification

#### **Structured questionnaire**

Questionnaire designers provide questions and list questionnaires that are mostly based on multiple-choice questions.

The advantages are: easy to study large samples; specific problems, simple answers, time-saving; higher recovery and reliability; easy statistical analysis and comparison.

Disadvantages: There are many restrictions, and the respondent's answer is not necessarily true.

#### **Unstructured Questionnaire (Open Questionnaire)**

Questionnaire design values provide questions, and respondents are free to use questionnaires based on questions and answers.

Advantages: easy to study in small samples; less limited, can get rich data; more in-

depth research can be conducted

Disadvantages: There is no uniform format for answering, and it is difficult to perform quantitative analysis and comparative analysis. Sometimes, the data will not be related to the research topic and influence the effect.

### **Semi-structure questionnaire**

Mixed form and unstructured form of the questionnaire. If the questionnaire is divided according to whether the respondent fills out, the questionnaire method can also be divided into questionnaires and self-enumeration questionnaires.

### **Substitution questionnaire**

Questionnaire to be filled in by interviewer based on respondent's response. Including in-person interviews and telephone interviews

In-person interviews with questionnaires: The researchers selected and trained a group of interviewers, and then asked the interviewers to carry the questionnaires to the survey sites. According to the requirements of the survey plan and survey plan, they interviewed and communicated with the selected respondents and followed the questionnaires. Format and requirements record answers. Because researchers often stop survey respondents from filling out questionnaires in the streets, they are also called **street visits**.

Self-administered questionnaire: How the respondent filled out the questionnaire.

Newspapers and periodicals questionnaire: The questionnaire was posted in the newspapers and periodicals, and the newspapers and journals arrived in the hands of the readers. After completing the questionnaires, the questionnaires were sent back at a fixed time.

**Mailing Questionnaire:** Mail the questionnaire to the selected target through the post office. After filling in the required requirements and time, mail the questionnaire to the investigator.

---

**Web Questionnaire:** Using the Internet to conduct questionnaires. The designed questionnaire is placed on the internet. The surveyee fills in online or downloads it and sends it to the corresponding email address.

### 3.2.2 Questionnaire Design - Problem Design

#### Problematic design

##### (1) Open Issues - Questions + Blank

No specific answer to the question is provided, and the respondent is free to fill it out.

Advantages: Flexibility, adaptability (for those who have not yet figured out the answers to various possibilities), which helps the respondent express their opinions freely.

Disadvantages: low standardization, difficulty in collating analysis; inaccurate answers, non-response questions, easy to appear worthless information; high cultural requirements for respondents, it takes more time to fill out, affect recovery rate and efficiency

##### (2) Closed question - question + answer

The answers to the questions are listed in full, and the respondent selects one or more answers from the candidates.

Advantages: Easy to code and quantify, answer time-saving, and easily obtain the cooperation of the respondent

Disadvantages: Lack of flexibility may cause people who do not know how to answer or have vague ideas to fill in the answers.

#### Number of questionnaire questions

The number and content of questions should be completed in 20 minutes and should

not exceed 30 minutes. If conditions permit, the investigator is paid a reward or souvenir, and the quality of the questionnaire will be relatively high.

### **3.2.3 The advantages and disadvantages of the questionnaire method**

#### **Advantage**

- Free from space restrictions
- Most of them are closed questions, and the answers are conducive to coding and input, facilitating quantitative analysis
- The question, order, and answer of the questionnaire are exactly the same, avoiding errors caused by human causes
- Questionnaires are not signed, which will help answer questions such as personal privacy, ethics, political attitudes, and social taboos.
- No need for special interviews, no investigations, no training, time and effort to save money

#### **Shortcomings**

- The questions and answers are fixed, there is no room for expansion, and it is difficult to investigate new things, new situations, and new issues.
- The questionnaire has a low recovery rate and efficiency
- For design-oriented surveys, most of them need to understand the user's intentions, motivations, and thinking processes. Questionnaire surveys are more difficult.

### 3.3 Service System Design Principles

Service design is all about taking a service and making it meet the user's and customer's needs for that service. It can be used to improve an existing service or to create a new service from scratch. In order to adapt to service design, a UX designer will need to understand the basic principles of service design thinking and be able to focus on them when creating services.

The principles here are drawn from the design ethos of Design4Services, the organization that is committed to developing service design and promoting business transformation. These are widely accepted in the commercial sector. There are other ways of approaching service design, which are not as widely used but which may add value to the service designer's toolkit; we have listed some of these approaches in the resources section at the end of this piece.

When it comes to service design - it can help to remember that “A design isn't finished until somebody is using it.” Brenda Laurel, designer at MIT.

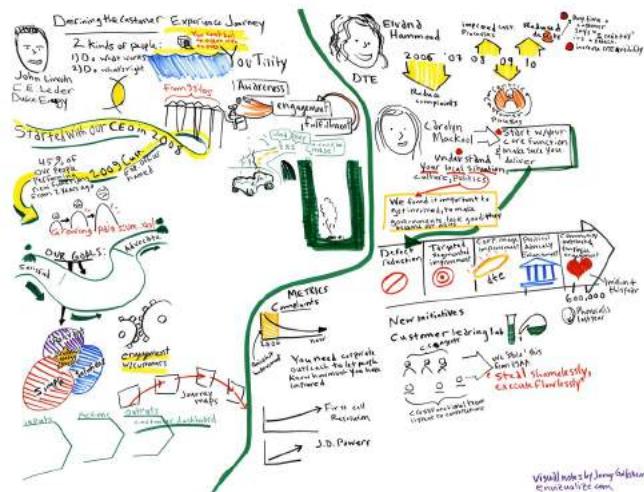


Figure3.1: Customer Journey Analysis (Source: From Net)

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Service design feeds into creating great customer experiences. This a customer experience map for a utility service.

### **3.3.1General Principles of Service Design**

The general principles of service design are to focus the designer's attention on generic requirements of all services. They are complemented by principles that relate to process design, organizational design, information design and technology design – we will come to these complementary principles in a few moments.

The general principles of service design are:

- Services should be designed based on a genuine comprehension of the purpose of the service, the demand for the service and the ability of the service provider to deliver that service.
- Services should be designed based on customer needs rather than the internal needs of the business.
- Services should be designed to deliver a unified and efficient system rather than component-by-component which can lead to poor overall service performance.
- Services should be designed based on creating value for users and customers and to be as efficient as possible.
- Services should be designed on the understanding that special events (those that cause variation in general processes) will be treated as common events (and processes designed to accommodate them)
- Services should always be designed with input from the users of the service
- Services can and should be prototyped before being developed in full

- Services must be designed in conjunction with a clear business case and model
- Services should be developed as a minimum viable service (MVS) and then deployed. They can then be iterated and improved to add additional value based on user/customer feedback.
- Services should be designed and delivered in collaboration with all relevant stakeholders (both external and internal)

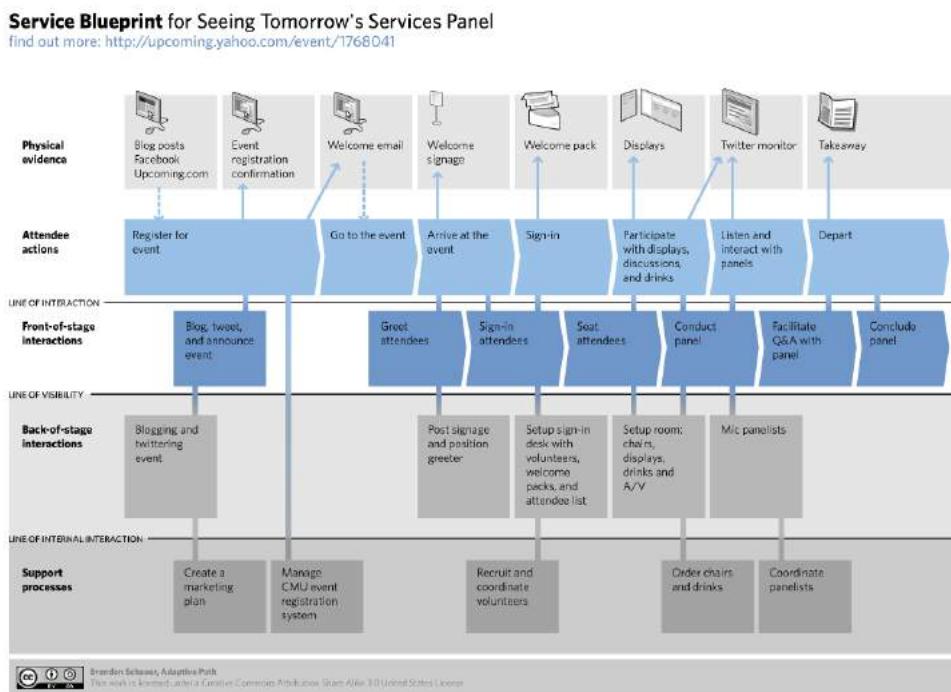


Figure3.2: Service Blueprint (Source: From Net)

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One of service design's eventual outputs is the service blueprint which details all interactions with a customer. The service design principles ensure that this blueprint adds customer value when complete.

### 3.3.2 Process Design Principles for Service Design

Much of service design is found in the design of processes, both internal and external, and these principles underpin this:

- Any activity that fails to add value for the customer should be eliminated or minimized
- Work is always structured around processes and not around internal constructs such as functions, geography, product, etc.
- Work shall not be fragmented unless absolutely necessary. This enables accountability and responsibility from a single individual and reduces delays, rework, etc. It encourages creativity, innovation and ownership of work.
- Processes should be as simple as possible. Focus on reducing process steps, hand overs, rules and controls. Wherever possible the owner of the process should have control over how it is delivered.
- Processes should reflect customer needs and many versions of a process are acceptable if customers have different needs.
- Process variation should be kept to a minimum.
- Process dependencies should be kept to a minimum. (I.e. process in parallel)
- Processes should be internalized rather than overly decomposed (e.g. training is better than work instructions)
- Process breaks and delays must be kept to a minimum
- Reconciliation, controls and inspection of process must be kept to a minimum
- KPIs for processes will only measure things that matter

### 3.3.3 Organizational Design Principles for Service Design

People are the key to service delivery and some basic principles for organizations can help them realize their full potential:

- Work groups are to be organized so that they match the processes and the competencies required
- Individual workers will be given sufficient autonomy to make useful decisions
- Work will take place in a location where it is done with the most efficiency

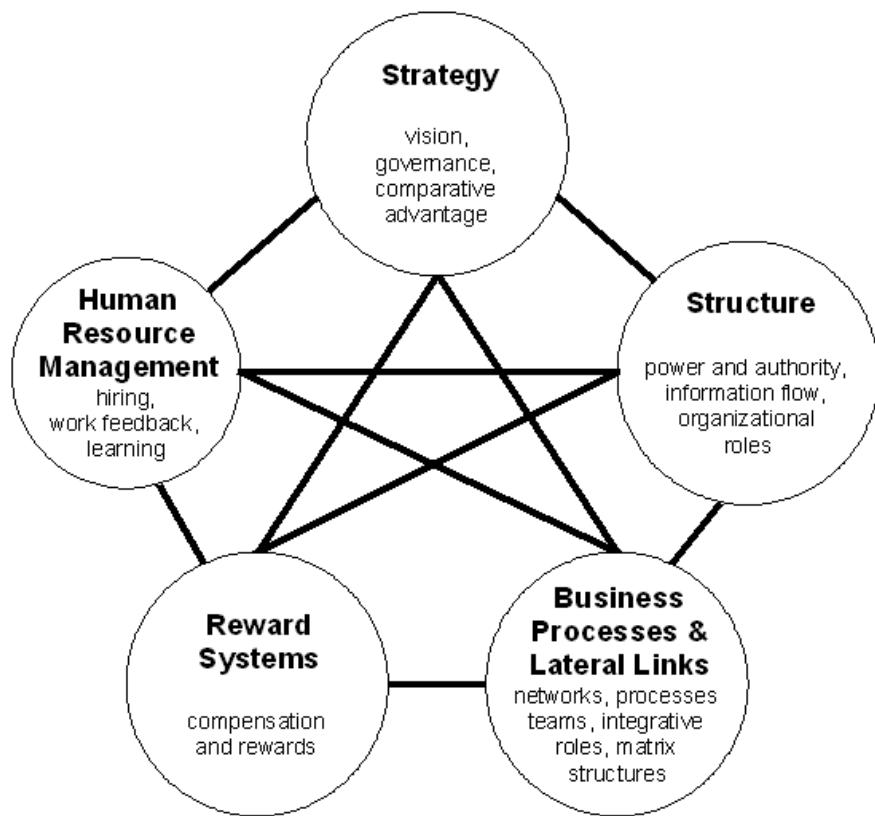


Figure 3.3: Principle of service design (Source: From Net)

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Organizational design is a field all of its own and can become incredibly complex. It's normally a process managed by HR but there's no reason that UX and service designers cannot be involved.

### 3.3.4 Information Design Principles for Service Design

Information flow is key to delivering high quality services; if people don't know what they're supposed to and when they're supposed to know it – service suffers. These are simple principles for information design in service design:

- Data shall be normalized between the organization and its customers and within the organization itself
- Data shall be easy to transfer and be reusable within the organization and within the partner network
- Wherever possible data entry shall be avoided and be replaced by data lookup, selection and confirmation utilities instead

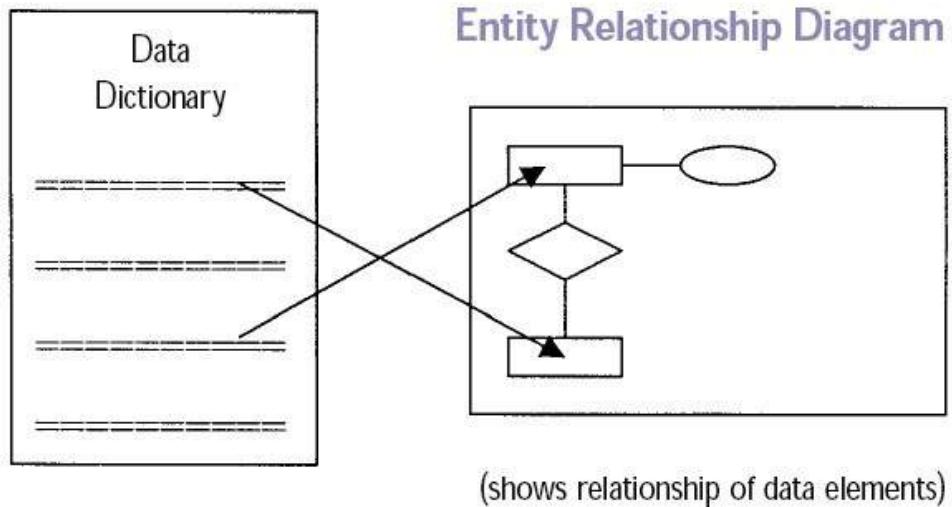


Figure 3.4: Data design (Source: From Net)  
Author/Copyright holder: Data Integration Glossary. Copyright terms and licence: Public Domain.

Data design will normally be carried out by DBAs (Database Administrators) however; UX and service designers should have a large amount of input in ensuring guiding principles are adhered to.

## 4 Case Study and Analysis of System Design

### 4.1 Coffee residue system design case analysis

Coffee is not only a kind of beverage that is popular in the world, but also forms a unique cultural trait. The coffee culture is very popular. From the cultivation of coffee beans to the sale of coffee, some people have done detailed research. Coffee grounds, however, is used as a waste material.



Figure 4.1 Coffee Linear Production Process (Source: Systemic Design)

Coffee slag contains large amounts of vitamins and nutrients still unexploited. 100 grams of coffee grounds contain 1 gram of caffeine, 15 grams of fat, 2 grams of large white paper, and 9 grams of tannic acid. Nearly 250,000 tons of coffee are consumed in Italy each year. If the grease in coffee grounds is used in cosmetics and pharmaceutical industry, it will generate a value of 152 €/kg. As long as we re-examine existing systems from a systematic perspective, qualitative analysis of the elements in the system will reveal the enormous value hidden in "waste".

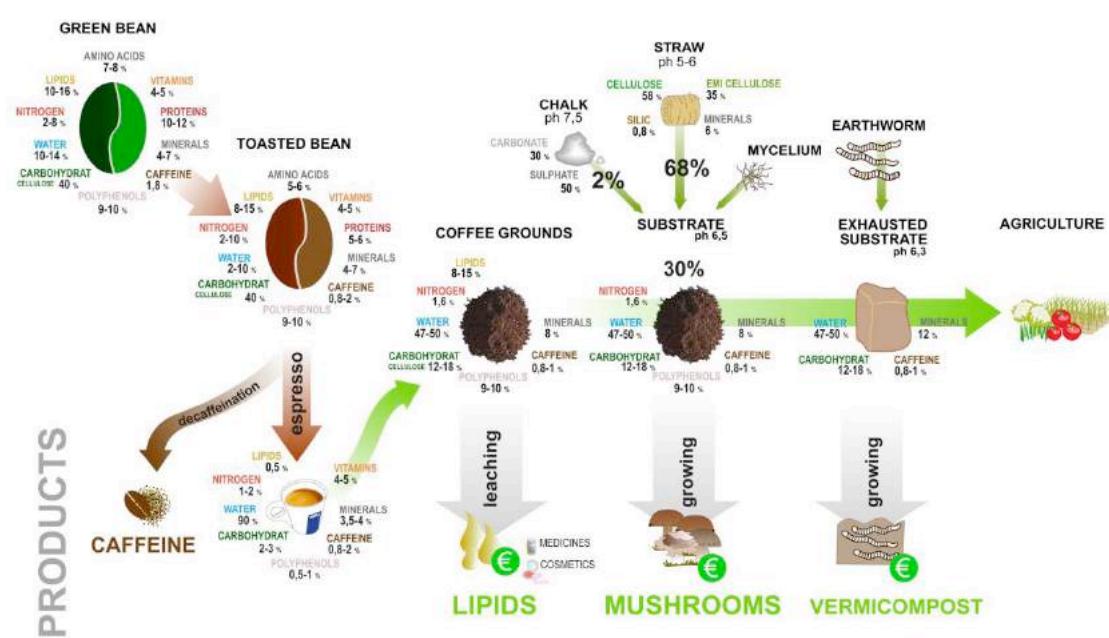


Figure 4.2 Coffee Components and Proportions in Different States (Source: Systemic Design)

The Italian coffee brand LAVAZZA uses a system design method to re-use coffee grounds in a mushroom greenhouse planting project. 0.4 kg of coffee grounds, 2.5 kg of straw and 0.1 kg of chalk mixed hyphae were planted. Through the analysis of the design case of coffee grounds systems, the waste is a product of a linear system that is not related to the external environment of the system and is a product of the cycle. The recycling of waste requires attention to the quality and nature of the waste itself. Classification and quality reproduction establish the relationship between the material and the system in order to truly realize the recycling of the material. (Luigi Bistagnino, 2009)

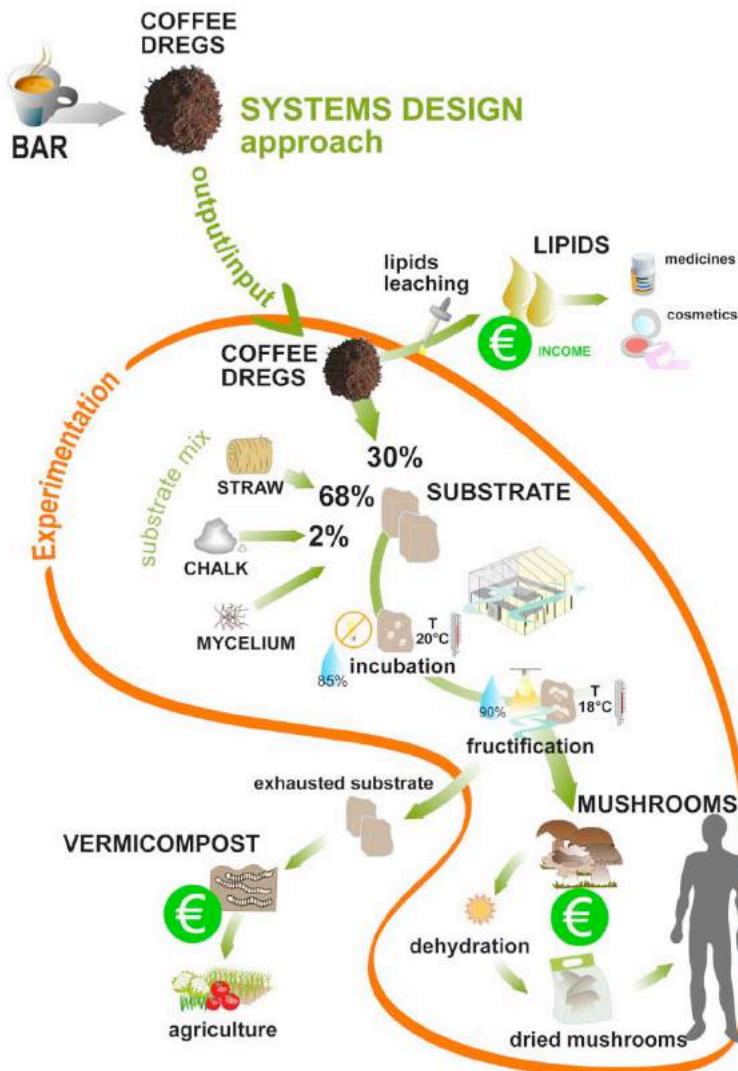


Figure 4.3 Design of Coffee Ground Mushroom Culture System (Source: Systemic Design)

Coffee is a popular beverage in the world. A large amount of coffee grounds are abandoned each year. Coffee grounds are rich in vitamins and can be used as plant nutrients and dehumidification agents for a variety of purposes. In this case, we introduced the research and application of lavazza to the active ingredients of coffee grounds, providing reference for the analysis and application of the components of vegetarian food waste.

## 4.2 XINGBAO nursing home service system design research case analysis

XIANGBAO advanced nursing house is located in Shanghai. There are almost 200 customers shared their last life together. Xiangbao wants to improve their service quality but lack of methods for getting precise feedbacks and design. What's our customers' need and how to spread out the “HOME” concept to them is what we should talk about.

### 4.2.1 Research Method

HEAR: An creative design solution come out from deep understand. Designer will immerse themselves in this situation for knowledge and communication.

CREATIVE: After understand well about our scenarios, designers will change their information into structure and prototype for solving problems.

DELIVERY: Use revenue and cost model/capability analysis/delivery of program to change prototype into action.

### 4.2.2 Tool box and research method

In order to better understand the real needs and pain points of the old people in the Star Fort nursing home, we are prepared to:

- *Self recording*
- *Self-interview*
- *Questionnaire*

The three forms record the details of life for the elderly within 7 days, record pain points

that are inaccessible in everyday life and use this method to help the elderly find their true needs. In order to relieve the old people's recording burden, the team designed a set of kits, including: self-recording manual/bag/pen/watch.

Before the investigation began, the team conducted recruitment and training for volunteers participating in the survey, and informed the team of the research purpose and process. At the same time, during the self-recording period, the team members were assisted by the focus group and a typical one-day survey to collect observations and data from the field:



Fig 4.4 Data of research result of XINGBAO (Taken by team)

#### 4.2.3 Blue Print and Touch point collect of XINGBAO

After 7 days, the team used the Blue Print/Touch point method to collect the survey data through the collection of self-recording manuals and survey data:

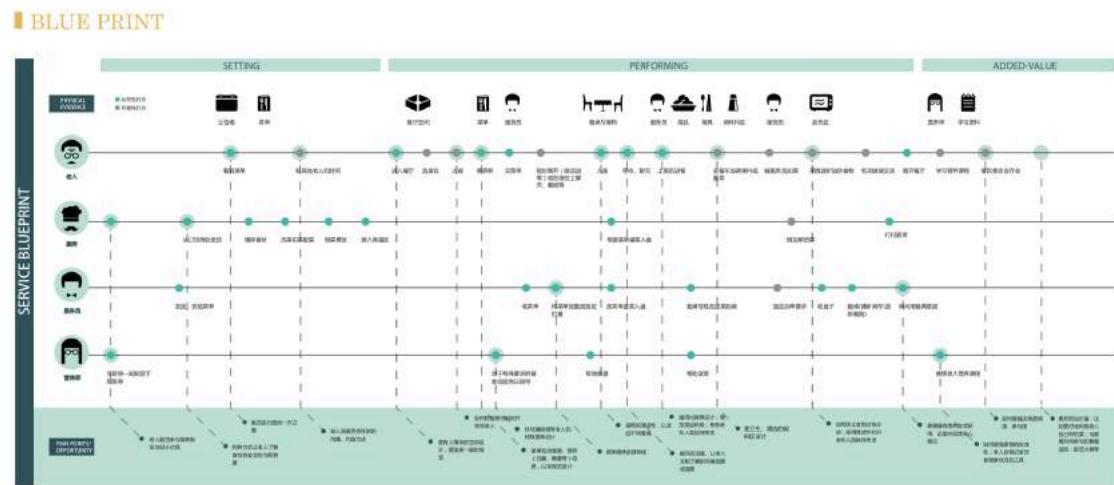


Fig 4.5 Blue print of XINGBAO (Draw by team)

Blue Print is the stakeholders in the system, in the different stages of the system service, in the chronological order, tell them what happens and interact with them, and at the same time, it shows on a chart. The point of intersection on the way is the contact point of the stakeholders in the system and is also the contact point for improving the service.

Blue Print can sort out all the activities performed by the stakeholders in the system and track the contact points in a clearer manner. The overall understanding of the system's services can be used to identify possible pain points in the system.

## 第4章 乐活时尚人文蔬食馆现状调研

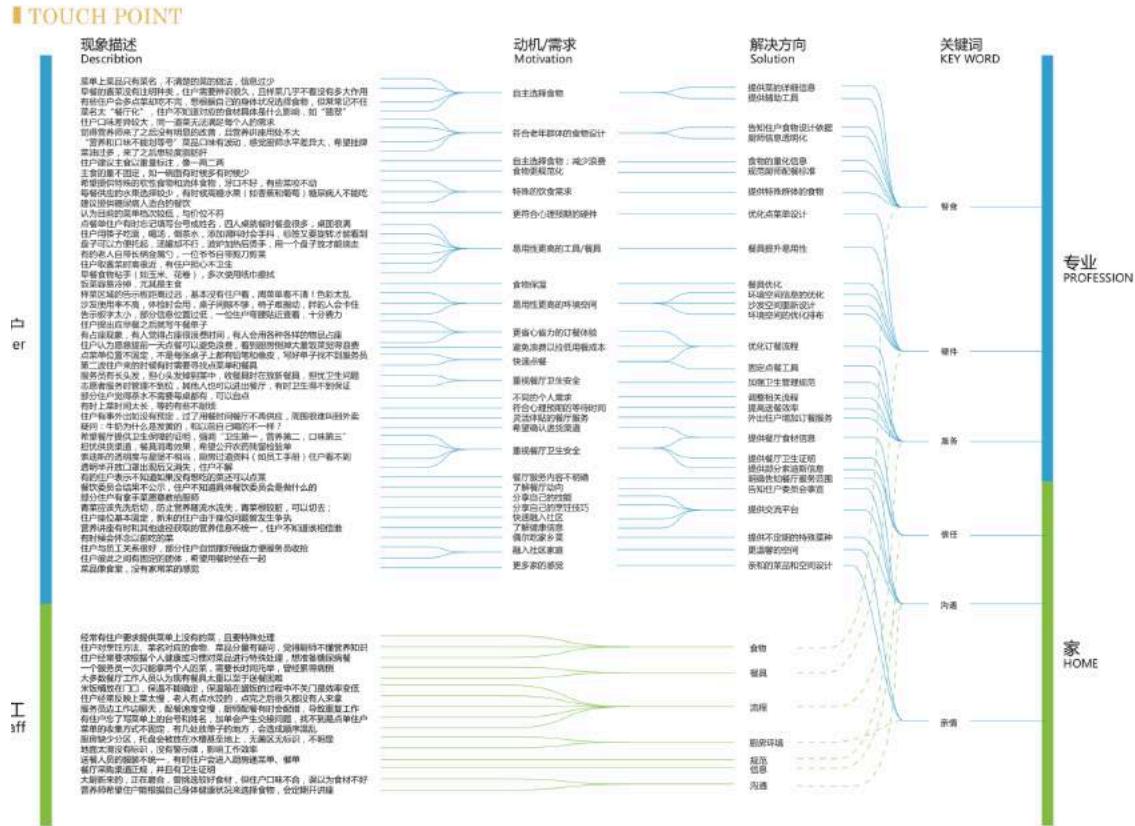


Fig 4.6 Touch points of XINGBAO (Draw by team)

Touch Point associates the collected research data with the contacts in Blue Print.

Through the description and analysis of the phenomenon, the motivation behind the problem was identified. Analyze possible solutions and mark keywords by providing insight into the real needs of the user and motivation.

Through the analysis and analysis of the research data, the team found that the pain points for the elderly in XingBao's nursing home are in the most urgent need of improvement. They are concentrated on the catering services in nursing homes:

The elderly can't discern the dishes and choose the dishes that suit them

Elderly people in nursing homes have more or less physical illnesses and need to follow the advice of dietary experts to control the type and amount of daily diet. Nursing homes are equipped with exclusive dietary experts for the elderly and plan the nursing home's dishes in weeks. However, nursing homes did not make a visual distinction between dishes. The elderly did not understand the characteristics of each dish and could not

choose the dishes that were suitable for them. Some elderly people also have problems with forgetfulness or lack of control. They often forget about the characteristics of their dishes, or need someone to supervise and choose dishes.

### Ordering process is inefficient

Because it is necessary to confirm the dishes for the elderly, the nursing home meal ordering process is mainly manual. The elderly have a low degree of self-service, from finding suitable seats, filling orders, waiting for dishes to ending the meal. The elderly need to call the waiter to pick up a new order list, and in the case of a busy service staff, they need to personally send the order to the back kitchen; due to the shortage of staff in the restaurant, the service flow is long, and the restaurant moves frequently during the period. It is prone to safety accidents. The team used the Blue Print method to sort out the service flow and found the following contacts:

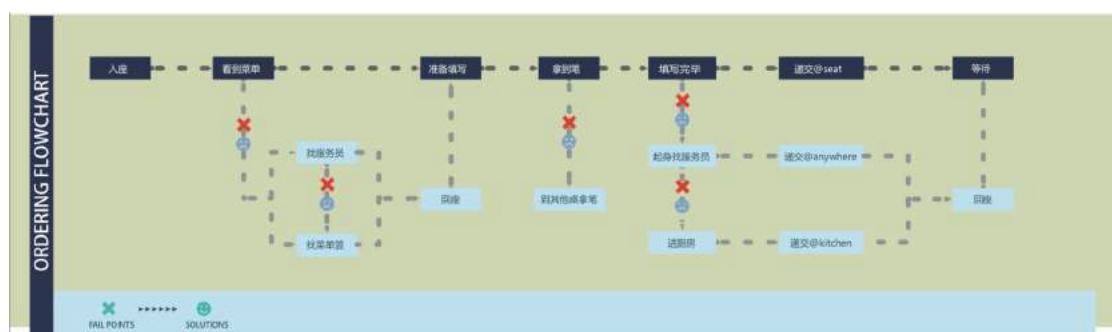


Fig 4.7 Touch points during ordering (Draw by team)

### Restaurant lacks feedback

Restaurant management and logistics are relatively opaque, lacking a window for information transmission. The lack of smooth communication of information has caused elderly people to have a mistrust of the restaurant's food safety. At the same time, restaurants have not systematically collected feedback from the elderly and targeted the feedback collection mechanism for improving services. Old people want to

be able to establish a communication mechanism to score catering staff and hope to make suggestions on the dishes in the restaurant.

#### Concept and Prototype for testing

The team used a hand-painted approach to express the concept of design, and got nursing homes to show and collect feedback from stakeholders. The hand-painted method can express the design concept of the team more clearly, so as to draw on hand and explain the concept in the form of stories like the elderly and nursing home administrators, and is highly praised by the tested users. Old people also gave more sincere feedback on the concept proposed by the team, and the concept phase of the project came to an end.

## CONCEPT

### MENU DESIGN



green: no meat dish  
orange: meat dish

### INFO EXPLAIN

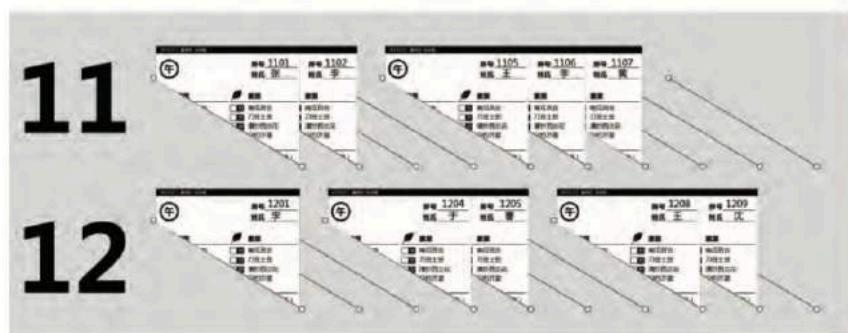
Every customers will get a customized menu suggestion service from their nutrition doctor.

They will get some icon on their information card about some forbidden element. The menu will sign out some high-contains nutrition.

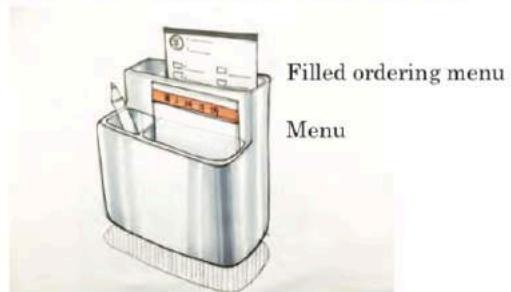
Customer could know whether they could eat from information.

▲ 碳水化合物  
● 脂肪  
■ 盐度  
◆ 糖度

### SHEET STOCKING DESIGN



### NUTRITION MATCHING DESIGN



### INFO EXPLAIN

Design for stocking ordered menu  
Though this stocking,sheets could be collected and changed easily.  
Although nutrition doctor could get clear eating habit info from it

Fig 4.8 Sketch of concept (Draw by team)

### 4.2.4 Conclusion

The case used the tools of Blue Print and Touch Point in the service system design to analyze the service process in more dimensions, find out the contacts in the service,

analyze the hidden pain points behind the contacts, and combine the research data collected by the team to analyze the pain points. The needs behind it express the design concept and test it in hand-drawn form. In order to better understand qualitatively and quantitatively the process of cooking kitchen waste during the LOHAS season, the author needs to work on the daily work of stakeholders from multiple dimensions such as management, work flow, and kitchen layout without disturbing the work of the staff.

In this case, typical research methods such as one day, distribution and production of survey questionnaires, and focus groups provide a reference for field research at the time of the Lohas; Blue Print and Touch Point can also be used to analyze and summarize research data.

### 4.3 Fruitful Enzyme Production Case

“果之满满” it is a fresh juice chain beverage store, which mainly uses fresh extracts of seasonal fruits to promote a healthy light diet. Fruitful daily produce more fruit and vegetable debris, and the quality of these fruit and vegetable debris is higher. The fruits and vegetables of each season are relatively fixed, and if the quality and quantity of fruit and vegetable waste can be guaranteed, the fruit and vegetable shavings remaining in the juice will be retained, and the area will be used as the unit. It is a drinking grade enzyme product. Full-fledged customers can make purchases or redeem points for redemption.

The use of high-quality vegetable and fruit crumbs for the production of fruit enzymes avoids the waste of fruits and vegetables. At the same time, the resulting by-products bring a diversified economic structure to beverage shops. In addition to the benefits and methods of use of our customers' popular science enzymes, we conveyed the environmental protection spirit of the store.



Fig 4.9 Internal of GUOZHIMANMAN (Taken by Author)

According to the author's understanding, in order to ensure the quality of food-grade enzymes, the fruitful enzyme production process requires higher professional production requirements. After the production of fruit and vegetable chips in the store, they need to be collected separately and stored under refrigeration, collected at the end of daily operations, transported to a processing plant for fermentation and packaging of edible enzymes.

The case of “果之满满” provided new ideas for the processing of fruit and vegetable scraps in the trendy humanities vegetable and food establishments at the time of music. The by-products of fruit and vegetable fermentation can not only reduce the waste of high-quality fruit and vegetable waste, but also bring a variety of economic structures to the stores. The fruit collection and preservation methods of fruit and vegetable chips in the store can also be the fruit and vegetable shavings of LOHAS. Classification and shelf life bring a certain reference value.

## 5. Research of Lohas vegetarian restaurant

This study used Lohas vegetarian restaurant as a research base to explore systematic solutions for urban kitchen waste through the systematic design of the after-kitchen process in vegetarian restaurants. The flow of food in the vegetarian restaurant is simpler than that of the ordinary restaurant, and the type and nature of the vegetarian food waste are also easier to measure. This provides a realistic basis for the qualitative and quantitative research in the systematic design process. In order to analyze the qualitative and quantitative analysis of the After-kitchen process at the time of LOHAS, the researchers conducted a one-day field survey and used field observations, interviews, questionnaires, and other methods to analyze the restaurant management, staff composition, and post A detailed understanding of kitchen processes, waste types and disposal, water consumption, expectations of the system design, and the help that can be provided.

The author used the field observation method, expert interviews, and research questionnaires to conduct a one-day observation and investigation of the situation of Houhuo.

The timing of the research and the timing of the cooking process are shown in Table 4.1 below:

Time	Process	Stuff	Process of research	Instrument
9 : 30	Employees enter the store	Chef	Equipment preparation and data measurement	Camera, video recorder,
10:00	Delivery & Storage	Buyer Manager	Obeservation &record	voice recorder, tape measure, calculator, pen, research outline, research questionnaire
11:00-1:30	Processing & Cooking	Chef Assistant	Record & Dispatch Diner Survey	
1 : 30-2:30	Finishing & Cookware Cleaning	Assistant	Record the amount of points in the morning	
2:30-4:00	Interviewed	Chef Assistant Manager	Interviews and records	
4:00	Food supplements	Manager Buyer	Interviews and records	

4:30-7:30	Processing &Cooking	Chef assistant Manager	Record & Dispatch Diner Survey	
8:30-9:00	Cleaning	Cleaning stuff	Interviews and records	

*Fig5.1 The relationship between the process of the after-kitchen process and the research process at Lohas (source: author's own drawing)*

## 5.1 Field observation method

Through one-day field observations and recordings, the author in-depth observation and record of the restaurant's kitchen space layout, the number and placement of equipment, the detailed process of the kitchen operations, as well as the waste of resources generated in the process, food waste classification. The author uses measuring tools such as measuring tape to accurately measure the kitchen equipment that needs to be measured, and records the equipment data to collect information and data for the drawing of the diagram of the kitchen flowchart.

## 5.2 Expert interview

In the period from 2:30 to 4:00, the author conducted interviews with experts for about 10 minutes according to the outline of the survey. Understand the background of kitchen staff management, main duties, etc., and ask about the causes and steps of cooking kitchen resources and water resources in the cooking process. At the same time, ask the staff about their attitudes and understanding of the classification of food waste in the kitchen. Optimization offers advice. Resident kitchen staff have different scale

restaurants and 5-10 years of kitchen work experience. The author asked expert advice from three aspects of kitchen management of different scales, kitchen quantification, food waste reduction and classification, and supplemented the author's lack of kitchen work experience.

### 5.3 Questionnaire

The author sent a questionnaire to the LOHAS diners to investigate the attitude and understanding of diners during the LOHAS event on environmental protection, the value of food waste, kitchen waste disposal methods, and the classification and reduction of food waste. To investigate the degree of diners' attention to restaurant-kitchen-garbage disposal during the time of LOHAS, explore the possibility of better system optimization by strengthening the linkage between LOHAS and their diners.

Through the collation and research of research data, the author will be in the 4.1 section, from the menu settings and vegetable sources, kitchen equipment and data measurement, staff and kitchen management, after-kitchen process, water resources and kitchen waste analysis , The classification details the current status of LOHAS restaurant.

### 5.4 Menu settings and vegetable sources

At the time of LOHAS, seasonal vegetables were the main ingredients and the place of purchase was Hunan Road Agricultural Products Market. A buyer purchases fresh vegetables that are needed on the day from 9:00-10:00 in the morning according to the purchase list provided by the cutting staff. The use of ingredients that are not yet suitable for storage on the same day was used to make food for employees. Vegetables with lower water content, such as onions and white radishes, are kept in a cold room

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for storage. While enjoying the seasonal vegetables at Leho, the menu changes with the changes in the solar terms. The LOHAS live January menu and March menu are shown in Figures 4.2 and 4.3 below.

Shanghai is densely populated and has a small amount of arable land. At present, Shanghai's vegetable supply comes partly from Shanghai's local cultivated land; some are from top-flight cultivated land in Shanghai, and Jiangsu Linyi, Shandong, and Hainan are the largest vegetable supply provinces and cities in Shanghai. Shanghai has a clear four-year climate with obvious seasonality. From January to January, the supply of local vegetables was the largest in Shanghai, and it was the smallest from July to September. According to the author's research period, 90% of Shanghai's green leafy vegetables, solanaceous vegetables, and bean products were provided by Shanghai's local cultivated land, and most of the rest were from cultivated land in other areas. The source of vegetables purchased by LOHAS is shown in Figure 4.5. The location where the vegetables are purchased during the time of LOHAS is Hunan Road Agricultural Products Market, and the vegetables are sold directly from the local planting base or distributed by large vegetable and fruit operators (such as Shanghai Vegetable Group). The LOHAS Purchase List is shown in Figure 4.4. In winter, most of the seasonal vegetables used in LOHAS came from local farmland, while fruits and staple foods mainly depended on imports. The LOHAS Veggie Vegetarian Restaurant promotes proper seasonal diet and pays attention to diet health, but has a weaker material connection with Shanghai.

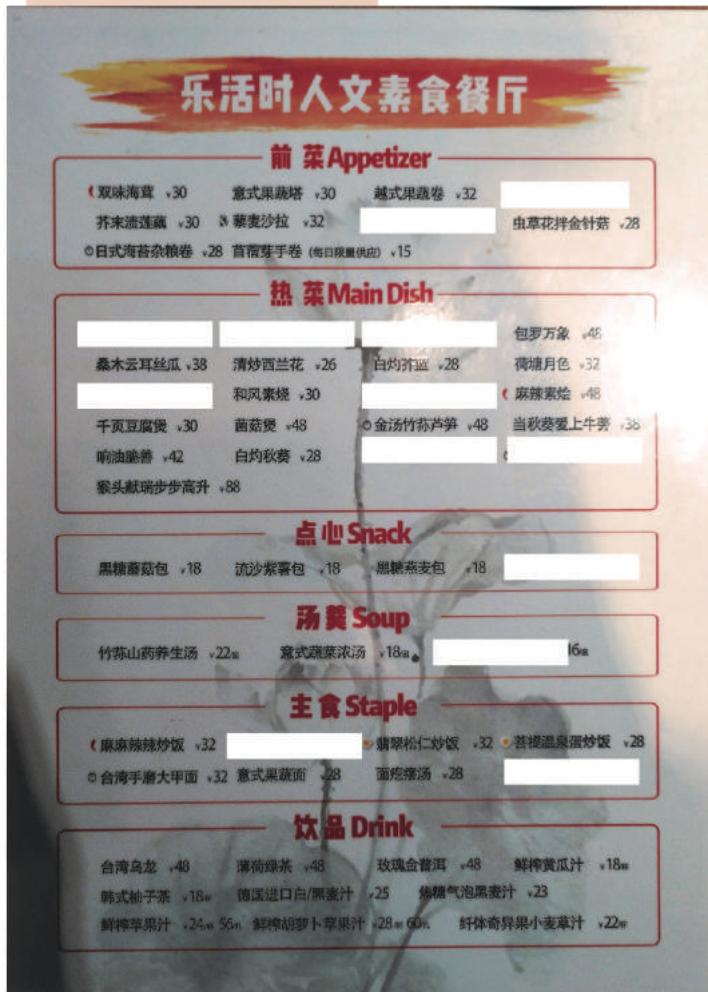
## MENU SETTING

### LOHASTIME MENU IN JANUARY

Appetizer	Double Flavored Ear Wax   Lotus Root with Mustard   Italian Fruit and Vegetable Tower Quinoa Salad   Nut Salad   Cordyceps Flower Mixed with Flammulina Velutipes   Alfalfa Sprouts Roll Fruit and Vegetable Roll   Japanese Seaweed Grain Roll   Hot and Sour Fern Root Noodles
Hot Dishes	Iron Plate Eggplant   Good Luck Sign   Dictyophora Asparagus   Mapo Tofu   Mixed Tofu Kroraina Fragrant   Braised Vegetables with Chilli Sauce   Okra with Great Burdock Stir Fried Lentils with Mushrooms   Chiba Tofu Pot   Fried Eel   Fungus Sponge Gourd All-inclusive   Mushroom Pot   Boiled Okra   Stir-fried Broccoli   Lotus Pond Boiled Chinese Broccoli   Curry and Vegetable Casserole   Vegetarian Diet   Rise Step by Step
Dessert	The Brown Mushroom Bread   Purple Potato Bread   Brown Sugar Oat Bread   Sago with Fruit
Soup	Yam Soup Dictyophora   Italian Vegetable Soup   Towel Gourd Okra Medlar Soup
Main Dishes	Spicy Fried Rice   Lohas Fried Rice   Mixed Vegetables Pine Nuts Fried Rice   Noodle Soup Bodhi Hot Spring Egg Fried Rice   Taiwan Handmade Noodles   Spaghetti   Rice
Drinks	Taiwan Oolong   Green Tea With Mint   Rose Gold Puer Tea   Fresh Cucumber Juice Korean Pomelo Tea   Caramel Bubble Black Wort   Germany White/black Wort Fresh Apple Juice   Fresh Carrot Apple Juice   Slimming Kiwi Wheat Grass Juice

Figure 5.2: The LOHAS January Menu (Source: Author's Painting)

## 乐活时时尚人文蔬食馆3月菜单变更



前菜	竹叶糕 狼牙土豆 海风裙带菜 梦幻荷仙姑 蔬香琥珀 乐活不老草 桂花小年糕 梅香烤菇 爱米粒
热菜	白灼西兰花 素蚝油生菜 响油脆善 咖喱鹰嘴豆
甜点	松露蘑菇包
汤品	九品太极羹 药膳煲
饮品	玉米汁 牛蒡茶 生机水果茶 黑糖红枣茶

新增食材: 竹叶 荷叶 桂花 生菜 鹰嘴豆 玉米 牛蒡等

Figure 5.3: The March menu change at Lohas (Source: According to the author of the WeChat menu in March of the time of Lohas)

## VEGETABLE RESOURCES

### VEGETABLE RESOURCES OF LOHAS

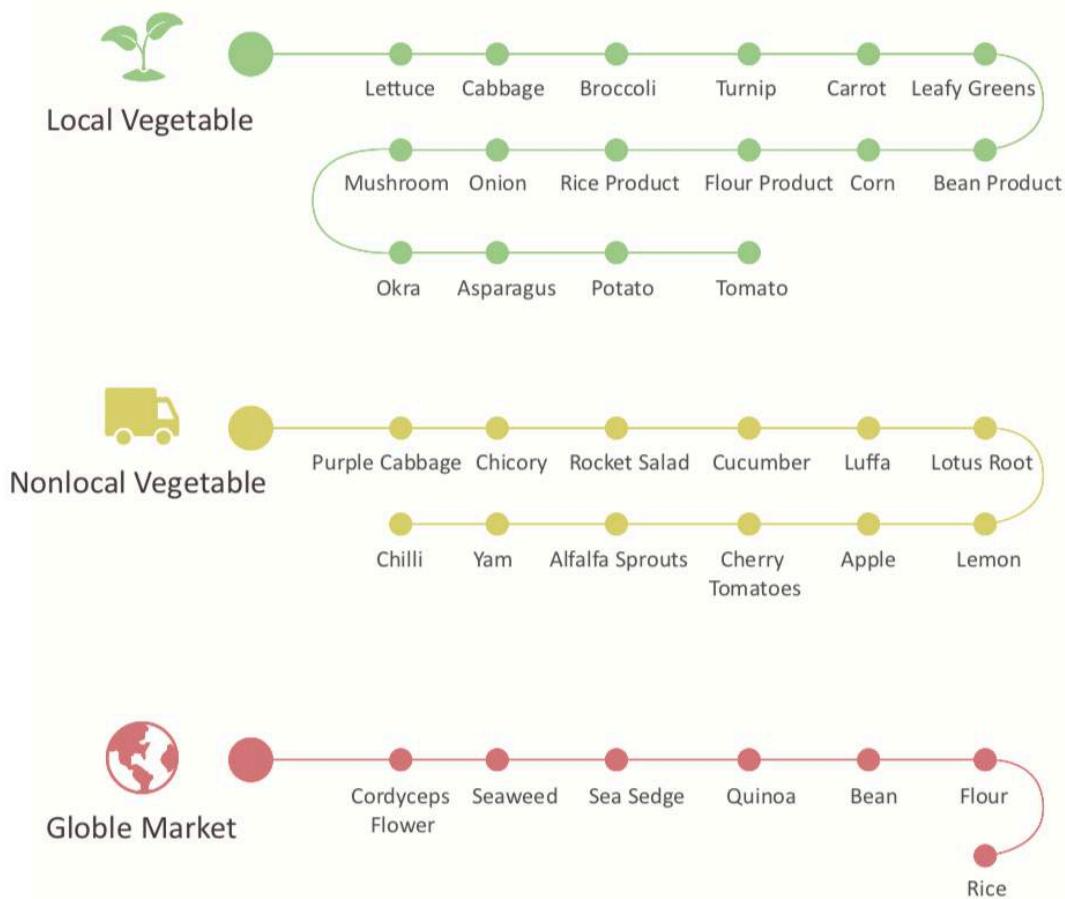


Figure 5.4 Vegetable Sources at Lohas (Source: Author's Painting)

## 5.5 Kitchen Equipment and Measurement Data

The kitchen at LOHAS is small and compact. There are 1 L consoles, 2 square tables, which are mainly responsible for cutting and loading; 1 refrigerator, keeping standing ingredients; 1 refrigerator, placing cooking materials and ingredients that need to be refrigerated; the kitchen has a total of 4 cabinets, Put the cooking ingredients and

utensils; 3 horizontal shelves, place the packaged goods and sundries; kitchen layout as shown in Figure 4.6 and Figure 4.7:



Figure 5.5 Restaurant layout for LOHAS restaurant (Source: Author photo)

### 乐活时线性后厨布局

The relationship between working flow and space in Linear system



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Figure 5.6 Restaurant layout for LOHAS restaurant (Source: Author's drawing)

Kitchen equipment measurement data is as follows:

Trash can :  $R_1=24.3 \text{ H}=25.2 \text{ R}_2=16.5 \text{ V}=\frac{1}{3}\pi R^2H = \frac{1}{3}\pi (24.3^2+24.3*16.5+16.5^2) \times 25.2 = 3331.08 \text{ cm}^3 = 3.33 \text{ L}$

Soup Pot :  $R=13 \text{ H}=15 \text{ V}=\pi R^2H = \pi \times 13^2 \times 15 = 7959.9 \text{ m}^3 \approx 7.96 \text{ L}$

Rice cooker : Product brochure display capacity is 4L

Wok :  $R=16 \text{ H}=9.3 \text{ V}=\pi R^2H = \pi \times 16^2 \times 9.3 = 7475.7 \text{ cm}^3 \approx 7.48 \text{ L}$

Cleaning tank :  $L_1=50 \text{ L}_2=41 \text{ H}=30 \text{ V}=L_1 \times L_2 \times H = 50 \times 41 \times 30 = 61500 \text{ cm}^3 = 61.5 \text{ L}$

Clean bucket :  $R=15 \text{ H}=38 \text{ V}=\pi R^2H = \pi \times 15^2 \times 38 = 26847 \text{ cm}^3 \approx 26.84 \text{ L}$

The cooking energy in the restaurant kitchen is gas and electricity. The gas is not fully burned compared to natural gas, and the transportation cost is high, and it is easy to generate safety hazards.

## 5.6 Restaurant kitchen staff and management

The restaurant has a total of 5 resident staff, a cleaning staff and a purchasing staff:

Admin: Mainly responsible for daily kitchen process supervision and coordination

Chef (2): Mainly responsible for cutting, cooking and serving

Assistant (2): Mainly responsible for roughing, cutting, cold plate preparation and wobble plate

Cleaning staff (1): It is mainly responsible for the daily cleaning of tableware, cleaning of the storefront and dumping of garbage.

Purchasing staff (1): Purchasing, repurchasing, and distributing daily based on the purchase list provided by the administrator.

The following process and the main person responsible for the kitchen process are shown in Figure 4.7 below. The planning of Houchu space was unreasonable at the time of LOHAS. Most of the restaurant staff were active in the cutting and cooking areas. During the observation period, the staff often collided and the activities were inconvenient, which affected the restaurant's work efficiency.

In order to better understand the status quo and problems of the after-kitchen process at Lohas, the survey conducted interviews with the above 7 staff. The chefs and assistants of LOHAS are both experienced in large-scale hotel companies or Japanese fast-food chain companies for more than 10 years, and have a deep understanding of the operation and management modes of restaurants of different scales. At the time of LOHAS, the restaurants were small and the management system was not perfect. The restaurant staff worked for a maximum of one year at LOHAS and the employees were highly mobile. This made it difficult for staff training and accountability. In the interview, the author found that employees' awareness of discarding rubbish was not strong enough to form a habit of properly discarding rubbish, and the sort bins set in the kitchen at Lehwood did not really work. In Chapter 5, the author will analyze the daily behavior of the staff at the time of LOHAS, according to the work process, improve the restaurant layout, improve the success rate of food waste classification, and reduce the cost of learning.

## KITCHEN LAYOUT

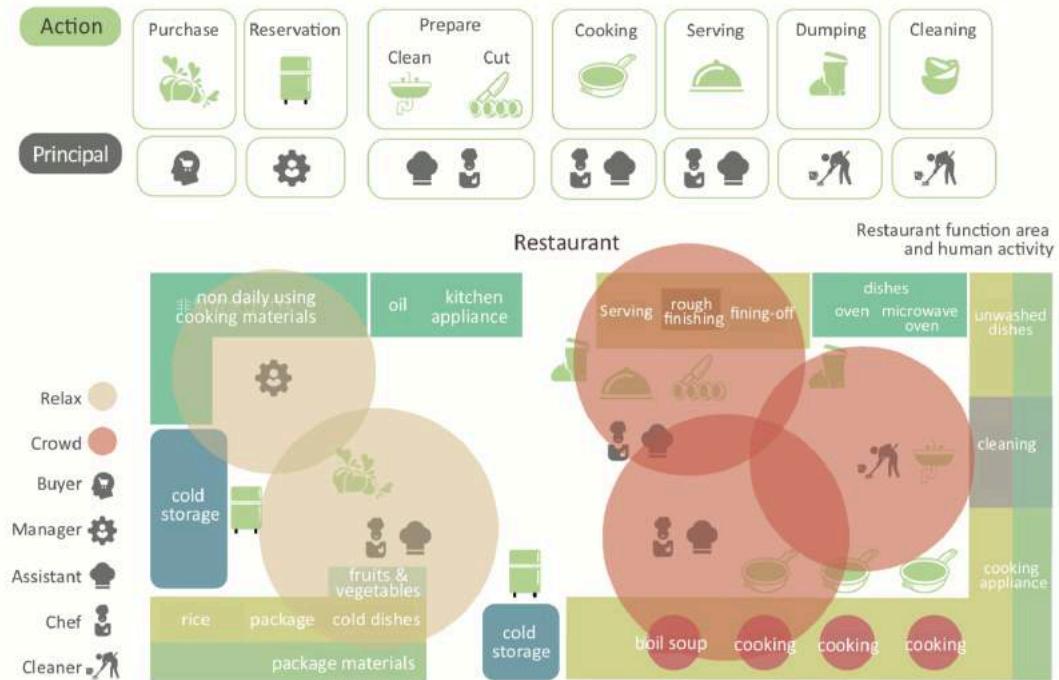


Figure 5.7 The division of the function of the kitchen after the music and the main responsible person (Source: Author's own drawing)

### 5.7 LOHAS restaurant restaurant flow

At LOHAS kitchen, daily processing of commonly used ingredients and foods with a higher order quantity is started at 9:00 a.m. for the delivery of fresh fruits and vegetables. After the fruits and vegetables are delivered to the warehouse, they can be processed. Restaurants can be roughly divided into the following process: purchase - storage - cleaning - cut with - cooking - food - dump - clean. Cleaning-cutting-cooking-cooking mainly focuses on the 9:00-12:30 in the morning and 4:30-6:30 in the afternoon; the cleaning of the trays and the cleaning of the store are done at 7:00 pm daily 30-9:30.

According to the author's observations and interviews, it was learned that during the cutting phase, the rough processing steps of the food ingredients produced a large amount of fresh fruit and vegetable peels, as well as poor taste or poor taste in the fruits

and vegetables. This type of kitchen waste is of high quality and has a high value of recyclability; a large amount of plastic packaging waste is generated during the process of packing the ingredients, plastic packaging bags and other packaging should not be degraded, and should be discarded separately from food and kitchen waste; after rough processing The ingredients can be cut after further cleaning. Cutting steps to complete the ingredients cut, sub-equipment. The food waste produced by the cutting is less scraps of ingredients, but the yield is low but the quality is high.

According to one-day observations and interviews, there are three most frequent tasks: cooking, cold plate making, and cooking. Staff cooking process is: get the ingredients - roughing - cleaning - cut with - cooking - loading - serving; cold plate production process: get the ingredients - roughing - cleaning - cut with - loading - serving; playing The rice flow is: to get rice - put cooking utensils - wash pan - steam - beaten - serve; due to the more compact space behind the kitchen, and not arranged according to the work process, the number of staff in the back kitchen more frequent, The efficiency is low; the longest time-consuming rough machining, cutting, and loading are concentrated on one work bench, and the workers are more concentrated on the side of the back kitchen and are very crowded. LOHAS linear operation process and spatial relationship as shown below:

## LINEAR WORKING FLOW

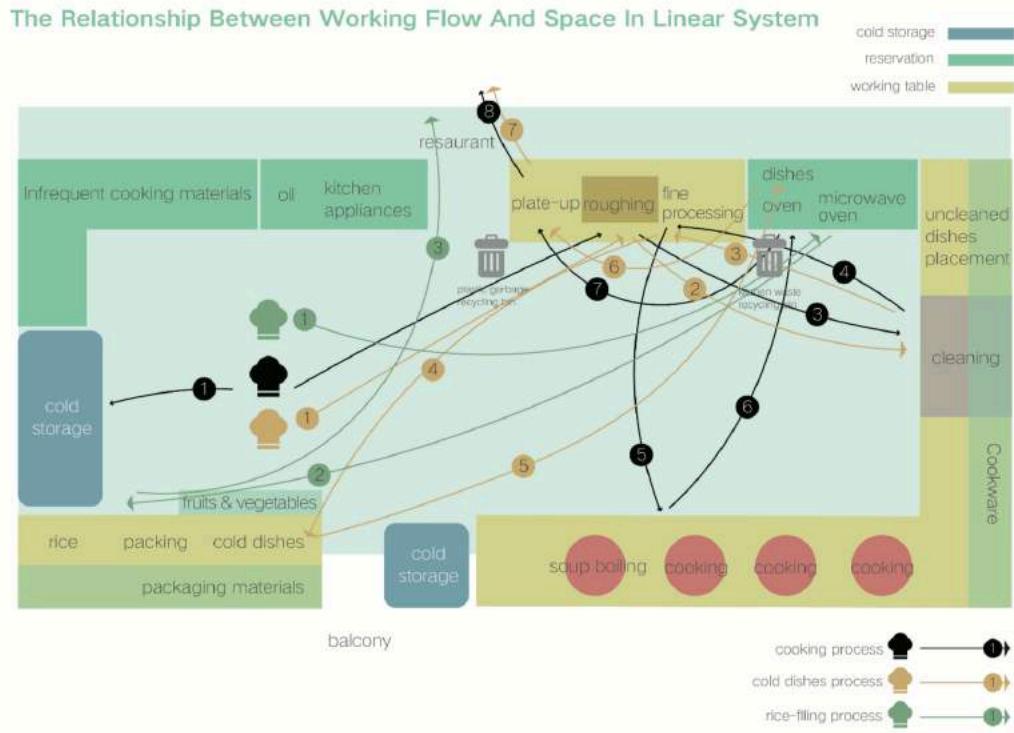


Figure 5.8 Work flow and spatial relationship of LOHAS linear system (Source: Author's own drawing)

As shown in Figure 6.1, the number of dishes on the back kitchen is higher, but the trays in the linear system are set aside the clearing pool in the back kitchen. It has been observed that when the kitchen is busy, the staff often collides, the efficiency is not high and the operation is It is not easy; the other side of the restaurant is only involved in the storage of food ingredients, cold plate production, rice rice, only to get involved, the space utilization is low; the linear system classification trash cans are placed on both sides of the roughing table, the left side Dispose of plastic waste on the right and discard food waste on the right. However, according to the author's observation, since plastic waste is generated during food storage and rough processing, these two steps are closer to the left trash can, and the probability of plastic waste being discarded is less. There

are many steps in restaurant-kitchen-garbage sparing, and they are relatively scattered, with a high probability of misplacement during busy hours.

## 5.8 Lohas and Ecology Farm

The consumption of fresh vegetables in the LOHAS VAT vegetarian restaurant is very large. At present, the main channel for restaurant purchase is the vegetable distribution market. This procurement model can not trace the source of fruits and vegetables to ensure quality. Shanghai has four distinct seasons and the area of arable land is limited. The supply of vegetables in this Municipality is partly from local cultivated land, and partly from arable land. In the course of transportation, foreign vegetables will be damaged by 20%, causing waste of resources, and will also consume energy and pollute the environment. The eco-farm to be collaborated in the future with LOHAS is located in Nanhui Town, Pudong New Area, Shanghai, with an acreage of 30 acres. Through cooperation with eco-farms, the first is to ensure the quality of the supply of food ingredients and solar terms, reduce the cost of vegetable purchases; Second, through the exploration of cooperation models with ecological farms, expand business and increase economic income.

## 6 Conclusions and Prospects

### 6.1 Conclusions

The purpose of the project is to use a systematic design method to analyze the qualitative and quantitative analysis of the Aftermarket kitchen system in LOHAS, and to realize the “zero emission” of kitchen waste through the optimization of the kitchen operating system and the collection and use of kitchen waste.. From the system's point of view, explore the possibility of urban kitchen waste. In this paper, we try to understand the historical and cultural causes of the Chinese food culture and cooking characteristics as well as Shanghai's catering culture. We try to understand the regional and specific characteristics of the Shanghai restaurant kitchen waste generation and management system from the perspective of history and culture. problem.

The reason for choosing a vegetarian restaurant as the starting point for the study is that the owner of a vegetarian restaurant has a stronger desire and awareness of environmental protection because of the religious and historical background of the vegetarian culture in Shanghai, and is more willing to participate in the research and interview of the author; The vegetarian cooking process is simpler than traditional Chinese food, and kitchen waste is concentrated in one to two steps during the period. The types and quality of meal ingredients are higher. For complex food kitchen systems, it is easier to achieve qualitative and quantitative analysis and measurement. The implementation of the project has a higher feasibility; third is a single vegetarian restaurant compared to a chain hotel. Dish information and purchase channels are more transparent, which makes it possible for quantitative analysis of the project.

The case study provides a feasible method for researching and analyzing the current status of the kitchen kitchen system. The analysis of the coffee grounds system design project provides methods for the quantitative analysis of food waste; analysis of research and analysis methods of Starburg nursing home provides service system design tools for research and analysis of the project; Garbage solutions provide ideas for the disposal of fruits and vegetables in vegetarian restaurants.

The author used a typical day, questionnaires, and focus interviews to record the LOHAS staff and the workflow at the current stage; using a measurement tool to quantitatively analyze the fruit and vegetable waste and water resource waste in the kitchen and kitchen system. Produce and discard the situation; and through the investigation of the geographical characteristics of Shanghai and the supply chain of fruits and vegetables, analyze the real source of seasonal vegetables in the season.

The author's research provided data and data for team members Angela's qualitative and quantitative analysis of linear systems at this stage of LOHAS.

## 6.2 Direction of further work

The project members will use the information provided in this article, use the method of system design, further qualitative and quantitative analysis of the linear system of LOHAS, refers to the problems existing in the linear system of the emergence stage, and provide feasibility for further system design and optimization.

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Time rushed, and a three-year graduate study is nearing completion. Thank Tongji University for giving me a new perspective and platform to contact the world. The four-year undergraduate study allowed me to have a basic understanding of design. I think that design is the process by which people make things. It is people's endless pursuit of beauty. At the same time four years of professional study let me have a solid design basis. Yan Yi I came into contact with more design teachers. The development of professional knowledge and design perspectives have benefited me a lot. With the aid of the Tongji University platform, I was fortunate enough to exchange a year with the Turin Polytechnic University in Italy. I learned the system design method and brought a systematic perspective and different thinking patterns to my design. I thank the teachers of Tongji University for their help and thank Professor Luigi Bistagnino, Professor Pace and Professor Peruccio for teaching me the system design method and for their patience with me.

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Thanks to Ms. Luo Ning, the person in charge of the music and food museum at the time of LOHAS, for the cooperation of this paper research and interviews, as well as strong support for the research data. Thanks to the cooperation of the Houchu staff at the time of LOHAS, we provided research materials and expert advice for the writing

of this paper, which supplemented the author's lack of culinary-related professional knowledge and lack of experience. It was also the management of restaurant staff. The optimization of the cooking process provides professional advice and helps with system optimization during music. Thanks again to the enthusiastic help and support of LOHAS Fashion Humanities and Vegetables Hall!

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June,2018

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## Appendix I LOHAS Winter Purchase List

classify	variety	unit price	amount ( kg )	cost/month	cost/day
fresh vegetable	lettuce	4.99	50	249.5	8.3
	red cabbage	4.9	45	220.5	7.4
	3122175	2.69	75	201.8	6.7
	witloof	9.9	30.3	300.0	10.0
	Eruca sativa	7.99	44.6	356.4	11.9
	carrot	1.69	74.5	125.9	4.2
	white radish	1.39	90	125.1	4.2
	cucumber	2.59	44	114.0	3.8
	Lotus root	4.99	58.9	293.9	9.8
	loofah	3.99	36	143.6	4.8
	alfalfa bud	13.8	9	124.2	4.1
	green vegetable	1.9	75	142.5	4.8
	broccoli	3.9	75	292.5	9.8
	potato	2.39	74	176.9	5.9
	tomato	4.99	58.9	293.9	9.8
	asparagus	9.9	26.6	263.3	8.8
	Okra	6.9	37.8	260.8	8.7
dry raw material	Chinese yam	4.99	50.9	254.0	8.5
	onion	3.99	59.3	236.6	7.9
cereal	cordyceps flower	9.9	9	89.1	3.0
	sea Velvet	5.8	5.1	29.6	1.0
	seaweed	10	3.6	36.0	1.2
	mushroom	9.9	60	594.0	19.8
	pepper	1.99	31	61.7	2.1
fruit	quinoa	8.1	6	48.6	1.6
	beans	8.8	15	132.0	4.4
	corn	5.9	60	354.0	11.8
	bean products	4.9	14.6	71.5	2.4
staple food	lemon	6.9	26	179.4	6.0
	apple	4.8	36	172.8	5.8
	cherry tomato	8.9	15	133.5	4.5
				<b>7091.3</b>	<b>236.4</b>

## Appendix II Lohas Research Outline and Questionnaire

### 调研目的 Research Purpose

This field study through a one-day observation and investigation of the LOHAS process of cook-kitchen, combined with the qualitative and quantitative analysis of the seasonal menu to study each step of the LOHAS after-kitchen process, analyze the input and output of each step, provide support for the later analysis

### 调研内容 Content of Research

#### Typical Day of LOHAS Kitchen

Use video, photo or text for recording activity of Lohas Kitchen Stuff and Kitchen flows

#### Expert Interview

Know details about Kitchen Flow and ask suggestions for refining

#### Questionnaire of Customer

Know about what they think about systemic design

### 调研流程与时间安排（拟定） Flow of interview and timeline

- Record of Typical day
- Distribute Questionnaire
- Expert Interview
- Data collect and analysis

### 调研原则与记录形式

### Principle for recording

- Record by video, voice memo and text
- Only used for research

### 受访人群与问题大纲

### List of Questions

#### Stuff of LOHAS

#### Garbage generation and classification in the back kitchen process

- which step generates the most garbage
- Is there a habit of sorting food waste?
- How does the current restaurant kitchen trash sorting
  - Is there any inconvenience in the current classification operation?
  - What obstacles encountered in learning kitchen waste classification
  - Whether guests often leave meals
  - Suggestions for the optimization of the cooking process and the recycling of kitchen waste

### Knowledge and advice on food waste

- How to treat the quantification of recipes
- The leading cause of food waste
- How to determine the amount of each meal
- Staff work arrangements and staff turnover

### "Lohas" guests

- How to treat and deal with food that can't be eaten at the restaurant
- Will you always eat in the restaurant?
- How to deal with unfinished leftovers
- Understanding of the classification and recycling of kitchen waste
- Did you have a cooking experience

- What is your knowledge of waste separation and recycling?
- What are the pain points and difficulties in garbage recycling?
- How to deal with leftovers
- How to deal with leftovers at home
- Views on community refrigerators
- Will it be willing to pay attention to the method of recycling kitchen waste
- Know what is the difficulty after implementation
- Views and suggestions on the subject of this study

Lohas Expert

Information about Eco Farm Recycling in Late Kitchen Waste Garbage

Tool box

Notebook book pen sticky note measuring tape

- Video, photo and recording equipment

- survey

- Bill of materials

- Research outline

#### List of Material

For the next step in the quantitative analysis and research work, we need to provide the following materials for research reference during the “Luohuo Shishi” (the materials provided will only be used for this research and will not be announced)

The material will be used to determine the quantity and type of ingredients in the next flow chart and the subsequent economic evaluation

- Quarterly purchase list of ingredients and price details (including type, quantity, and unit price of ingredients)

- Quarterly menu

## **Questionary of LOHAS stuff**

About restaurant staff

- How many employees are there in the restaurant?
- Does the restaurant staff have a fixed position and job?
- How often do restaurant staff flow?
- What kind of staff is most relevant to the classification of food waste?

work process

position

Length of service

- Aftershock process and waste sorting
- Which part of the work is you responsible for in the kitchen process?
- Are there strict rules in your workflow?

- What do you think about the quantification of recipes?
- Which steps do you think have the most vegetarian waste?
- Which step do you think is the biggest waste of water resources?
- Are you aware of waste sorting during your work?
- How do you sort food waste at the moment?
- What do you think is the biggest difficulty in learning garbage classification?
- What do you think is the problem during the actual operation? Is there inconvenience?
- About restaurant ingredients and menus
- How do you determine the quantity and type of ingredients purchased each time?
- How do you store the ingredients that have not been used?
- What kind of food is being wasted at the restaurant? What is the biggest cause of such food waste?
- How often does the restaurant's menu change? What is the reason for the change?

- Guests and food about the restaurant
- What time is the restaurant most? When is the least time?
- What are the meals that restaurant guests often order?
- Is there a quantitative rule for the dish to be served? How to determine the size of points?
- Will guests always have meals left? What kind of food will be left often?
- How do you handle the rest of the guests' meals?
- How do you think the current process can improve?
- Do you have any suggestions for the process optimization of kitchen and kitchen waste recycling?

## Questionary for LOHAS Customer

Hello, I am a graduate student of the School of Design and Innovation of Tongji University. I am currently studying the topic of restaurant kitchen waste recycling. There are 15 questions about food waste, and I hope to take up a few minutes of your precious time and help me complete the survey. Thank you

- What are the main reasons for your vegetarian diet?

healthier

More environmentally friendly

Belief factor

- Will you always have meals left in the restaurant?

Often not occasionally

- What do you think caused the rest of your meals?

The restaurant does not have a size option. The restaurant has an incorrect estimate.

The restaurant's food does not meet the taste.

- Under what circumstances can you choose the right amount of food for you?

Through the display of physical pictures

Through the display of units of measure Through the number of suggestions

Rice 2 Two Assorted Fried Rice

Plain Noodles 3 Two

Lohan Casserole

- How do you deal with unfinished leftovers?

Packaged not packed

- The main reason you choose not to pack is?

Inconvenient to carry around Can not be processed in time Leftover food is not good

- Do you often cook at home?

Will not

- Which step in the kitchen do you think has the most waste?

Prepare to handle leftovers during cooking

- How do you usually deal with household waste?

Whole bag treatment Disposal of kitchen waste and household waste

- How do you deal with kitchen waste?

Separate the soup from the solid and discard it directly in the trash

- What do you think of the value of kitchen waste recycling? (Multiple choices)

Farm fertilization made animal feed

The production of environmentally friendly enzymes is of little value and can also cause

secondary pollution

- Do you think that your local waste classification method is effective?

Effectively, most people will be classified and discarded. Not very effective, not clear about specific classification, often discarding errors. Invalid, most people will not be classified and discarded. My area is not classified trash.

- Which of the following ways do you think can help residents do the right waste sorting?  
(Multiple choices)

Distribute garbage bags with different colors with signs Perfect community waste sorting devices Public numbers with rich recycling methods

- How do you deal with leftovers in your home?

A booklet with a detailed classification and recycling method to inform the significance of waste sorting and recycling

After processing, eat another meal and feed the pet.

- Suppose you set up a community refrigerator near the community where you live. Households can pack up the uneaten leftovers and put them in the refrigerator for the homeless. Will you be involved?

Willing to both reduce waste and help others

Willing to, but need to provide a separate box Unwilling to eat the rest of the food

unsanitary Unwilling, do not want outsiders close to the community

- Assuming that there are people around you that organize environmental activities, the organization you are most willing to participate in is:

Vegetarian Festival, enjoy food while learning environmental knowledge Green Forum, can learn more effectively and get acquainted with like-minded people Green Travel, on-site visits to environmental-related sites Environmental workshops, participate in environmental protection equipment design workshops, contribute to environmental protection

You have a more recommended form



### Appendix III Interview Record of LOHAS

buyer

What job are you mainly responsible for?

-purchase.

Is there any other responsible project besides procurement?

- No, mainly purchases.

- How long have you been working?

- Come here four or five months.

- Are there strict time regulations for your work?

- General purchases are sent to the store from 9:00-10:00 a.m., and the procurement

location is at Hunan Road Agricultural Market.

How are your working hours arranged?

- Generally, the completion of the procurement in the morning is over, and if there is a shortage, it will be replaced.

Will there be more replacements?

- Less, generally enough

How do you know the quantity and type of materials purchased on the next day? Is there a purchase list?

- Checkers and administrators will give me a purchase list one evening in advance

Chef

What is your main job?

- Roughing, cooking

What is your workflow?

- Preparation in the morning, rough processing, fine processing, cooking, serving, should not be the first choice.

When I came in the morning, the buyer didn't come yet. I think you already started roughing. Are you using a previously reserved dish?

- Yes, materials that are commonly used in winter still need to be stocked, usually with 3-7 days of usage. Like carrots often used for reserves, soy products and green vegetables need to keep fresh on the day of purchase.

How do you do when roughing and finishing?

- We will prepare materials that require a long preparation time, high a la carte rates, and soup stock. For example, broccoli and selenium will be prepared in advance.

What food is more popular this season?

- Small pot, sweet corn, fungus, vegetables, soy products, high consumption

Which step do you think is a waste of resources?

- Rough processing is a relatively large waste of food, and the waste is relatively large

when the water is washed. I sometimes use water to receive pots and reuse them until I can't use them to drain them. I'm a northerner who cares about water resources. I learned that we are classified as trash cans. Do you think it will be difficult to classify them?

- Yes, we want to use garbage bags, disposable plates, and the rest of the vegetable waste to make enzymes. This wastes resources. When you first begin to operate, you sometimes lose the wrong one, but you're used to it. The current trash can is a blue one and a gray one, but when it gets used to it, it will not be lost. These are all controllable factors and I believe they will get better and better.

- Because I don't see any obvious signs on these sorts of bins, if you classify bins according to different classifications by color, do you think it will work better?

Well, I think I can try it.

- Do you think there is anything unreasonable about the layout of the back kitchen console?

This we are all based on the need to optimize the mix, sauce bottles, raw materials, we are on hand as needed.

How does Houchu determine the type and quantity of purchases to be given to the buyer's purchase list?

- Estimate according to customer order quantity and recent situation.

Do you think the ingredients are now the most expensive?

- Mushrooms and soy products

assistant Manager

Which step in the cooking process do you think has the greatest amount of trash?

- roughing

Which process do you think is the biggest waste of water in the cooking process?

- Cleaning

Do you think that the current classification of kitchen trash can be done well?

- We all see what to throw, not classified

Do you think there is anything unreasonable about the layout of the kitchen?

- Kitchen food safety is very important. Many things should be separated. However, our kitchen space is limited and cannot be separated. You should not be near the stove like a sink. Garbage classification is a condition, if

- Did you have similar work experience before?

- I have been a manager for ten years in Ajisen Ramen. Ajisen Ramen's kitchen management is more standardized.

Oh, did you cook at Ajisen Ramen? How many employees are there in Ajisen Ramen?

- This depends on the size of the store, 500,000 shop kitchens with 5 people.

What kind of ingredients do you think is the biggest waste in the kitchen now?

- The soup, the ingredients are all wasted. There are vegetables, such as broccoli, to eat that.

Which stage are you busy?

-12:30-1:00, the amount of passengers is busy. There is no busy at noon in the evening.

assistant Manager

What is your main position?

assistant Manager

What steps are you in charge of cooking?

Roughing, finishing and cooking.

Which step do you think produces the most waste?

- In fact, the garbage bags generated during the procurement process are actually quite numerous. There are about 20 a day.

Which kind of vegetable and fruit trash do you think is more?

- The leaves of the peel and vegetables, and the leaves of poor quality cannot be used.

Which step do you think is the most wasted water?

- Cleaning. There are three cleaning tanks for others. We only have one and we cannot store it. It is wasteful.

Do you think that water is consumed during cooking?

- Fortunately, dishes have water control, washing pot water is more waste.

I understand that we have garbage bins. Do you think the classification is valid?

Do guests often have meals left?

- Yes, often left with dishes and soup.

Where do you think the current vegetarian restaurant can be improved?

- Actually, I don't have a lot of requirements. I'm roughly the same.

management

How long have you been working here?

- More than a month

What is your main position?

- Responsible for kitchen management

Can you briefly introduce your workflow?

- Prepare (a side dish, etc.), also responsible for cooking

How do you view the quantification of recipes?

- General uniform configuration of the central kitchen

Where do you think the waste generated during the cooking process is the most?

- Material roughing and cutting

Where do you think the most wasted water in the cooking process?

-roughing

What does roughing do?

- Cleaning, peeling, disposal of disposable bags is done in the roughing step. Cutting process is basically a little scrap.

Will you throw rubbish into the bins?

-decide as things go. Roughing is more discarded, mainly the classification of plastic garbage and vegetables.

Do you think how to increase the restaurant garbage classification rate?

- Positioning of rough machining is responsible for people.

Who do you direct to tell the buyer the type and amount of vegetables purchased? And how are you sure?

- Cut the fittings. For example, if you initially bought three catties and you have two pounds left, then let's buy one pound from the purchasing department tomorrow.

Which food ingredient do you think is the highest?

- The discard rate of vegetables and fruits is quite high, mainly due to rough processing.

What time period are you most busy?

-11:30-1:30, 5:00-7:00 in the evening, this also depends on the location

What is the longest dish for guests this season?

- Chiba tofu and mushroom soup, small pot

How to quantify the dish when it is loaded?

- Large restaurants are weighed, and small restaurants are based on experience.

What is the current kitchen waste?

- Uniformly dropped to the garbage dump.

What is the amount of waste generated?

-2-3 barrels

What do you think is inconvenient in the current kitchen operation?

- The back kitchen console does not conform to the operating procedure, so it is not easy to operate.

Do you have any suggestions for garbage sorting?

- Most of the rough-processed garbage is garbage. There is no substantial usefulness for the number of garbage bins to be set. The main reason is to set trash bins according to the steps for generating garbage. Then set the post, training, and develop operating habits.

Please summarize the main operating procedures of Houchu.

- Storage - Warehouse - Roughing - Cut - Cooking - Loading - Dumping - Cleaning - Trash Disposal

Washer

What is the period of your night work?

7:00-9:00, long time is 9:30

Can you talk about your work process?

- Wash dishes first and then mop the floor. Rinse it with clean water first, use detergent, and then rinse it twice. I was all washed one by one and put it in the basket after washing.

How long is your washing time?

- 1 hour to 2 hours

Can you roughly estimate the number of water passes?

- A bowl of water 4-5 times

Is the water you use to mop the water for recycling? How many barrels do you use?

- Two barrels

Do you have a sense of saving water at home?

- I waste water.

10:45 The cutting work is basically completed. The material is roughed. The trash can has been filled with one.

expert interview

Do you have any operational experience with the quantification of dishes?

- Yes, if there is a central kitchen in a large hotel with a central kitchen, the central kitchen will be uniformly cut and distributed to the chefs. The ingredients used by chefs are all well-defined and quantified. If it is a relatively small kitchen, the quantitative operation mainly depends on experience.

- What difference do you think of vegetarianism versus foraging?

I have been eating for a long time before, and I have some experience in medicated food production. After dealing with so many years of foraging, more and more people feel that eating and eating are not vegetarian and healthy. On the one hand, the feeding of meat and poultry is now contrary to the laws of nature and is catalyzed by hormones. It is not as healthy as it is. In terms of nutrition, excessive use of foraging can damage the spleen and stomach. Vegetarian cooking is mainly made from vegetables that are better in quality and more healthy and fresh. However, people nowadays eat less vegetables and do not pay too much attention to the seasonal season. Whatever they want to eat is actually not nutritionally healthy.

- What do you think is the consumption of water compared to vegetarian cooking?

Foraging. In the breeding process, the meat and poultry consume a large amount of water. Some people have done statistics. A cow consumes 3,000 water a year, which is a staggering amount. In specific cooking, foraging also consumes more water. Foraging food consumption in the two steps of cleaning and processing consumes more water. I

have done statistics when I was a dietitian.

- How long should the soup be prepared?

The soup stock must be cooked for more than 2 hours. The rest is now thrown away but it can be used as an enzyme.

- Do you have a specific ratio when configuring soup stock? Is it restaurant regulation or your own recipe?

This is an analogy with you, I basically rely on muscle memory