

The Residential Quality of Rural-urban Migrants in big cities of China, Case Study Wuhan

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by

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Abstract

Due to the growing proportion of rural people in total Chinese population in the 70s and 80s, the national government has encouraged and impelled the development of enterprises in the countryside and rural towns to absorb the foreseeable labour surplus from agricultural production. By the end of the 1980s, these enterprises had failed to attract the rural labor surplus. When the massive agricultural population from countryside inevitably rushed into the cities for employment chances in the end of 1980s, the preface of big-scale rural-urban migration was beginning in China.

The sudden and large numbers of new comers resulted in quite a few social-economic problems. Urban construction lags behind the increase of urban population¹ and at present in various statistical departments when calculating the average municipal facilities and services level, only urban population excluded the rural-urban migrants are accounted in. In other word, government gives the urban original residents and those with urban Hukou priority. Thus the rural-urban migrants are inferior to urban permanent residents on social-economic status. As far as their living situation is concerned, poor condition is unavoidably attached to them. How is their residential condition on the earth?

This research developed quantitative and qualitative approaches to investigate the residential quality and analysed the main causes. The rural-urban migrants of the inner city are compared with those in the urban fringe and also the residential situation of the migrants with that of the permanent urban residents, so as to deeply understand their situation. Before that, the social-economic situation and general model of current rural-urban migration have been described to help understand their residential condition.

In this research Wuhan was selected as study case in regards of its geographical location, social economic position in China and size of the city. The main data used in this research composed of two parts: municipal yearbooks and the fifth census in 2000, and primary data from social survey in 2003.

The study result indicated that rural-urban migrants living in the old built-up areas and those living in the urban fringe encountered different problems on settlement. However, no matter where are they living, their integrated residential quality is far lower than urban permanent residents.

The strong differences between rural-urban migrants and urban permanent residents and the absolutely poor residential quality of the migrants directly derived out of the long-time binary population structure and the unequal treatment to rural people in China.

¹ See appendix 1 Definition of terms.

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Chapter 1 Introduction

1.1. Background

Urbanization is the process of faster growth of the urban population compared to the rural population. The current world urban population had reached 2.9 billion by 2000 and expected to rise to 5 billion by 2030. In 2001, a report issued by United Nations Population Division presented that “the urban growth rate of less developed regions reached 3 percent per year in 1995 – 2000 compared to 0.5 percent in more developed regions. In contrast, the rural population of the less developed region is expected to grow very slowly, at just 0.2 percent per year during 2000-2030. Almost all of the population increase expected during 2000-2030 will be absorbed by the urban areas of the less developed regions.” (United Nations, 2001)

Internal rural-urban migration is the classical way of urbanization. For most developing countries, especially the countries with low or even negative natural population increase, this migration is one of the most important components of urbanization and it played an important role in the urbanization procedure of Latin America and Asia.

In current China, cities are facing up an unprecedented challenge of surge of rural-urban migration. For a long time, Chinese population has been divided into agricultural population and non-agricultural population² according to the Hukou (household registration)³ system. Since 1955 the agricultural population had been tied to the agricultural land (rural area) for agricultural production and usually they were not allowed to live into urban areas and obtain an urban Hukou permit. At present, the limitation and control on place of residence is loosened a little and the influence of Hukou began to weaken. Moreover there is a large number of labour surplus in rural areas, which is a driving force for people to seek alternative forms of employment mainly found in the urban areas. These factors have caused that a very large number of rural people are currently permanent or temporary living in cities.

1.2. Research problem statement

According to the Population Reference Bureau (PRB), the total number of rural-urban migrants (or floating population) in China who migrate to the cities in search of work has arrived at 120 million to 130 million by 2003. In the light of the urbanization experience of other third world countries, rural-urban migrants on such a large scale and in a relatively short time usually have no other option to create themselves their own accommodation. “Overcrowding in central slum areas has increased at the same time that people have built improvised structures on whatever vacant land they could find...”(UNCHS⁴, 1981: 1)

² See Appendix 1 Definition of terms.

³ See Appendix 1 Definition of terms.

⁴ UNCHS is the abbreviated name of United Nations Center of Human Settlements or also known as HABITAT.

But in China, the temporary characteristics⁵ of rural-urban migration and the land administration practice made land invasions or land subdivisions very difficult and not an option to obtain land for self-help housing. Rural-urban migrants thus have to find an alternative type of accommodation. However the unique characteristics of the Hukou system, migration and employment policies and limited support given to migrants made that in China rural-urban migrants have a lower social-economic status when compared with urban permanent residents. When lower social-economic status meets temporary status, poor settlement is no longer on the doorstep—it moves in.

This research will focus on discussion the residential quality of rural-urban migrants and the inequality of settlement between those temporary migrants and urban permanent residents.

1.3. Research objectives

The main aim of this research is to identify the residential quality and its characteristics of rural-urban migrants' settlement and find the reasons.

1. To describe and qualify the general settlement situation of rural-urban migrants in big cities of China.
2. To identify and analyse the residential quality and characteristics of rural-urban migrants located in old built-up area and urban fringe.
3. To compare the residential quality of rural-urban migrants with permanent urban citizens in order to identify the residential gap and then to analyse the main reasons.

1.4. Research questions

1. What is the social-economic status of rural-urban migrants?
2. What are the residential characteristics of rural-urban migrants in big cities?
3. How to analyse and evaluate residential quality?
4. What is the difference between the residential quality of rural-urban migrants living in old built-up area and of those living in urban fringe?
5. What is the disparity of residential quality between rural-urban migrants and permanent urban citizens and why?

⁵ In current China, rural-urban migrants include permanent migrants and temporary migrants, whereas most rural-urban migrants are considered by the Government as temporary migrants. The main difference between them is the type of Hukou, which will be explained further in Chapter 2.

1.5. Methodology

In order to illustrate the migrants' residential quality and locate the status of rural-urban migrants' settlement in a large city, it is necessary to operationalize 'residential quality' and to describe and compare the social-economic status of migrants and with the social-economic characteristics of the common citizens.

Data collection:

- ① Map of the urban built-up area of Wuhan, Hubei and China administrative maps
- ② Image of neighbourhood concentrated with temporary migrants
- ③ Municipal yearbooks of Wuhan and China
- ④ Census data of 1990 and 2000
- ⑤ Literature study on rural-urban migration
- ⑥ Interview with key migrants and a household survey of 102 rural-urban migrants

Data processing

Pre-process statistical data with SPSS and input image with Arc View

Data analysis

- ① Use statistical methods to analyse the social-economic characteristics of temporary migrants
- ② Employ statistical methods to analyse the physical characteristics of the migrant's settlement and quantify the residential quality by calculating indices for residential quality.

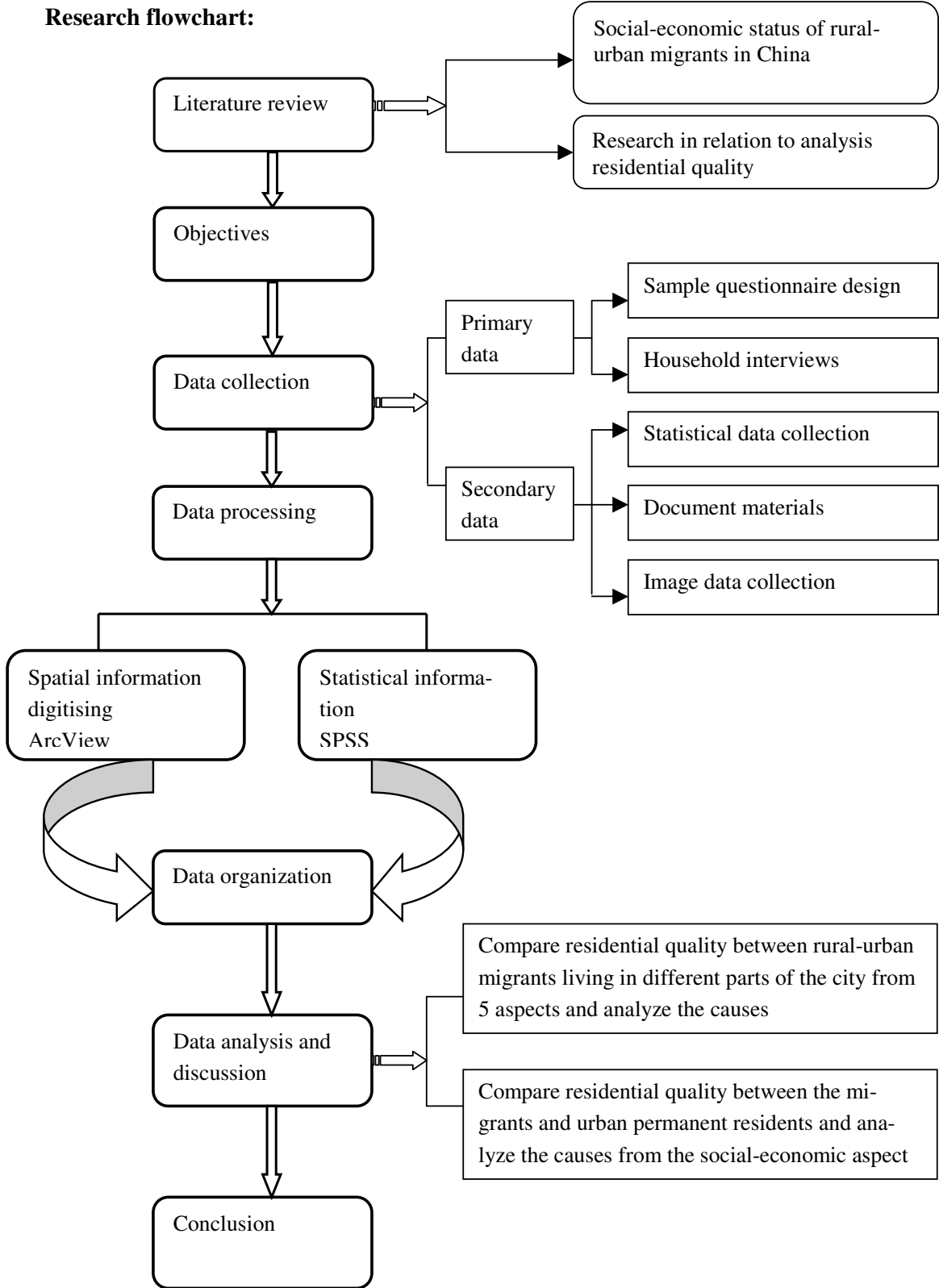


Figure 1.1 Research flowcharts

1.6. Study area and sample survey

1.6.1 Study area

Due to its geographic location and social-economic features, Wuhan is taken as typical representative of large cities in China facing a representative number of rural-urban migrants.

Wuhan is the capital of the Hubei Province, and is the largest city in Central China, and the centre of economy, culture and politics in Central China. Located on two rivers of the Yangtze, the second longest river in the world, and Hanshui, the greatest branch of the former, Wuhan is divided into 3 parts, Wuchang, Hankou and Hanyang.

Wuhan is rich in culture and history. Wuhan's civilization began about 3,500 years ago, and is of great importance in Chinese culture, the military, economy and politics. Famous scenic spots in Wuhan include Yellow Crane Tower, Guiyuan Temple, East Lake, and the Museum of the 1911 Revolution.

Wuhan is a major junction of traffic and communication in Inner China. Historically, Wuhan is referred to as Thoroughfare to Nine Provinces because of her great convenience in transport. And now, a new airport, a largest inner inland harbour, two big railway-stations, several national railways and highways allow Wuhan a greater capacity of transportation.

Wuhan features solid and comprehensive industrial power, as well as textiles, plastics and shipbuilding. Wuhan is proud of her 4 pillars of metallurgy, automobiles, machinery and high-tech industries. The year of 1995 witnesses the comprehensive economic power of Wuhan ranked to the fore of 10 top Chinese cities. In the meantime, Wuhan is the largest financial and commercial centre in Central China. More than 2,000 financial estates are involved in savings and financing of capital, issuing and exchange of stocks and bonds. Both state and private-run commercial enterprises make Wuhan a flourishing market.

Since the economic reform in 1978, active market and economic potential has attracted massive migrants, especially temporary migrants. Of the total population in Wuhan of 1978, only 0.5% was temporary migrant. However the proportion of temporary migrants had increased to 13.8% by 2000 (Wuhan Statistical Bureau, 2001).

Table 1.1 Population and temporary migrants

| | 1978 | 1985 | 1995 | 2000 |
|---|-----------|-----------|-----------|-----------|
| Total population | 5,482,880 | 6,083,925 | 7,100,100 | 8,312,600 |
| Temporary migrants | 25,498 | 219,425 | 751,029 | 1,149,200 |
| The proportion of temporary migrants in the total population (%) | 0.4% | 3.6% | 10.6% | 13.8% |

Source: Adapted from Wuhan Yearbook 1990, 1996, 2000 and Fifth National Census of 2000

Wuhan is a high-density city. In the administrative region population density is 947 people per sq. kilometre, which is the seventh densest city in China. In the main built-up areas of Wuhan population density varies from 1,191 people per kilometre sq. of Hongshan district to 13,663 people per sq. kilometre of Jianghan district. The original urban residents combined with the immigrants contributed to a quick increase of population. Since the fifth census in 2000, the population of Wuhan has arrived at 8.3 million, while in the fourth census in 1990 it was 6.9 million. During the past decade, the total number of population in Wuhan had increased by 1.4 million with growth rate of 1.49% every year.

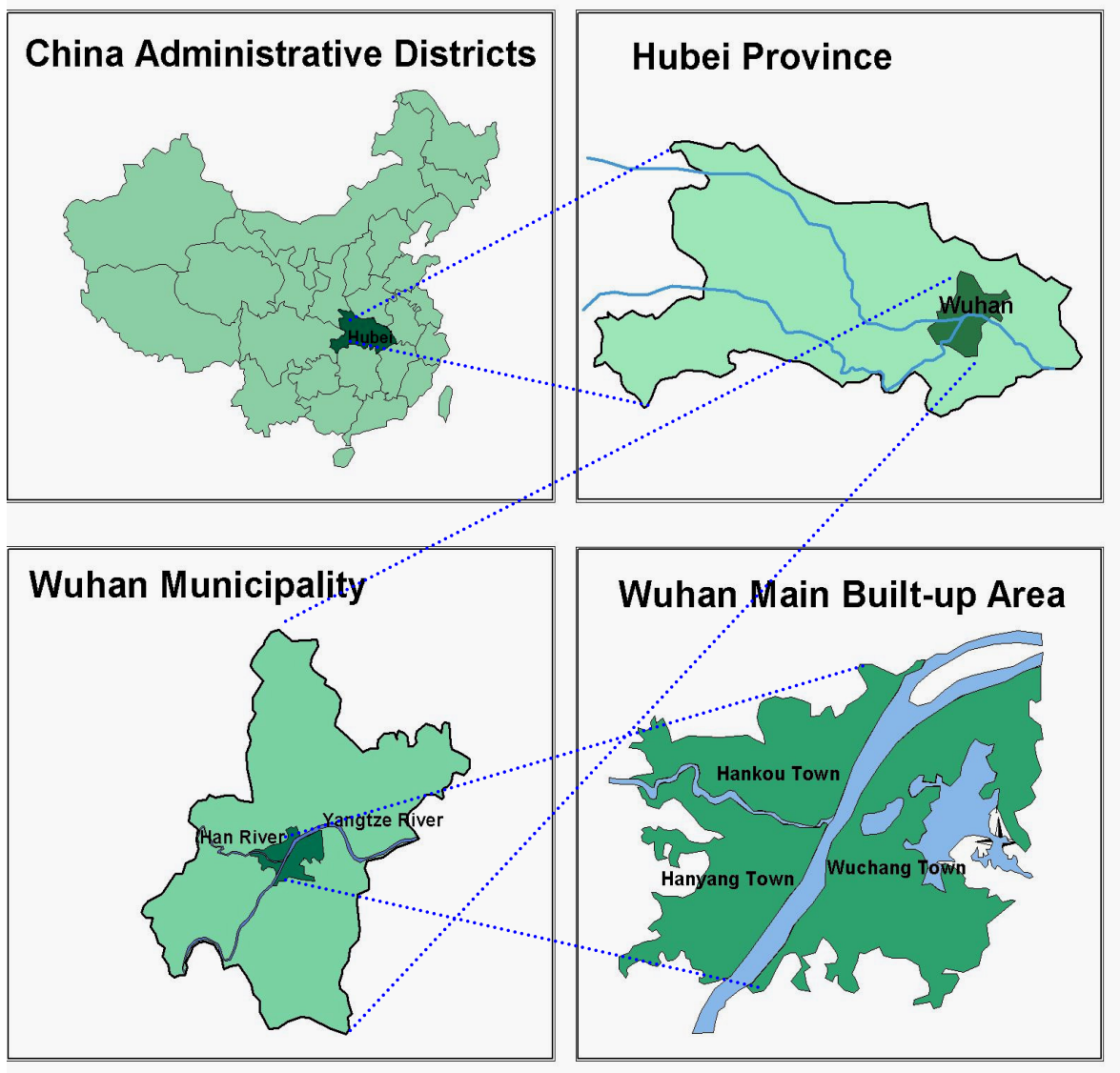


Figure 1.2 location of study area

The dense population and massive rural-urban migrants make the settlement problems of those migrants in Wuhan striking. Wuhan was selected as the study object of this research for the following two reasons.

◆ High density of population results in a generally poor quality of residential environment for the urban of Wuhan, while plenty of rural-urban migrants as a weak group in the city have never been treated as common citizens, which means rural-urban migrants have worse residential conditions.

◆ In China the very large cities such as Shanghai and Beijing, and other big cities in southeast China, attract migrants from the whole country and lead to very high levels of rural-urban migration. Other large cities mainly attract migrants from surrounding areas and neighbouring provinces. Wuhan, as the biggest city in central China, is a typical city attracting mainly rural-urban migrants from surrounding area and nearby provinces, so it can be taken as a case owning common features with normal big cities of China.

1.6.2 Sample surveys: design and procedure

Based on the research objectives and methods, field survey of the residents in the study-area was carried out in the period February-March 2003. In this survey, information referring to the individual members, characteristics of the sample people and their settlement conditions were collected.

The sample methodology which was originally envisaged consisted of a single random-sample with the main aim of getting a comprehensive understanding about the study population, such as housing quality, outside environment, infrastructure and accessibility. However it soon became clear that this would not be directly feasible since the migrants living in the inner city and those living in the urban fringe have different residential problems and demands. After interviewing some key-informants and literature review, the original target group was divided into two groups in regards of their residential locations. One is in the old built-up area of the inner city and the other is on the urban fringe which is the interface of rural area and urban area.

Purpose of the survey

The main objective of the household interviews is to identify the present residential characteristics of migrants and find the main cause of the poor living condition.

The questionnaire was divided into two parts according to the main objectives:

- ▶ Questions and observations to identify the residential characteristics of the migrants
- ▶ Questions related to the social-economic characteristics of the people living in the sample areas

Questionnaire design: Designing a good questionnaire involves selecting the questions needed to meet the research objectives. The questionnaire including questions built on the purpose of the survey was mainly composed of two parts. One part focused on the features of sample people like age, income and education etc. The other part put emphasis on the physical characteristics of migrants' settlement. Since the residential quality has included lots of factors, the data should be collected as many as possible that some questions, not included in the variable list, were designed to get a comprehensive impression of living condition. <Questionnaire in details is available at appendix 3>

Sample size: First, two or three areas with 80-100 sample people respectively were taken as reasonable number for sample. With the division of migrants, study area was revised and the total number of sample achieved 102 during the sample procedure. (70 samples in old built-up area and 32 on the fringe of city)

The unit of survey: The unit of study was the individual migrants. Every sample person was interviewed in terms of his (or her) education level and related technical terminology need to be explained. Household has not been chosen as unit because, in general it is the individual members, generally the stronger and younger ones, who go to the city to find employment opportunity, after which the whole family might or might not follow. In many cases, several people without relative relationship or sharing no bloodline live in one house or apartment in order to decrease housing expenditure.

Sample area selection: The 1% sample research in 1987 and the fourth census in 1990 together with the fifth census in 2000 indicated that rural-urban migrants would like to choose accommodation at the least cost. For inner city some old and dilapidated built-up areas have lost their initial economic value and it won't be redeveloped in a short time. Whereas the city is expanding toward the urban fringe and the economic potential of the urban fringe needs to be exploited. At present, the land value and living cost is still lower than inner city. Under this condition the dilapidated and old built-up areas and urban fringe are the typical concentrated areas of rural-urban migrants. In this research, one old built-up area in Hankou Town and part of urban fringe in Wuchang Town are selected as typical settlement location for rural-urban migrants living in big city.

3.2.3 Distribution of sample:

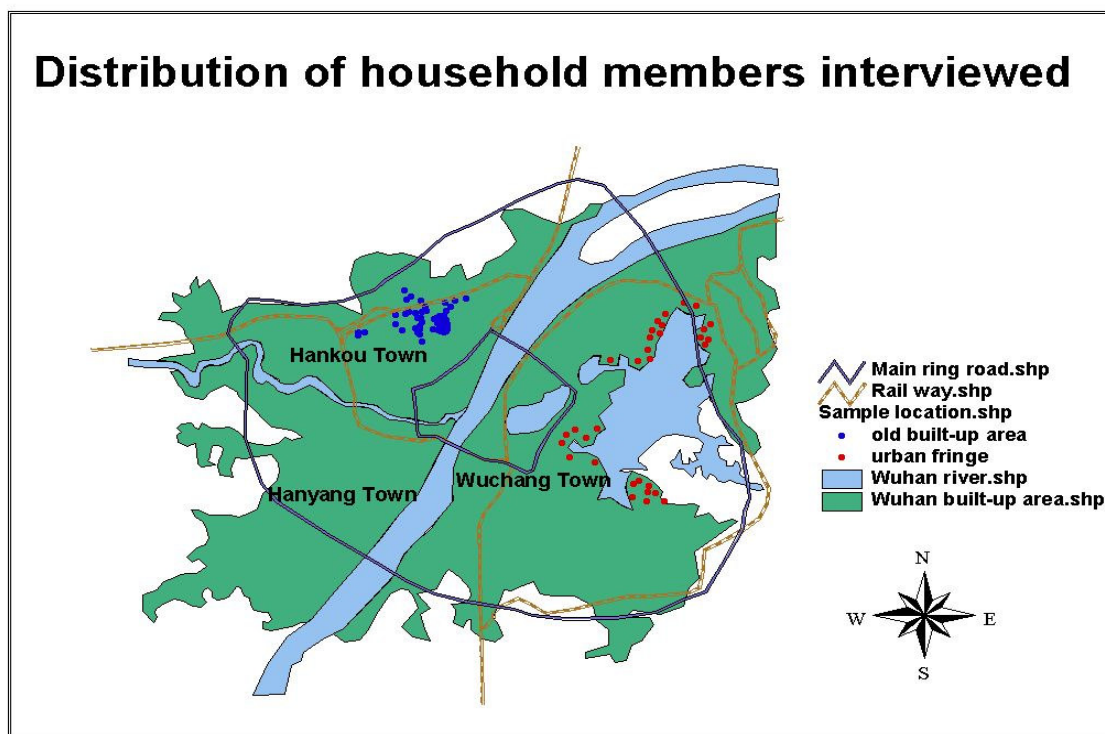


Figure 1.3 distribution of household members interviewed

Old built-up area: Wuhan has long cultural history and famous as an old-aged city and Hankou Town was developed earlier than the other two Towns. At present, old built-up areas are mainly located in Hankou Town. Due to the financial shortage, except a few old built-up area located on most important part of city were renewed, most of old built-up areas remains original scenes with spontaneous restoration at small scale by local residents. In this research, the built-up area between central ring road and second ring road near Hankou Railway-station was selected as sample area in order to find enough sample people. This area is famous for plenty of rural-urban migrants, because of its land use and low land value as well as the short distance from a big traffic node⁶ (Hankou Railway-station).

Fringe of city: Whereas Hankou is marked as the economic centre of Wuhan; Wuchang is marked as cultural centre, which is developing quickly. Part of urban fringe around East Lake is selected as the sample area. East Lake is the first biggest lake in urban area of China with water body of 33km². The large-scale water area prevent stop the city developing toward east. Thus the belt around the lake formed the boundary of the built-up area, and some initial villages remained. In the past decade, many rural-urban migrants were attracted to the Wuchang, and part of them gets accommodation in the initial villages in the urban fringe. These locations are the sample area for this research.

Limitation on the sample survey: For the limited time and manpower available for the study, it was decided to limit the sample area to only one old built-up area and one small part of urban fringe. Thus there are some shortages for the research. Due to the limited total number and types of sample, some results of data analysis don't reflect the reality precisely, although they are valid.

1.7. Structure of the thesis

Chapter 1: Introduction

This chapter is concerned with the general background of migration, research problem, questions, objectives and a brief introduction of the research methodology.

Chapter 2: rural-urban migration in China

In this chapter, focus will be given to general migration situation in big cities, including the characteristics of rural-urban migration, social-economic status of rural-urban migrants and their general settlement conditions.

Chapter 3: Methodology

At first several methods used to research residential quality will be presented by presenting a literature review. Then the advantages and disadvantages of these methods will be described. The second part will introduce the methodology used in this research. It includes indicators selection for residential quality evaluation, analysis and evaluation of residential quality.

⁶. For new rural-urban migrants and those migrants in unemployment, a big traffic node usually means chance of employment and then becomes the normal attractive point for rural-urban migrants. So an old built-up area near the traffic node always is the concentration area of rural-urban migrants.

Chapter 4: The relationship between settlement location and residential quality

This chapter will focus on the discussion of the residential quality of rural-urban migrants located in old built-up area and urban fringe.

Chapter 5: The inequality of settlements of rural-urban migrants and urban permanent residents.

As mentioned above, this chapter also focuses on the residential quality but mainly discusses the gap between rural-urban migrants and permanent urban citizens and the main causes for these differences.

Chapter 6: Conclusion

Based on the above comparisons and analysis, conclusion will be drawn and discussed.

Chapter 2 Rural-urban migration in China

2.1 Introduction

Rural-urban migration is a well-known phenomenon during the process of development and the transformation from an agricultural based society to an industrial and service sector economy. The basic characteristics of migration and migrants' social-economical status are different from one region to another, from one country to another. This chapter will discuss Chinese rural-urban migration from the basic characteristics of migration itself, social-economic status and relevant policies. Also a general introduction about settlement conditions of rural-urban migrants will be presented.

2.2 Migration and rural-urban migration

2.2.1 Concept of migration

Generally speaking, migration is defined from two aspects: geographic and social-economic.

Eisenstact, as the typical socialist, in 1953 defined the migration as “ the physical transition of an individual or a group from one society to another. This transition usually involves abandoning one social setting and entering another and different one.”(Eisenstact 1953,p.1) This comment clearly takes the change of the social surrounding and setting as the most important “signal” of migration. Thirteen years later, another definition, focusing on spatial transition, for migrants was put forward and claimed that any act of migration consists of an origin, a destination and an intervening of obstacles without concerning the distance and the difficult degree of migration. Thus, according this definition, a move across the hall from one apartment to another is counted just as much as an act of migration as a move from Bombay, India, to Cedar Rapids, Iowa, though, of course, the initiation and consequence of such moves are vastly different (Lee, 1966).

2.2.2 The temporary status of rural-urban migration

In China rural-urban migration has its own unique features, besides the spatial and social transfer. At first for most those migrants, this migration is **temporary**, which can also be observed from their alternative name: “floating people”. This temporary situation reflects a social status and the tight connection between the present residential location and the original residential location.

Every year in China, the number of long-distance traffic soars astonishingly during special periods due to “back-and-forth” of massive rural-urban migrants. Except this spatial “back-and-forth”, rural-urban migrants also keep close connection with the original location on economic income and consumption. Remittance is a popular way for those migrants to support their remote families and it's normally an important family income for most rural households. During the past decades, remittances by rural-urban migrants have accounted for an important part of the rural family income and increased quickly every year accompanied with the more and more people away from their own family in rural areas to earn money in urban areas.

Table 2.1 Income structures of rural families in Wuhan

| | 1993 | 1995 | 1996 | 1997 | 1998 | 1999 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
| Households investigated (person) | 2,209 | 2,193 | 2,302 | 2,302 | 2,264 | 2,245 |
| Workers away from families (rural-urban migrants) | 94 | 52 | 126 | 136 | 150 | 213 |
| % of workers away from family | 4.3% | 2.4% | 5.5% | 5.9% | 6.6% | 9.5% |
| Total rural family income (RMB) | 3,190,690 | 6,005,963 | 6,967,768 | 7,862,825 | 7,954,772 | 8,422,180 |
| Total remittance income (RMB) | 16,660 | 23,001 | 26,910 | 68,244 | 72,480 | 111,997 |
| Remittance as part of family income (%) | 0.52% | 0.38% | 0.39% | 0.87% | 0.91% | 1.33% |

Source: adapted from Wuhan Year Book 2000

From the table 2.1 we can see that the number of rural people who are willing to leave families to cities for employment chances became more and more. Also the proportion of remittances from rural-urban migrants in the total income of rural family kept rising since the beginning of 1990s'. This confirms the fact that rural-urban migration is employed as an important way to increase family income by rural people and earning money, not enjoying life, is their most important pursuit. According to current investigations. With the main pursuit of more income, rural-urban migrants follow the employ chances. When without fixed career, they need to adapt their settlement location and living anytime to their new employment. For most rural-urban migrants, due to the peasant status they only take urban area as a temporary place of employment not a permanent place of living, so they are more workers than consumers in big cities. After a long time of work in urban area, they would like to return back to let their mind and body relax, at that time, they are more consumers than producers. In effect the living conditions of rural-urban migrants are worse than expected. Their living conditions are worse than rural people. In one sample survey of rural-urban migrants in Wuhan, over 60% rural-urban migrants answered that their living conditions became worse than in rural family (Song, 2000). But all of them still want to city with the aim of increasing income.

The temporary status of migrants without urban Hukou is not selected by the rural-urban migrants themselves but a special production under certain polity and administration conditions. Hukou (household registration), as we mentioned, is the most important mark of temporary and permanent population. Hukou is household registration system in China. Every china citizens should be registered in the uniform household registration system. For those who were accepted as legal urban citizens, each household was issued a household registration booklet, whereas for rural household, only a collective registration booklet was issued to each co-operative. Since the first household registration according to settlement location, the following registration for newborn babies should reference their parents' Hukou situation. In other words, urban Hukou (non-agricultural Hukou) and rural Hu-

kou (agricultural Hukou) are decided when people are born and then the unequal treatment is decided.

According to whether Hukou is transferred or not, migration is divided into two categories: permanent migration and temporary migration. Permanent migration refers to the migration across the boundary of certain administrative district undertaken by residents after they go through necessary procedures of transferring household registration (Hukou). Temporary migration refers to the migrants who go to work without transferring household registration (Hukou). In current China, rural people who flowing into cities are typically and mainly temporary migrants, which are different from permanent migrants under government's plan. Permanent urban Hukou holders can enjoy all government subsidies for urban residents in housing, medical care, education and transportation. As a temporary migrant, one should go to local police station to get a temporary resident permission card, but given no access to these subsidies. Take education as an example. When family carries out temporary rural-urban migration, children from the family need to pay additional fee to get a chance of enjoying educational service, even compulsory education, because of no local non-agricultural Hukou. And even after going through local education, they must come back to the original place where their Hukou is registered to attend examination of entrance.

Besides formal temporary migrants there are expected to be large numbers of informal migrants in urban areas who don't go to the local police station to get resident permission cards because they want to avoid the fee for these cards every year. Without resident permission, informal migrants must face up with the possibility of being repatriated to original rural area at any time.

Due to the fact that most of rural-urban migrants are temporary migrants, during the following research, rural-urban migrants are specified as temporary rural-urban migrants, no matter with or without residential permission card. Permanent rural-urban migrants with non-agricultural Hukou, according to popular census statistic, have been listed into urban permanent residents and normally are treated the same as original urban citizens.

2.2.3 The current decision-making model of rural-urban migrants in China

As we known, there are so many unequal treatments between rural-urban migrants and urban permanent residents. Before discussion the inequalities in detail, the current decision-making of rural-urban migration model in China is presented.

According to the fourth census in 1990, migration was divided into various categories according to the methods to migrate. Afterward Gu and Jian, associate professor of the Institute of Population research of the Wuhan University concluded: "considering the reality of rural-urban migration in our country, we mainly divide it into two categories: planned adjustment including transferring job, assignment and matriculation, study and training, retirement and quit working, and migration with direct relatives, and the rest part belong to market adjustment including "*wugongjingshang*"⁷, migration by marriage and relying on relatives and friends for shelter (Gu, Jian 1994: 85) . The former can get Hukou transfer; the latter have no chance to get a urban Hukou. But those transferred Hukou by government account for lower rate; most of rural-urban migrants depend on themselves.

⁷ It means that rural-urban migrants migrate to urban areas for seeking employment in industry and running business by themselves.

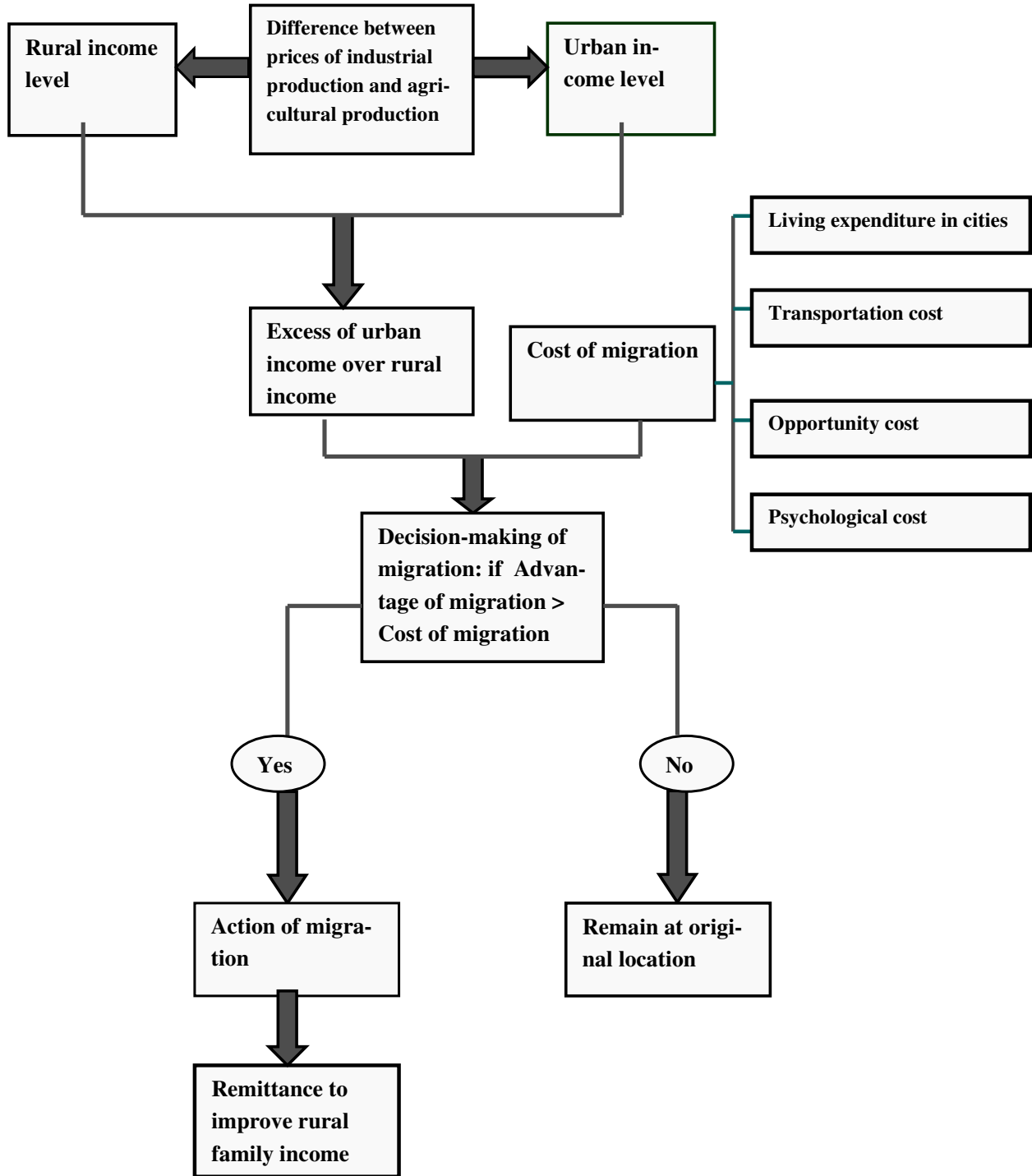


Figure 2.1 Flowchart of decision-making of rural-urban migration

In 1994, a research project on population mobility and urbanization in contemporary China presented a model of rural-urban migration of China showed as Figure 1. (Gu, Jian 1994: 32)

Initially the discrepancies between urban and rural actual income was seen to be the result from the big gap between rural social-economic situation marked with agricultural production and that of non-agricultural production in urban area. This gap will be exaggerated or reduced by the price difference between agricultural and industrial production and income transfer by remittance of migrants. “The currency income, however, does not reveal the whole discrepancies between rural and urban area, or in other words, non-currency factors also play an important role (Gu, Jian 1994: 33).” That’s why the concepts of cost and advantage of migration were introduced in section of the decision-making of rural-urban migration.

In China, except the difference in wage income, more important difference is the difference in non-wage income. Urban permanent residents always can enjoy various social welfare, subsidies, assurance and bonus.

Cost of migration is composed of the higher living cost in cities, transportation cost caused by a long-distance movement, opportunity cost consumed on migration, and also psychological cost presented here to describe the nervousness, maladjustment, and the similar emotion during the migration procedure which consequently result in economic loss. As an economic unit who takes maximizing advantage as the sole goal of his act, migrant or rural labour force surplus must estimate the cost and advantage of migration before his consciousness of migration came into being.

In addition, pull-push force influences the dynamics of migration hold by potential migrants. Push force is from rural area and pull force is from urban area. Generally our rural area character that every peasant takes on land approximately equal in size and quality, which differentiates from unequal land ownership in for example Latin America, so the push force in China rural area is not so strong. It’s concluded in the research: “rural-urban migration in China is mainly a pull-force model (Gu, Jian 1994: 33).” Considering that China is a big country with a vast expanse of land, in different region the push-pull force work in different degree.

In order to transform the consciousness of migration into act of movement, it’s necessary to go through evaluation and decision-making procedure. During this procedure, three aspects play an important role.

<1> Intervention factors including two main categories: obstacles and ‘sticky factors’. Under our traditional system, the obstacles which intervene rural-urban migration are mainly made up of Hukou (household registration) system, employment system, commercial production supply system, and housing system. In the meantime, a series of policies about agricultural production and development of agricultural industry try to bind rural people on the agricultural land. Those obstacles combined with sticky factors form a substantial rural-urban barrier and put aside the economic and marketing adjustment of labour force mobility. Once this barrier has been moved away or just loosened, a huge potential of migration might start in the whole country.

<2> Circulation of information (including oral information and literal information). In developed countries, migration information is spread mainly by public media, especially literal media. However, in China, oral transmission plays an important role in broadcasting migration information. This oral

way has special characteristics and regularity. At first, it's informal and operates by communication among countrymen, relatives and friends, and neighbours. At first sight, this oral transmission seems random and haphazard under the informal surface. It's by the spontaneous way that plenty of agricultural labour surplus successfully transfer into urban labour market, and a special organization of rural labour transmission, marked with "relationship of social intercourse", formed during this procedure.

<3> Effect of demonstration. In China migration views hold by people have an important effect on the dimension of real movement act. Grossly, the stronger rural people hold market consciousness, the more possibly they migrate from original location into developed areas. Migration demonstration cannot be ignored in helping to form the consciousness of migration in village. Normally, when a few rural people have achieved a higher living level by migration, those in the same village or even same region will be brought into migration for better life.

As a vital turning point, migration will spur migrants to be assimilated by local citizens in view of value, style of life, labour skills, and norm of behaviour etc. Nevertheless, as new comers, they still need a long time to adapt the new environment to get rid of the inferior social-economic status.

2.3 Social-economic status of rural-urban migrants

The social-economic status includes a series of indicators. In this part, employment, education, social welfare and settlement condition were employed to reflect the social-economic status of rural-urban migrants.

2.3.1 Employment characteristics

① Employment view

Dr. Xie mentioned the concept of "self-isolated career" like that: "considering the different Hukou status from common citizens, many rural-urban migrants voluntarily engaged in low-class job with low income and thus form concentration on such kinds of careers"(Xie, 2000: 97).

Through self-isolated career, rural-urban migrants avoid successfully direct competition with permanent urban citizens and consequently flee away from frustration and hurt brought by the competition. From this point, self-isolated migrants are more fortunate than those who work with physical force in state-owned corporation and enterprises and still get discrimination on status and income even after working harder than other workers. Restaurant industry, retail trade, tailor, washer, cook, to daily production supplier, mender and waster collector, are all common self-isolated careers.

Many researches related to migrants and employment show that the unemployment rate of rural-urban migrants is far lower than that of the permanent urban citizens. It seems that rural-urban migrants always can find a job because they would like to deal with what permanent urban citizens won't like to do and what is thought of as low-class job. Jones (1985) listed occupation characteristics with the lowest unemployment rate in the post-service time:

- <1> Labor-and-time consuming;
- <2> Indirectly influenced by technology competition;
- <3> Meeting individual daily need;
- <4> Based on the constant need of people;
- <5> Of reclaiming Material.

② Career distribution

Table2.2: career distribution (percentage %)

| Migration Classification \ Career classification | Industrial worker | Peasant | Cadre | Technician | Common office employee | Service people | Others |
|--|-------------------|---------|-------|------------|------------------------|----------------|--------|
| Permanent migrants in China | 48.6 | ---- | ---- | 2.9 | 45.7 | 2.9 | ---- |
| Temporary migrants in China | 5.8 | 1.3 | 0.4 | ---- | 0.9 | 91.1 | 0.4 |
| Permanent migrants in Wuhan | 66.7 | ---- | 0.5 | ---- | 4.2 | 25.0 | 4.2 |
| Temporary migrants in Wuhan | 6.3 | 1.6 | 1.8 | ---- | 1.1 | 89.9 | 0.5 |

Source: adapted from Population research Institute, Wuhan University, 1991

From table 2.2, it can be observed easily career distribution of permanent migrants is different from that of temporary migrants in China. About permanent migrants, those engaged as worker and common office employee compose of two largest groups and the rest, less than 10% permanent migrants, deal with other occupation. However over 90% temporary migrants depended on service industry to make living, few others work as industrial worker, technician, common office employee etc. the career distribution of temporary migrants in Wuhan is similar to that in China. But for permanent migrants in Wuhan, industry and service industry absorb most permanent migrants, which accounted for more than 90% of the total permanent migrants.

The fourth census in 1990 showed that characteristics of rural-urban migrants are:

<1> Rural-urban migrants working as self –employed mobile vendor make up the largest career group with rural-urban migrants up to 9.56%. And this is an informal seller who mainly works without fixed market and working stage.

<2> Working at the expense of consuming huge physical force, more than 30% migrants select construction worker, porter, tailor, bricklayer, and spinner etc. to make a living.

Also the table 2.2 shows that most migrants depend on labor-intensive industry, few of them make living on technology-intensive industry.

③ Career change

Before the economic reform, employment for rural-urban migrants consisted of industrial worker or cadre by several ways: joining the army, matriculation and marriage. And only a few of them successfully realized this mobility. At that time, limited by strict Hukou control, career change is connected with social-economic status change, or in Prof. Li's words, migration firstly was change of status, then was change of career (Li, 1996). No matter what, all the mobility is upwards because farming is down at the bottom of career in China.

After economic reform, change of career began to move away from status change that means peasants had not only one career choice without status change. Flexible choice of career made migrants in this time different from the first ones whose career change only once.

In 1996, the Renmin University of China organized a social research about migrants' career in the whole country, which includes 6400 samples cross 100 towns and 200 villages and residential committees. All the samples remained being temporary migrants according to Hukou.

Table 2.3: Original career and second career:

| Career | Structure of first career (%) | Structure of second career (%) |
|--|-------------------------------|--------------------------------|
| Agricultural producer | 68.6 | 12.4 |
| Non-skilled worker (by physical force) | 8.4 | 27.9 |
| Skilled worker (by physical force) | 11.1 | 21.4 |
| Service people | 7.1 | 26.9 |
| Common office employee | 0.4 | 2.0 |
| Primary special technician | 3.1 | 0.5 |
| Middle special technician | 0.4 | 0 |
| Senior manager | 0 | 0.5 |
| Self-employed business man | 0.8 | 6.5 |
| Police man | 0 | 1 |
| Other career | 0 | 1 |
| Total | 100 | 100 |

Source: adapted from the research of the Renmin University of China, (Li, 1996)

From the table 2.3, we can see that most of the rural-urban migrants were engaged in agricultural production while non-agricultural producer occupied 31.4% of total samples. It can be concluded that some people with agricultural Hukou directly went to cities to find a job after leaving school and have not been engaged in agricultural production at all. So there are three kinds of mobility: one is from agricultural career to non-agricultural, one is from agricultural to agricultural and the rest is

from non-agricultural to non-agricultural. Of course, some people keep in one career from the beginning to the end.

According to the table, most of them changed from agricultural production into industry and service industry. It's out of expectancy that 12.4% peasants still engaged in agricultural production. Why did they remain original career? Prof. Li explained: "in one hand, most of rural-urban migrants don't have special labour skills and are familiar with agricultural production. In the other hand, daily production market is vast because of high-density population in big cities (Li, 1996)." Thus part of peasants picked up the original work in suburban area.

2.3.2 Education unbalance

The inequalities of education principally embody in education chance and quality and relative payment.

Before migration

Money needed by construction, reconstruction and continuation to a school offering compulsory education in urban area should be listed in the investigation plans of infrastructure by local government, or be collected by other way; in rural area should be collected by village, and county government could give subsidies to the villages with difficulties according to the National Compulsory Education Rules. No matter central government or local government they do not subsidize poor peasant children to attend education, but also transfer the duty, which should have been undertaken by central government to peasants. In 2001, peasants spent 13 billion RMB to help build primary school in the countryside of China. In rural area, however, matriculation rate is far lower than that in urban area, and about 25% peasant children cannot go through junior middle school included in compulsory education. In some lagging regions, illiteracy and half-illiteracy rate is high to 35%. As far as rural-urban migrants are concerned, 80% of them accept junior middle school education or below.

The burden brought by additional education expenditure, poor educational service and lower family income compared with urban citizens reduce the education chance that peasant children can accept. Moreover, the inequality more reflects on the entrance examination to senior high school just after 9 years compulsory education. A great many of high schools stipulate a score line for rural candidates, which is tens of points higher than that for urban candidates, while the total score is 750 points. 30% undergraduates are from peasants who are about 70% of total population while 70% are from urban citizens who are about 30% of total population. Additionally, in rural area, due to the insufficient profession training supply, and lagging technology and information services, human capital cannot be improved which consequently influence not only peasant (including migrants) income but also the life quality of their younger generation and even the coming generations.

After migration

After migration, those who still keep agricultural status have three choices about education. One is spending much more money to send children into local school special for urban children. Another is

leaving children to middle or small cities near origin or even to original village for education. The last one is turning to special schools for younger rural-urban migrants.

Generally speaking children who get education chance by the first way endure the discrimination from local children because of their countryside accent and original education background if accepting education before migration. In certain degree, peasant status always makes them be looked down on by the classmates. However in many cases, rural-urban migrants who cannot support additional fee for their children often appeal to the schools special for their children or original schools. But both of them have poor education quality.

The special schools for migrants' children are different from the public schools supported by government. Due to the lower income and frequent migration, migrants' families cannot offer their children with stable and good education, and the special schools for them are equipped with simple teaching apparatus, classrooms and even insufficient teaching staffs.

A research for 2000 rural-urban migrant children carried out in the informal schools of Wuhan reported that over half of them have accepted education in public school (Zhao and Wu, 2002). What leads to transfer school includes three main reasons: parents change their making living location frequently; high tuition and additional fees; and discrimination. Additional fee for primary student is 400 RMB every year and that for junior middle student is 600 RMB every year according to the Education Ministry, which are considerable expenses for most migrants' family.

2.3.3 Social welfare

As public welfare project, social welfare supported by government offer necessary living materials to those who suffer unemployment, disease, caducity and lack of labor capability and income source.

Because the targets who accept the social welfare are whole social members, this welfare should cover the whole society. But in China the subsidies from government are only for permanent urban residents. Agricultural people (including migrants) are still out of this project actually. Temporary rural-urban migrants, as long as under the status of agricultural Hukou, have no chance to get the same social welfare as permanent urban citizens, no matter how long they service for the city. Thus they develop "self-support" methods to ensure their normal life with aid from relatives and friends and few from government and community. At present a view prevails that government nowadays cannot build an overall welfare-system for the society, and rural-urban migrants will not achieve equal social welfare in a short time.

2.4 Rural-urban migrants' settlement in big cities of China and Wuhan

For rural-urban migrants, settlement condition is closely related to employment and income situation. Those who are employed in industry sectors normally get accommodations offered by employers or employ unit. Construction workers usually live in temporary and simple shelter directly built on their working site. The rest migrants without long-term employers or self-employed distribute into the cit-

ies and get accommodation by themselves. Renting house is the most popular way. Due the severe land administration in urban administrative districts, self-help shelter didn't occur at large scale despite massive poor migrants' influx. This is contrary what one would expect and different from the experience of other developing countries.

The record for 796,000 rural-urban migrants in Beijing of 1987 showed that: 29.8% migrants lived in construction sites, 27.0% migrants lived in fleabags, 11.6% got free lodgings from relatives and friends in Beijing, and the rest rent house (Xie, 2000:118). Compared with the record of 1985, the percentage of those living in fleabags get down while those who lived by renting house or supported by employers grew up. That illustrates the expenditure of housing kept down because the cost in fleabag is higher than other ways. In the meantime, similar investigation carried out in Wuhan, Chengdu and Zhengzhou showed the same regularity (Xie, 2000: 118). Except fleabag, accommodation supported by employers and renting houses are the two main way of settlement.

Due to need of work and administration, employment units or departments usually offer the collective and relatively closed dormitories near outside-labours. By this way, outside-labours are limited to relatively isolated space near their working sites. For the city, this isolation decreases the traffic jams in rushing hour.

Relatively speaking, shelters for construction worker are in poor condition. Due to the temporary status, these shelters normally are simple and crude and, in some content, similar to slum of other developed countries. But they are more methodically organized together. That settlement on working site also decreases or even eliminates traffic pressure.

In addition, most rural-urban migrants who deal with settlement by themselves put their sights on dilapidated old built-up areas and urban fringes. The distribution ratio of rural-urban migrants in the two locations is different from one city to another.

2.4.1 Spatial distribution of rural-urban migrants in big city

Beijing, Shanghai and Guangzhou attract most rural-urban migrants from whole country. It's difficult for them to merge with local residents, even poor residents, since the big gap of cultural background and living styles cannot be avoid between long-distance migrants and initial residents. In these cities, rural-urban migrants prefer urban fringe or suburban areas rather than inner city. In the survey of Beijing in 1994, 86.6% rural-urban migrants settled down on urban fringe and suburban (Xie, 2000: 119). In some districts quite stable concentration area came into being gradually with plenty of rural-urban migrants dwellers converging together. In "Zhejiang Village" of suburban area in Beijing, only hundreds of outside-labours appeared there ten years ago, but now there were more than 30,000 migrant dwellers (Dang, 1995). In urban fringe or suburban areas, every migrant can get an accommodation in price of 50 RMB per month. Related research in Shanghai and Guangzhou showed that rural-urban migrants like to form their own Town, particularly in fringe part of city (Xie, 2000: 119).

As far as other cities in central and western China are concerned, the distributions of rural-urban migrants show different regularity. Sample research of Wuhan in 1990 discovered that 79.6% rural-urban migrants got accommodation from inner city while the rest 20.4% lived in urban fringe and suburban areas. (Wuhan Statistical Bureau, 1990) According to the record of 1998, the proportion of

those in inner city grew up to 87.5%, only 12.5% lived in urban fringe. Potential employment chances brought by large-size traffic nodes and flourishing free markets attracted most rural-urban migrants. In the related research of 2000, about 90% rural-urban migrants put their work and settlement together or nearly, thus those temporary dwellers firstly select inner city to settle down then turn to the urban fringes. (Wuhan Statistical Bureau, 2000)

The following figure shows the distribution of rural-urban migrants in Wuhan of 2000, which discovers that the more developed the district is, the more rural-urban migrants concentrate there.

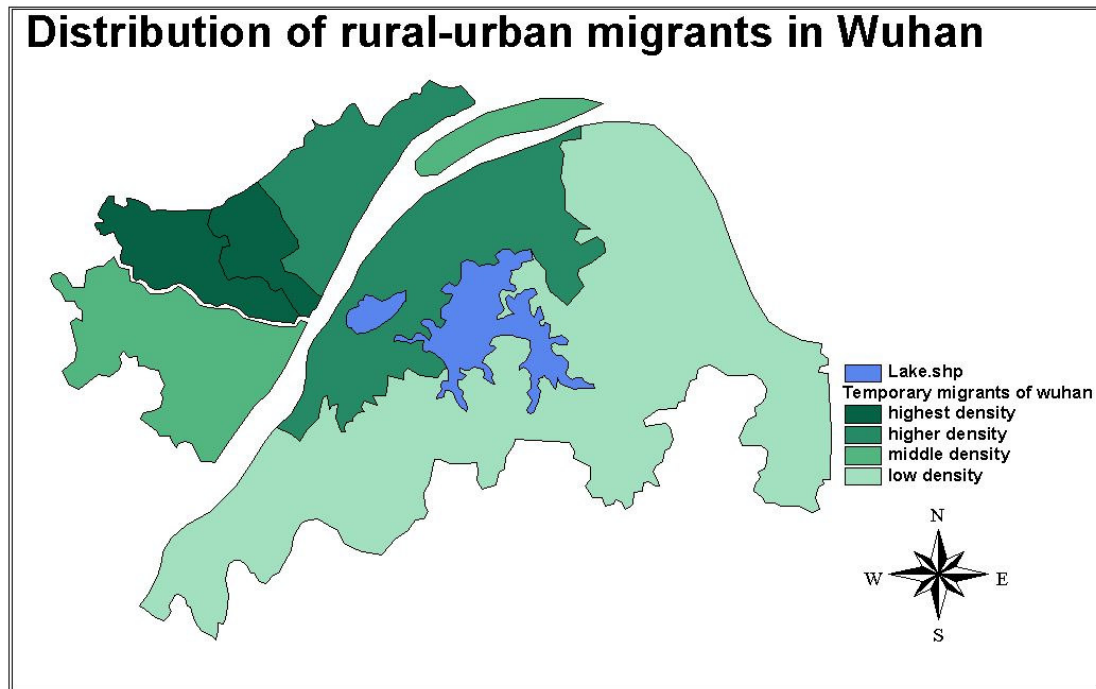


Figure 2.2 Spatial-distribution of rural-urban migrants in Wuhan

Source: adapted from Year Book 2000 of Wuhan

2.4.2 Accommodation source and conditions

According to the source of accommodation of rural-urban migrants, several types divided are:

❶ Form employ organization or unit. When urban factories and corporations employ plenty of rural labours, these organizations or units usually offer collective dormitories for the outside employees. Generally speaking, these dormitories are in poor conditions. One room has usable floor areas ranging from twenty to thirty m^2 , and is equipped only bed and communal toilet. Fresh air cannot be insured because ten or tens of people need to share one such a room and no ventilation facilities are available.

❷ Renting house individually. As mentioned before, renting house is an important settlement way for rural-urban migrants. There are mainly two house sources available to rent when divided by location. One is from individual owners of inner city; the other is from local peasant owners in urban fringe.

Increasing aspiration for accommodation of massive immigrants stimulates the potential housing markets and leads to fast construction in these areas. Housing-owners of inner city and urban fringe often break up the housing building rules issued by national or local government to extend housing areas, thus density of building always far exceeding national norm and residential quality keeps declining.

③Self-help settlement. Over the past-war period, Turner has been the most influential writer about housing for the poor in the developing world. In 1970s his ideas of self-help settlement influenced the World Bank to initiate major sites-and-services projects. Orderly squatter or self-help settlement has been the most important way for the poor in urban areas of developing countries. However in China, government remains severe control on self-help settlement, although some rural-urban migrants also built shelters by themselves. Part of rural-urban migrants prop up a shelter with simple materials in dull corners of city. Actually this shelter is simpler compared with organized self-help settlement of other developing countries and usually in chaos.

④Government invest. When realizing the importance of collective administration on rural-urban migrants, local governments of some cities begin to develop united settlement for those temporary residents. These special communities follow a series of norm and planning and are equipped with basic and necessary facilities. Compared with other ways mentioned above, residential conditions and environments are relatively better. But, due to the limited land of cities, only few special communities appear and meet the settlement demand of a little part of rural-urban migrant.

⑤Buying house. For high-income migrants, it's a good solution to settle down with individual house. In many big cities, immigrants can get an urban permanent status by buying a house above a certain price issued by local government. For most rural-urban migrants, it's only an unrealistic dream.

2.5 Summary

Currently rural-urban migrants are situated at the bottom of urban life by virtue of their social-economic status. Under the unequal treatment, rural-urban migrants need to work more hard to make their lives and their present residential conditions, as expected by most people, are unsatisfactory.

Their low social-economic status should trace back to the initial division of population policy, since then government put more attention on urban development with plenty of financial, material and human capital support. But rural areas get little support from government. During this procedure, living condition of urban citizens has been improved fast, but rural people improve their lives spontaneously without or with little help from outside. So far, living level of rural-people is still far behind that of urban citizen. Before 1990s, due to the severe limitation on population movement from countryside to cities, rural people were bonded with their land. When the limitation began to weaken, rural people cannot be prevented from migrating into cities for better life.

For the urban government with limited capacities, the sudden and massive new comers mean a headache. Governments, at least the current governments, have no enough economic force to absorb so many outside labourers, so the rural-urban migrants has been out of the governmental plans and budget. At present, central government began to attach importance to the social-economic problems

brought by rural-urban migration. But the improvement of the rural-urban migrants' lives should depend more on themselves than governments in a short time.

Chapter 3 Research methodology

3.1 Introduction

In the previous chapters we have presented the research objectives and problem as well as the research questions into which the problem statement was specified. Also the general social-economic status of rural-urban migrants has been depicted earlier. Before presenting the research-findings we will discuss in this chapter the research method for residential quality evaluation.

To identify the differences of residential conditions between rural-urban migrants living in different locations of the city as well as between rural-urban migrants and permanent urban residents, statistical methods are used as main analysis and comparison method to identify the residential quality of rural-urban migrants and a MCE (multi-criteria evaluation) as aided instrument to quantify the comprehensive residential quality.

3.2 Methods used for analysis and evaluation of residential quality

3.2.1 Qualification of residential quality

In this research the term “residential quality” refers to the quality of residential environment and housing, thus the definition “residential quality” differs from “housing quality”. The former includes the housing and the outdoor environment and is a more complicated concept. The latter has been in common use in urban studies and planning. The difference between the two terms lies on that “housing quality” represents a narrower scope, which contains fewer variables, which has been contained into the scope of “residential quality” (Liang, 1980). In the following study, the variables used to define and measure residential quality consist of variables from two aspects of housing and outside environment characteristics.

Housing provide shelter to people, which embody a fundamental human need. The U.S. census of housing (1950, 1960) and Musil’s (1966) comparative discussion of housing policy in Great Britain and Czechoslovakia provides an indication of the problems associated with the housing quality. There are two problems associated with the housing quality: physical attributes associated only with housing and functional attributes associated only with housing. That means the quality of housing lies not in the provision of shelter, but in the components of shelter and the consequent functions. Thus housing is typically considered to be a shelter, which contains sleeping, cooking, eating and bathing facilities.

However this is not enough. A review of real estate sections indicates that real estate brokers view housing quality in terms of the construction techniques, materials, and occasionally design features. These indices have been developed to provide a basis for determining whether a dwelling meets some minimum standard for healthful living. The census indices are related to the building only, and fall under three categories: (1.) Facilities (toilet, water supply, bath, etc.), (2.) Maintenance (condition of repair), (3.) Occupancy (room crowding).

In 2000 the U.S. census of housing surveyed the house from the aspects of housing structure and facilities. Housing structure includes units in structure, and number of rooms and number of bedrooms. Facilities consist of plumbing and kitchen facilities, telephone service, vehicles available, and heating fuel. The census showed that the standards of modern housing contain more than fundamental shelter functions. They put more attention on healthy and convenient living.

Also there are other indicators used to measure housing quality. For example, HQI (housing quality indicator), a measurement and assessment tool designed to allow housing system to be evaluated on the basis of quality rather than simply of cost, assesses the quality of housing project using three main categories: location, design and performance (DTLR⁸, 2000). The main body of the HQI form contains information on the ten indicators that measure quality. Each indicator contains a series of questions that are completed by the developer or client. The ten indicators are:

Table 3.1 Indicators used to measure housing quality in HQI

-
1. Location

 2. Site - visual impact, layout and landscaping
 3. Site - open space
 4. Site - routes and movement
 5. Site - Unit
 6. Unit - layout
 7. Unit - noise, light and services
 8. Unit - accessibility
 9. Unit - energy, green and sustainability issues
 10. Performance in use
-

In this period, housing has been equipped with more outside facilities and housing quality has begun to expand to the scope of the outdoor environment. The overlapped and ambiguous belt makes both housing quality and outside environment cannot be divided easily.

In this research, housing quality and outdoors environment feature more by territorial division than functional division. In this research, all facilities outside of the house, including infrastructure, belong to the outdoors environment.

Sustainable community environment has been put forward and spread in the past several years in China. A few new-built and high-class neighbourhoods put much attention on the outdoor environment, other middle-or-low-class neighbourhoods are still marked with crowded building. As for the rural-urban migrants in the bottom of the cities are concerned, their popular low income and the special attitude to consumption in the cities limit their settlement to only the most indispensable function. They care little about the green space, sport and service facilities, and other landscapes. Due to

⁸ It's the abbreviation of the department for transport, Local Government and the Regions and the Housing Corporation, UK.

the present residential situation of rural-urban migrants, road system and environment are employed to present the outdoor environment.

3.2.2 Methods used for residential quality research

Residential quality is such a complicated concept, which is related to a set of interrelated variables. Due to the shortage of records of these variables in the censuses and other statistical departments, residential quality is not easy to be perceived. Thus, so far, little has been done on residential quality in the work of social area analysis. In the following two measurement methods will be presented. One is to measure residential quality from the aspect of “principal services” put forward by Andrew and Richard (1991), the other was carried out in 1980s by Chinese University of Hong Kong.

① “Principal services” used to measure residential quality

Normally settlements also include essential communal services such as schools, health centres, recreational areas, leisure and religious activities, and basic infrastructure. Without any infrastructure services housing was defined as zero baseline service level, which was presented in the situation: “a residential environment lacking of drainage, sanitation, suitable access, solid waste removal, and power supply, and only being access to small quantities of grossly polluted waster in many cases” (Andrew & Richard, 1991:6).

The primary level of services, the first and lowest stage above the zero baseline of physical infrastructure to satisfy basic residential needs, is measured by seven indicators, which were define as “principal services” by Andrew & Richard:

“**Ground preparation** to provide the foundation for the construction of shelter, including the protection of low-lying land for inundation by flood waters and the prevention of soil erosion and movement on steep hillsides.”

“**Drainage** to permit both storm water and household waste water to drain away without creating stagnant pools.”

“**Access and roads** to define a site layout with clear boundaries for housing plots, access routes, rights of way and emergency vehicle access.”

“Water supply to provide clean water in adequate quantities to cope with basic needs.”

“**Sanitation** to remove and dispose safely of human wastes; this is an essential component of environmental health.”

“**Solid waste management** to ensure that refuse which is generated on the site is collected and disposed of.”

“**Power supply** for cooking, lighting or to run other electrical appliances.”

Andrew and Richard suggested that the seven factors directly influence residential quality and divided shelter or neighbourhood for low-income residents from slum. As a minimum standard of set-

tlement, principal services are used only for households with relatively lower income. For rich households, they should measure residential quality from more aspects due to their pursuit for better living quality. However the primary services are typical representatives, which are significant to illustrate rural-urban migrants' residential quality. But due to the special features of China, it's necessary to change some indicators in order to make it suitable Chinese situation. For example, Secondly since power supply in current China has been sufficient to support daily use for all people, it is of no value to reflect the residential level of study objects.

② Residential quality research in Hong Kong of 1980s

With the aim of investigating the real nature of urban residential quality, in Hong Kong a quantitative approach was undertaken in order to make residential quality to be measure, so as to see how many principle criteria of residential quality could be identified, and their spatial differentiation in the urban area⁹. In that research 29 variables, from two aspects of housing and environment characteristics, were used as principal criteria of residential quality¹⁰. (See appendix 2 for the list of variables)

That study employed the Principal Component Analysis (PCA) model to correlate the 29 variables. The author used simple-structure Varimax Rotation to identify the eight criteria, which accounted for 75.2% of total variance, of residential quality after re-arranging the original factor matrix. The first factor is fitted to the data so as to produce the greatest regularity, the successive factors are fitted so as to best define the remaining regularities. Beyond the eight factors, other factors can be fitted to the data to account for very small variations and hardly represent meaningful association with the main criteria. Also every variable were weighted from 0 to 5 according to respective attributes. An index representing the unbiased integration of the eight criteria of residential quality was also constructed. Then a map with every parcel marked by the final result from eight criteria was created to illustrate the residential quality of the city from best to worst.

3.3 Method used in this research

This research focuses more on analysis and comparison of residential quality between different migrants group and permanent urban citizens. In order to deeply understand the residential situation of rural-urban migrants, both qualitative and quantitative methods have been used in the following chapters.

3.3.1 Indicators

In the collection of data pertaining to residential quality a pioneer work of field investigation for the sample area was undertaken during the February – March 2003. The results of the survey, together with the data obtained from the governmental departments, were used for deriving the 16 variables, which were listed in Table 3.1.

⁹ The survey of the residential quality was carried out by a team of some 30 geography students of the Chinese University of Hong Kong during April 1976 – November 1977 under the supervision of the author.

¹⁰ The 29 variables were classified into six broad categories: residential density, types of housing, domestic facilities, physical conditions of building, degree of mixing in land use, and aspects of residential environment

Table 3.2 The 16 Variables Pertaining to Residential Quality

| | |
|--|----|
| A Residential density | |
| <1> Housing space per person | 1 |
| B Housing quality | |
| <1> House age | 2 |
| <2> Sunshine | 3 |
| <3> Ventilation | 4 |
| C Basic equipment | |
| <1> Water supply (tap water) | 5 |
| <2> Sanitation facilities | 6 |
| <3> Kitchen | 7 |
| D Road system | |
| Road problem | |
| <1> Road is narrow, | 8 |
| <2> Road is muddy, | 9 |
| <3> Road is occupied, | 10 |
| <4> Road is chaotic, | 11 |
| <5> Road is not equipped with drainage system, | 12 |
| E Environmental pollution | |
| <1> Air pollution | 13 |
| <2> Noise pollution | 14 |
| <3> Water pollution | 15 |
| <4> Solid waste pollution | 16 |

The 16 variables were classified into 5 broad categories. The first category represents residential density comprising only one variable: Housing area per person, which only represent the housing space for residents.

The second category representing the housing quality includes 3 variables: house age, sunshine (or daylight) and ventilation. House age is an important variable, which reflect the old level of building and directly decide the security of settlement. There is no big scale sample in my research, so detailed housing structure and building density is unable to be used as key variables presenting housing quality.

No matter what kind of housing structure and building density, good sunshine and ventilation condition is their common goal to make healthy settlement ensured. Despite the difficulty to measure and evaluate, both sunshine and ventilation were selected as key variables describing housing quality.

The third category is concerned with the basic housing equipment on infrastructure, which consists of 3 variables: water supply (equipped with drainage system for wastewater), sanitation (meaning toilet), and kitchen (referring to separate space with stove, special for cook). Although in many cases sanitation comprises toilet and bathroom, only toilet was taken as measuring variable by virtue of the

actual situation that 8% percent residents have toilet and bathroom at the same time (a sample investigation on 500 households of Wuhan in 2000). Traditional approach of bath for those migrants is aided with alternative instruments, and the bathroom is not the same principal as toilet. So in this research bathroom wasn't counted into the variable list.

The fourth category, which is concerned with the road system, includes 5 familiar problems of road. In this situation, road means pedestrian and vehicle access to all houses at slow speed.

<1> Narrow road refers that is not broad enough to match the demands of access. This problem is popular in some concentration area with high-density building.

<2> Road without paved surface is subjected to muddiness when meeting with precipitation and the ragged road surfaces always bring difficulty to drain away water. Under both conditions, it's inconvenient for pedestrian and vehicle to pass.

<3> When without necessary commercial services, simple and mobile trade is going on by the road. Temporary vendor or pitchman more often than not occupy bypass roads, which are easily overlooked by inspectors and mixed neighbourhood for low-income residents, lacking of necessary services, is a seedbed for this kind of informal trade.

<4> Settlements for low-income residents are likely to be lacking of planning that road net is complex and chaotic without clear classification of functions.

<5> Without drainage system, road is likely to stockpile water for long time. Plash and small ponds always form access handicap.

The last category presenting environmental pollution consists of familiar pollution problems. Air pollution, noise pollution and water pollution are common in a big city with high-density population while solid waste pollution is more common in low-income communities or neighbourhoods than other part of city.

Other factors influencing the residential quality, which are either not so principal or difficult to measure, had got to be cut off, considering the limited time and manpower.

3.3.2 Method used for analysis

① Qualitative analysis

As mentioned before, comparison will be one of the most important ways to analysis residential situation of rural-urban migrants. There are many comparison methods in statistical theories. According to the size there are simulated paired comparison by experiment and unequal size comparison, which is common in survey sample. No matter which size the all comparative studies are designed to discover and evaluate differences between effects rather than the effects themselves. In planned experiments equal numbers, being similar to analyse and more efficient, are preferable, but equality is not necessary in this research. Due to the random sample, an unequal number comparison is employed to deeply investigate the residential characteristics of rural-urban migrants.

② Quantitative analysis

For a research with many variables, it is important to get a comprehensive result of all the variables. This study used the “Hierarchical analysis with tree-degree” approach (Xu, 1999:142) to correlate the 16 variables. At first the importance are compared between criteria pairwise to get comparison matrix. Based on the comparison matrix and related formula a judgement matrix is established. After normalization, an eigenvector out of the formula is used to present the weights. But this way only is used for the variables or aspects without correlation. In the case that one variable with many possible values, every value is weighted with weighting points beginning from 1.

As presented by the indicator list, there are 5 categories used to reflect the residential quality and every category includes several variables. Comparison first is carried out in every variable and then between indicators belonging to every category and then between 5 categories with the aim to get their weights. Percentage out of fieldwork for every variable presents its membership value.

➔First step

In this research, “hierarchical analysis with three degree” approach is used to endow every variable or category with weights. The following part is about how to calculate the weights.

A Comparison Matrix is given by comparison between variables pairwise according to the following formula.

K_{ij} is the criterion in Comparison Matrix, and “ i ” is encoding of row and “ j ” is encoding of volume.

$$K_{ij} = \begin{cases} 0 & \text{(criterion } i \text{ is less important than criterion } j) \\ 1 & \text{(criterion } i \text{ is the same important to criterion } j) \\ 2 & \text{(criterion } i \text{ is more important than criterion } j) \end{cases}$$

Then the Judgment Matrix is generated from comparison matrix and related mathematic formats.

The procedure is explained with a 4-variables (solid waste pollution, air pollution, water pollution and noise pollution) evaluation.

Table 3.3 Comparison Matrix

| $K_i \backslash K_j$ | K_1 | K_2 | K_3 | K_4 | $\sum_{i=1}^4 k_i$ | |
|-----------------------------|-------|-------|-------|-------|--------------------|-------|
| Solid waste pollution K_1 | 1 | 2 | 2 | 2 | 7 | K_1 |
| Air pollution K_2 | 0 | 1 | 2 | 2 | 5 | K_2 |
| Water pollution K_3 | 0 | 0 | 1 | 0 | 1 | K_3 |
| Noise pollution K_4 | 0 | 0 | 2 | 1 | 3 | K_4 |

Format for Judgment Matrix

$$r_{ij} = \begin{cases} [(K_i - K_j) / (K_{max} - K_{min})] \cdot (b_m - 1) + 1 & (K_i \geq K_j) & \text{①} \\ 1 / \{ [(K_i - K_j) / (K_{max} - K_{min})] \cdot (b_m - 1) + 1 \} & (K_i < K_j) & \text{②} \end{cases}$$

$$b_m = K_{max} + K_{min}$$

Note: “i” and “j” of r_{ij} are the correspondent to the “i” and “j” from K_i and K_j . “i” and “j” respectively represent the coding of row and volume in the Judgment Matrix. K_i and K_j mean the cumulative value of every row ($\sum_{i=4}^4 ki$). And K_{max} and K_{min} respectively mean the maximum and minimum of K value (from K_1 to K_4). In this example, K_{max} is 7 and K_{min} is 1.

The value of r_{ij} means the elements of Judgment Matrix. For example, in the judgment Matrix, r_{11} refers to the row1 and volume 1, because $K_1=k_1$, which accord with the precondition ($K_i \geq K_j$) of formula ①, so it’s needed to use formula ① to calculate the value of r_{11} , which in 1 in the following matrix. The r_{21} is 3/10, which is from formula ② because K_2 less than K_1 and accord with the precondition of formula ② ($K_i < K_j$).

Table 3.4 Judgment Matrix

| | r_j | | | |
|-----------------------------|-------|-------|-------|-------|
| r_i | r_1 | r_2 | r_3 | r_4 |
| Solid waste pollution r_1 | 1 | 10/3 | 8 | 17/3 |
| Air pollution r_2 | 3/10 | 1 | 17/3 | 10/3 |
| Water pollution r_3 | 1/8 | 3/17 | 1 | 3/10 |
| Noise pollution r_4 | 3/17 | 3/10 | 10/3 | 1 |

After coherence proof-test, the eigenvector (normalized) is:

$$\overline{W} (4*4)=(0.588, 0.256, 0.048, 0.108)$$

The figures, 0.588, 0.256, 0.048, 0.108, respectively represent the important degree of the four variables to the category they compose of. Also the 3by3 and 5by5 matrix get their eigenvector is:

$$\overline{W} (3*3)=(0.669, 0.243, 0.088)$$

$$\overline{W} (5*5)=(0.529, 0.260, 0.123, 0.058, 0.030)$$

Note: The figures are arrayed according to the important degree for every criterion from high to low.

➔Second step

Let's take basic equipment as example. Basic equipment contains water supply, sanitation and kitchen. For every variable, the weighting points given are: private facility: 3 points; communal facility 2 points; and without facility: 1 point. According to the percentage of every part, which composes of one variable, every variable get a weighting points. Take water supply as example:

Table 3.5 Water supply in old built-up area

| Water supply (%) | Percentage (%) | Weighting points |
|--------------------|----------------|------------------|
| Private tap | 45.6 | 3 |
| Communal tap | 52.9 | 2 |
| Others (or no tap) | 1.5 | 1 |

Weighting points for variable of water supply in old built-up area:

$$0.456 \cdot 3 + 0.529 \cdot 2 + 0.015 \cdot 1 = 2.441 \quad 2.441/3 = 0.814$$

Through the same approach, the weighting points for sanitation and kitchen are: 0.709 and 0.653.

➔Third step

Then the weighting points for the basic equipment follow the next formula:

$$(0.669, 0.243, 0.088) \bullet \begin{bmatrix} 0.814 \\ 0.709 \\ 0.653 \end{bmatrix} = 0.774$$

Use the same way to endow the five categories with weighting points and weight points and the final result for the residential quality of rural-urban migrants in different parts of the city. The chapter 4 will present the detailed measuring procedure.

This method used in this research is an easy method to measure many variables. Compared with other methods, this method is relatively objective. However it has limitation on the final result, which only reflects the relative value not absolute value. In other words, the final results make no sense if they are not used to compare between each other.

Chapter 4 Residential quality and characteristics of rural-urban migrants

4.1 Introduction

Urban development is following the spatial pattern of “expanding from the inner city outwards”. The urban fringe is therefore expected to have different living and dwelling characteristics compared to the inner city. Thus a field survey was carried out in two migrants’ sub-groups: rural-urban migrants in old built-up area, rural-urban migrants of urban fringe, which was classified according to settlement location selection.

According to the initial assumption that different settlement location was corresponding to different living conditions, this chapter will highlight on identifying and comparing the residential difference between the two migrants’ sub-groups as well as a consequent discussion on the main causes of the differences.

4.2 Analysis of relationship between settlement location and residential quality

Before we enter into the discussion about residential quality, firstly we should get a general impression of the settlement location. As we known, in this research, settlement was divided into old-built up area and urban fringe according to the spatial pattern and temporal order of urban development.

“Old built-up area” is a general concept, which includes various kinds of land use types like commercial area, residential area, and mixed area etc. As for Wuhan, old commercial areas mainly concentrated on Hankou Town and still remain the initial land use type. Those commercial areas have kept active since 1950’s when they were built-up, and are of huge commercial value at present. They have been well maintained on infrastructure, building and even environment, which attributes to the governmental and individual heavily investing and the consequently quick renew, reconstruction and development. Some other old built-up areas, like part of the sample areas in this research, at the same age of or a little younger than those commercial areas, however, remain in chaotic function and layout as well as old infrastructure and municipal centre, but without huge commercial or economic potential. For individual investors, the slight profits or even negative profits brought by re-development of these areas are not worthy to be considered. Meantime the huge difficulty of re-development and renew makes it impossible for local government to reconstruct these areas on a large scale, at least, impossible in short time. Thus, since these areas have been occupied by original residents, they have featured random construction, chaotic function and crowded settlement. When congested with plenty of rural-urban migrants, these areas couldn’t keep away form a decreasing residential environment.

Due to the change of land uses from rural land to urban land and of local residents from agricultural population to non-agricultural population, urban fringe is one of the most important parts in the urban area. During the development procedure, cities need to contend with population’s living where

crowded population and massive demand for living space force developers out into surrounding rural area. For much the same reasons, housing is creeping into this area. Demand for housing from workers at the business parks and offices also located out of town, as well as need for dormitory villages for existing workers from the city looking to move out of the urban area, means more and more farm land is changing into urban built-up land and also means that urban fringe is keeping active with the development and regeneration of local land.

In what follows the residential quality of the old built-up area is compared with the residential quality of the urban fringe based on the results of the sample survey. A total of 102 migrants were interviewed from the two areas: 70 from old built-up area and 32 from fringe of the city (for details of the survey see section 1.6.2).

The following five aspects will be discussed:

- Living density;
- Housing quality;
- Basic equipments;
- Road system;
- Environment pollution.

4.2.1 Residential density: average housing space

No matter living in old built-up area or urban fringe, rural-urban migrants polled have the same average housing space per capita of 10.7 sq. m., although residential density (presented by average housing space per capita) of inner city expected to be higher than that of the urban fringe. As we known, it's difficult to find more space for settlement in old built-up area with high-density population and crowd building as well as the land of high value, while in urban fringe land value is low and plenty of land is available for building. It's easy to be taken as granted that average housing area of rural-urban migrants in the inner city is lower than that in urban fringe.

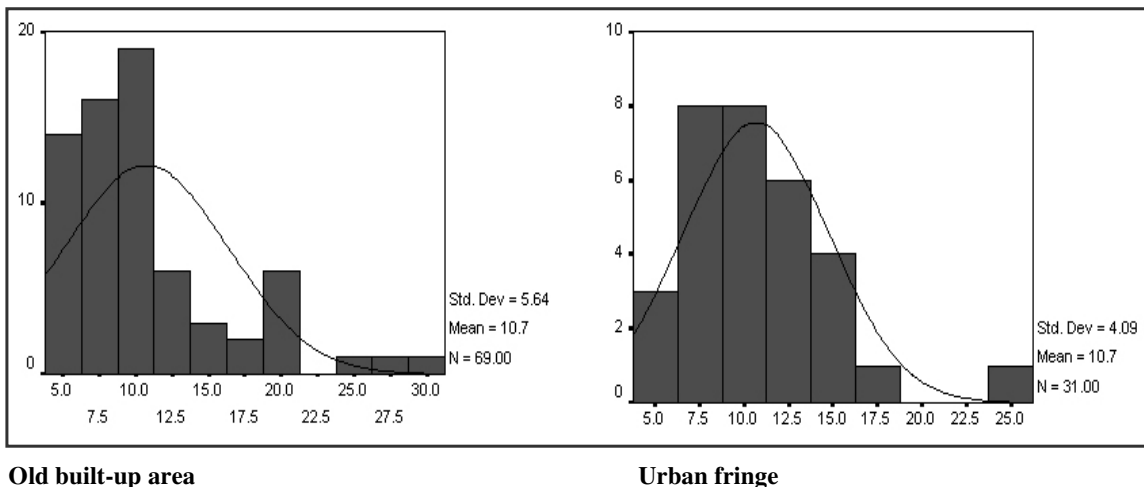


Figure 4.1 Average housing spaces (Source: sample survey)



Usually income level is parallel to housing expenditure for a certain group with basic features in common. This it can be expected that income level is parallel to housing space, which was confirmed by the field survey. The higher the income, the more the housing space enjoyed by those migrants. In or-

Old built-up area

Urban fringe

der to find the reason of

why there are no remarkable disparities on average housing space between the two categories, let's take a close look at their income structure and the corresponding housing spaces.

Table 4.1 Income levels of rural-urban migrants living in different parts of city

| | Old built-up area | | | Urban fringe | | |
|--------------|-------------------|----------|------|--------------|----------|------|
| Income level | (%) | Sta. Dev | Mean | (%) | Std. Dev | Mean |
| <500 RMB | 58.0 | 3.27 | 8.7 | 51.6 | 3.6 | 9.4 |
| 500-800 RMB | 21.7 | 5.7 | 12.3 | 38.7 | 5.03 | 12.8 |
| 800-1200 RMB | 14.5 | 4.14 | 13.1 | 9.7 | 1.61 | 13.2 |
| >1200 RMB | 5.8 | 4.17 | 15.4 | 0 | 0 | 0 |

Source: from sample survey

According to the table 4.1, it can be found that over half rural-urban migrants have income less than 500 RMB per month in both old built-up area and urban fringe. Although of the same income level, the average housing space of rural-urban migrants in old built-up area is marginal lower than that in urban fringe, but the ratio of rural-urban migrants with higher income in old built-up area is higher than that of the urban fringe. Generally speaking the income structure of urban fringe more concentrate on the middle class, with less than 10% people have income over 800 RMB and no people have income over 1200 RMB per month. However in old built-up area, the income differences and inequality are more remarkable with over 20 % migrants have income over than 800 RMB and among them %5.8 have income over 1200 RMB.

It can be concluded that the income of migrants in urban fringe is more concentrated in the middle classed while the income in the old built-up area is more spread. The structure of housing space per

capita has the same characteristics (see standard deviation), but there is no big difference on the mean value of housing spaces for all sample required in both areas.

4.2.2 Housing quality: house age, sunshine and ventilation

Like other big cities, Wuhan is developing following the primary spatial pattern of “from inner to outside” and “from small to big”. Inner city is expected to differ from urban fringe on structure and age of houses.

Table 4.2 shows that both locations have most houses built in recent 15 years with percentage proportion over 80%, although not surprisingly relatively more new houses can be found in the urban fringe, especially built in recent 5 years. These old built-up areas, they were not so crowded like what they are today. From the beginning of rural-urban migration in big scale, accommodation was needed in abundance, so local residents, particular houses owners with real estate, took advantage to expand the area of housing for rent. It forms a situation that new houses appeared among existing old built-up areas every year and thus today’s old built-up area is at the status of mixed houses of different periods.

Table 4.2 Housing quality of rural-urban migrants living in different parts in city

| Items | Old built-up area | Urban fringe |
|----------------------|-------------------|--------------|
| House age (%) | | |
| <5 years | 15.9 | 34.4 |
| 5-15 years | 66.7 | 50.0 |
| 15-30 years | 15.9 | 15.6 |
| >30 years | 1.4 | 0 |
| Sunshine | | |
| Perfect | 18.8 | 6.3 |
| Good | 27.5 | 46.9 |
| Poor | 31.9 | 40.6 |
| No sunshine | 21.7 | 6.3 |
| Ventilation | | |
| Perfect | 15.9 | 9.4 |
| Good | 34.8 | 59.4 |
| Poor | 39.1 | 31.3 |
| No ventilation | 10.1 | 0 |

Source: from sample survey

From table 4.2, the indoor sunshine and air condition received by the rural-urban migrants in the urban fringe is better than those in the old built-up areas. Of rural-urban migrants in old built-up area, less than half live with good and perfect sunshine and ventilation and above 10% live in closed room without windows and any other facilities to get fresh air and sunshine. The shortage of sunshine and fresh air show that there are high proportion of the crowded building and unreasonable house structure in the old built-up area. Normally, poor and crowded living space is the seedbed of disease and

guilty. For those who living in the urban fringe, most of them can get good or poor sunshine and fresh air, and few of them get perfect or no sunshine and fresh air. That means the houses rented in urban fringe mostly have the same structure characteristics and can basically ensure the relatively healthy indoor environment.

4.2.3 Basic equipment: water supply, sanitation and kitchen

The findings of the survey show that the percentages of those who enjoy private equipments in two categories are approximately close and the percentage in urban fringe is slightly higher than that in old built-up area. About sanitation, there are no noticeable differences on the structure of equipment between old built-up area and urban fringe.

As far as water supply and kitchen facilities are concerned, however, the inequality can be observed easily.

Table 4.3 Basic equipment of rural-urban migrants living different parts of city

| Items | Old built-up area | Urban fringe |
|---------------------------|-------------------|--------------|
| Water supply (%) | | |
| Private tap | 45.6 | 48.4 |
| Communal tap | 52.9 | 38.7 |
| Others (or no tap) | 1.5 | 12.9 |
| Sanitation (%) | | |
| Private sanitation | 35.3 | 41.9 |
| Communal sanitation | 41.2 | 38.7 |
| Others (or no sanitation) | 23.5 | 19.4 |
| Kitchen (%) | | |
| Private kitchen | 42.4 | 45.2 |
| Communal kitchen | 11.1 | 29 |
| No kitchen | 46.5 | 25.8 |

Source: from sample survey

From table 4.3 we can find the condition of water supply in old built-up area is better than that in urban fringe. At first temporary migrants of inner city equipped with water supply facilities (including private and communal facilities) is up to 98.5%, which is 11.4% higher than in urban fringe, where 12.9% migrants' residents cannot directly get living water. Although there is no clear difference on private tap equipment that most migrant's residential collectively use one water tap in crowded old built-up area still cause the inequality on water supply.

As to sanitation facilities, no big differences can be found. The proportion of private sanitation in old built-up area is a little less than that in urban fringe but, quite the contrary, that of communal sanitation in old built-up area is slightly higher than urban fringe. Taking a comprehensive view of the

sanitation equipment, the proportion-configurations of every equipment approach are approximate the same in the two settlement locations.

As to kitchen, except the approximation on the private kitchen, there are remarkable differences on communal kitchen and no kitchen facilities, and the advantage is standing on the side of urban fringe. The digit of those who have no kitchen is up to 46.5% in old built-up area, which means many rural-urban migrants must solve the problem of cook in bedroom or corridor. In effect, those without basic equipments usually have only one room respectively, or even several people share one room. This one-room-accommodation is forced to be kitchen, bathroom, sitting room and bed room in different period of time during one day. Relatively speaking, the proportion of “no kitchen” in urban fringe is lower, but it’s still the top point when compared with water supply and sanitation.

Let’s take a close look at each volume. We can find it’s common for two settlement styles that the situation of water supply is best, “sanitation” condition is secondary and kitchen equipment is far away from enough.

According to the survey only 30.4% have been equipped with all the three categories of basic facilities. Other most temporary migrants are forced to find alternative approach to meet the basic living demand.

4.2.4 Road system: road problems

From the survey, no matter in old built-up areas or the urban fringe, road problems concentrate on muddy, narrow and without drainage system. For all aspects surveyed, especially the three aspects mentioned above, problems in old built-up area are more serious than urban fringe.

Table4.4 Road problems

| | Old built-up area | Fringe of city |
|-------------------|-------------------|----------------|
| Road problems (%) | | |
| Road is muddy | 52.9 | 38.7 |
| Road is narrow | 44.1 | 29.0 |
| Road is occupied | 20.6 | 6.5 |
| Chaotic function | 20.6 | 19.4 |
| Without drainage | 35.3 | 32.3 |

Source: from sample survey

During the survey we found most of the roads in old built-up area were paved many years ago. Normally road system renewal cycle is longer than housing in neighbourhoods in China. After firstly established, most road system has remained its original style for a long time, without maintenance or renewal. For poor neighbourhoods, this situation is common and their renewal is slower and more difficult than other parts of city due to shortage of financial support, effective administration and maintenances. Current road system in these places normally is the original one with few changes. What resulted in these road problems of old built-up areas include various aspects of reasons. But the most important are historical heredity of original problems and lack of timely renewal.

As we known, road construction and regeneration is different from building houses, which can be an individual action. For complicated road system servicing for a group, it's impossible to be completed invested by common individual by virtue of its size and cost. Thus road construction and renewal must depend on local government or estimate investors. As mentioned before, at present the reason of these old built-up areas invaded by rural-urban migrants remained poor without renewal is because that they lack of commercial value. It's not realistic to attract estimate investors to improve local living conditions. But, even if government is willing to undertake this assignment, it's still a troublesome task.

The first question faced is how to find land for new road structure. Because original old road system couldn't meet the current demand of residents in size, material and functional structure, it's quite necessary to find new space to renew road system. However, land in these areas usually is fully occupied by local residents (including original residents and immigrants) with overcrowded buildings. Moreover, in the event that land for road construction can be commandeered from local residents, where to find new place to resettle these residents and how? Even if all these questions have been resolved, the shortage of technical and financial support also will form new balk to stop the renewal projects. Due to various aspects of reasons, road system of old built-up areas always remains in poor conditions.



(Road in old built-up area)

dered development. Plenty of neighbourhoods built in 1980's lacked necessary commercial and sociable services and communal spaces. About commercial services, mobile vendors or hawkers and part of local residents spontaneously formed informal commercial markets to meet the daily demand of local residents. After more than twenty years' development, in the old neighbourhoods without patience

Except what is mentioned above, there is still another serious problem in old built-up areas: road occupancy. Here, road occupancy not points to be occupied by local residents but means that many mobile vendors usually occupy roadsides to deal with commercial action. This action not only handicaps the daily life of local residents but also offer convenience for local residents, although it's a road problem for regular neighbourhoods with reasonable services. The original source of this problem is from the original establishing of these built-up area. China urban flourishing and stable development has begun since the economic reform of 1978. Before that, urban construction didn't follow the or-



(Informal market in old built-up area)

capacity to get renewal, these informal markets have been developed and formed specially regulars of they own which are different from formal market, as well as fixed marketing locations and period of every day. No matter small-shop runner or vendor without shop, all of them occupy roadside, more or less, as marketing locations. From present situation, this marketing of road-occupied will remain dynamic in old built-up area for a long time.

Also, as for urban fringe, there are the same roadside markets, which have been developed in the recent years. But it is smaller in size and number.

4.2.5 Environment: pollution and security

Generally speaking, the environment of a city is not the same for the different parts of the city. But the degree in which every part is influenced also keeps different. As an important part of residential quality, environment condition has been investigated from two aspects: pollution and security. Due to the geographical characteristics and peripheral settings, pollution source and degree vary in thousand ways in different parts of a big city. Environmental differences between old built-up area and urban fringe were expected to be notable.

Table4.5 Environmental pollution

| Environment pollution | Old built-up area | Fringe |
|------------------------------|--------------------------|---------------|
| Solid waste pollution | 48.5 | 35.5 |
| Air pollution | 41.2 | 12.9 |
| Water pollution | 5.9 | 25.8 |
| Noise pollution | 48.5 | 9.7 |

Source: from sample survey

From the four indicators investigated, the degree in which environment is polluted in old built-up area is more serious than that in urban fringe, but it is opposite in the aspect of water pollution. This result is due the geographical location and development degree of space. Those rural-urban migrants required of urban fringe are around the East Lake, the biggest lake in Wuhan (see figure 1.2 in Chapter 1). In the past years, the East Lake has been polluted gradually when surrounding households, universities and industries discharged plenty of wastewater into it. In the recent years, pollution from this lake began to beat back that surrounding residents suffered from it. Rural-urban migrants also cannot keep away from it. However, in the old built-up area, over-development of land has occupied the initial water space. Imprint of water body is difficult to be found now in old built-up area, thus water pollution is not serious like other aspects.

In the field survey, we found that solid household waste can be easily found in every place, especially inner of the old built-up area. As mentioned before, the residential density in old built-up area is higher than that of urban fringe. In the same space of old built-up area more living garbage is produced than in urban fringe. When effective cleaning facilities and staff cannot be supported, living garbage is forced to pile on roadside, corners and small spare space. In the long time deposition of living waste, residents living in the old built-up area with denser population and building suffered

more than those living in urban fringe with more open spaces. That's why solid waste influenced the life of residents in old built-up more seriously than that in urban fringe.

From the table 4.6 it's easily to be observed that air and noise pollution in urban fringe is far better than that in old built-up area. In the field survey, we found that the old built-up areas offering accommodation to rural-urban migrants mostly are close to polluting factories. In some degree these old built-up areas actually form the barriers between flourishing commercial area and main polluting industry. At one hand these polluting industry have no capacity to perform the dustproof and noise-proof deal. In addition, the dense building population and traffic facilities also attribute to produce astonishing dust and noise. At the other hand due to shortage of sound and dust insulation barriers and the low-standard housing, residents in the old built-up areas have no way to keep away from noise and precipitating dust. In the urban fringe noise and air pollution is relatively slighter. Compared to the old built-up area, urban fringe is partly close to natural environment and partly close to inactive urban action. Firstly, surrounding water body and natural plants have a capacity to clean air and reduce noise. Secondly, the urban actions have relatively less influence on the life of residents in urban fringe. Thus living in urban fringe is relatively quiet and fresh air is available.

4.2.6 Quantitative analysis and comparison between both migrant groups

By the methods introduced in Chapter 3, all the indicators influencing the residential quality are calculated together to comprehensively evaluate residential of rural-urban migrants living in old built-up area and urban fringe.

The first category is concerned with residential density, which includes one variable: average housing space per capita. All of the values are divided into 4 classes. The weighting points given are: $\geq 14 \text{ m}^2$: 4 points; $10-14 \text{ m}^2$: 3 points; $6-10 \text{ m}^2$: 2 points; $< 6 \text{ m}^2$: 1 point. Due to the only one variable for this category, its weight point is 1.

The second category includes three variables: house age, sunshine and ventilation. House age represents the safety of the building in which the interviewee lives. Houses less than 5 years old are weighted with 4 points; those ranging from 5- 15 years old are weighting with 3 points; those form 15-30 years old are weighted with 2 points; others older than 30 years are weighted with 1 points. Sunshine and ventilation are used to explain the suitability of the structure of the building. Houses with perfect sunshine are weighted with 4 points, houses with good sunshine are weighed with 3 points, houses with poor sunshine are weighted with 2 points and those without sunshine are weighted with 1 point. The same rule also is used to ventilation. The weight points for house age, sunshine and ventilation is 0.088, 0.243, and 0.669 respectively.

The third category is concerned with the basic equipment, which is necessary for the minimum living standards. Three variables are selected: water supply, sanitation and kitchen. According to the respective condition of every informant, the weighting points are given. Those who enjoy private facility (water supply, sanitation or kitchen) are weighted with 3 points, those who share communal facility are weighted with 2 points and others without facility are weighted with 1 point. After the weighting, the three variables get their weight points following the 3 by 3 matrix and the final weight points is 0.669, 0.243, and 0.088 respectively. That means every variable represents how much of the category when 1 is representative the whole category.

The fourth category consisting of 2 variables is concerned with road system. And the road problems are reflected from the aspects of road surface, function, and drainage system etc. all of the factors have two answers: yes or no. “Yes’ means that the road system in the community have problems on the aspect. “No” means the community is in good condition on this aspect. “Yes” is weighted with 0 weights and “no” is weighted with 1.

And the five variables get their weight points 0.529, 0.260, 0.123, 0.058, and 0.030 in turn.

The fifth and final category representing environment pollution consists of 4 variables: solid waste pollution, air pollution, water waste pollution and noise pollution. According their effects on the living environment, four variables get their weight points: 0.588, 0.256, 0.108, and 0.048 in turn. They are given weighting points according the same rules of road problems.

The methods introduced in chapter 3 were used to get the following result in the table 4.7: (the detailed procedure see appendix 5)

Table 4.6 Weighting points for the 5 aspects

| | Old built-up area | Urban fringe |
|-------------------------|-------------------|--------------|
| Residential density | 0.641 | 0.662 |
| Housing quality | 0.642 | 0.639 |
| Basic equipment | 0.774 | 0.769 |
| Road system | 0.567 | 0.691 |
| Environmental pollution | 0.555 | 0.736 |

Source: calculated by author

Then the final the weight points endowed to every category are: residential density: 0.529; housing quality: 0.123; basic equipment: 0.260; road system: 0.058; environment pollution: 0.030.

The comprehensive value for residential quality in old built-up area:

$$(0.529, 0.123, 0.260, 0.058, 0.030) \bullet \begin{bmatrix} 0.641 \\ 0.642 \\ 0.774 \\ 0.567 \\ 0.555 \end{bmatrix} = 0.669$$

The comprehensive value for residential quality in urban fringe:

$$(0.529, 0.123, 0.260, 0.058, 0.030) \bullet \begin{bmatrix} 0.662 \\ 0.639 \\ 0.769 \\ 0.691 \\ 0.739 \end{bmatrix} = 0.691$$

Both figures illustrate that there is no big differences on comprehensive residential quality in old built-up area and urban fringe.

4.3 Summary

As expected, the settlement locations influence the residential quality of rural-urban migrants, especially when these locations are on the different stages of urban development. From the field survey, it seems that rural-urban migrants living in the urban fringe have residential quality slightly better than those who living in the old built-up area. Fringe area does better in road system, environmental pollution and slightly better in residential density. Old built-up area does seemingly better in housing quality and basic equipment.

As new explored land, the urban fringe kept its initial natural features in some degree and the industrial and commercial pollution has not influence the lives of local residents as much as that of inner city. In addition the population density of urban fringe is lower than that of inner city. Due to the both aspects, fringe area is superior to old built-up area in road system, environmental pollution and residential density. However for inner city, overdeveloped in the past years, plumbing net and other infrastructure begin to be old but more complete and denser than urban fringe. But it can't catch up with urban fringe in equipment with more spaces. Generally speaking the old built-up area is superior to urban fringe in basic equipment and housing quality.

Overall the residential quality of rural-urban migrants in urban fringe is a bit better than old built-up area. But no matter where, according to the limited indicators used to measure residential quality the residential condition for rural-urban migrants is far lower than the minimum residential standards.

Chapter 5 living environment of rural-urban migrants compared to permanent urban citizens

5.1 Introduction

In this chapter the most important assignment is to identify the residential position of rural-urban migrants compared with permanent urban citizens. And the main reasons will be presented from the aspects of income, education, career, policy as well as other social-economic situations.

5.2 Residential conditions

In this research we supposed that there is clear gap of residential conditions between rural-urban migrants and permanent urban residents. To identify the gap, two aspects of living conditions are employed to illustrate the current disparities between them. One is residential density represented by average housing spaces per capita. The other is basic equipment consisted of water supply, sanitation and kitchen facilities.

5.2.1 Residential density

At first, a comparison on the residential density between both groups will be carried out in the following section. For permanent residents of Wuhan, in 1999, the average housing space per capita is 12.8 sq. m. while it's only 10.7 sq. m. for rural-urban migrants in 2003. Given an average growth rate of 4%¹¹ to permanent residents, until 2003 the average housing space is up to 15 sq. m., which is 4.3 sq. m. higher than the rural-urban migrants. This shows that the housing space of rural-urban migrants is smaller than permanent resident.

But because the way of calculating housing spaces in the municipal yearbook are different from that of the field survey, the real gap between rural-urban migrants and permanent residents may be larger than what presented by the figures above. In the past years, statistical residential spaces in Year Book followed two ways: average bedroom area and average housing area. The former is that the area limited by the interior wall of bedroom is divided to every one equally. But the areas of sitting room, kitchen, bathroom, storeroom, aisle linking one room to another, and other useful spaces are not accounted. The latter is the housing floor area subtracted the floor area occupied by the wall, corridor and stair. According to current situation of common apartment or house, the housing floor area is 10% more than the housing space. In the meantime, during the field survey, housing area is from the estimation of interviewees who normally estimate the approximate area of housing space. The figures from them refer to the housing area including all the spaces of various uses. As shop runner or commercial action performer, 90% of them combine their settlement and work together to curtail expen-

¹¹ This growth rate is out of the growth rates of recent years, showed in appendix 2, which was calculated according to the statistical data from YEAR BOOK 2000 FOR WUHAN.

diture. Thus the real residential space of rural-urban migrants is less than the figures presented in the following table 5.1.

According to statistical data, 5 classes are decided to present the residential density: 0-6 sq. m., 6-10 sq. m., 10-12 sq. m., 12-14 sq. m. and >14 sq. m. The following table 2 reflects the distribution structure of residents with different housing spaces.

Table 5.1 average housing spaces of permanent residents and rural-urban migrants

| Average housing spaces | Permanent residents in 1999 (%) | Rural-urban migrants in 2003 (%) |
|------------------------|---------------------------------|----------------------------------|
| 0-6 sq. m. | 9.1 | 17.2 |
| 6-10 sq. m. | 32.9 | 51.5 |
| 10-12 sq. m. | 14.2 | 4.0 |
| 12-14 sq. m. | 13.9 | 9.1 |
| > 14 sq. m. | 29.9 | 18.2 |

Source: data of permanent residents are from Year Book 2000 of Wuhan; data of rural-urban migrants from field survey in 2003.

Table 5.1 shows that about 70% rural-urban migrants have housing spaces less than 10 m², and only about 30% of them have average housing spaces more than 10 m². But for permanent urban residents, about 60% have more than 10 m². These figures present that most rural-urban migrants have residential space insufficient when compared to permanent residents. as mentioned before, due to the different ways to collect data, the real difference between rural-urban migrants is larger than that presented in table 5.1.

5.2.2 Disparities on basic housing facilities

Except the differences in residential space, the differences in basic facilities also are remarkable.

Table5.2 Basic equipment of permanent residents and rural-urban migrants

| | Permanent residents of Wuhan, in1999 | Rural-urban migrants, 2003 |
|---------------------------|--------------------------------------|----------------------------|
| Water supply (%) | | |
| Private tap | 87.4 | 46.5 |
| Communal tap | 12.5 | 48.5 |
| Others (or no tap) | 1.0 | 5.0 |
| Sanitation (%) | | |
| Private sanitation | 80.0 | 47.4 |
| Communal sanitation | 12.8 | 40.4 |
| Others (or no sanitation) | 7.2 | 11.1 |
| Kitchen (%) | | |
| Private kitchen | 89.7 | 42.4 |
| Communal kitchen | 9.8 | 11.1 |
| No kitchen | 5.0 | 46.5 |

Source: from field survey in 2003 and Statistical Yearbook of Wuhan

From table 5.2, it can be easily observed that in 1999 more than 80% permanent residents have enjoyed well-equipped basic facilities, but by 2003 rural-urban migrants who have been equipped all basic facilities haven't accounted for a half. The rest of the permanent residents mostly share communal facilities and few of them live in shortage of water, sanitation facilities or kitchen. Rural-urban migrants who cannot support private equipment also turn to communal facilities. But for those who pursue for as much as possible savings, they limit their equipments to the most necessary. Thus the proportion of those without kitchen is far higher than the other two items. For there is no alternative way for water supply and sanitation, most migrants need to be equipped with them privately or communally. But kitchen is not really necessary for them. In the survey we found that most rural-urban migrants get daily food or from simple eateries, or from cheap restaurant, or use any spare corner to serve as temporary kitchen.

While residential unit of permanent residents is household, these basic facilities cannot be cut and also need to be equipped family by family. Except the most necessary facilities, permanent residents also enjoy other services like relaxation, sports, medical care, etc. In other words, the differences between rural-urban migrants in residential conditions reflect on various aspects and should not be neglected.

5.3 Factors causing the differences in residential quality

For those who live in one city, the residential disparities between the permanent residents and the rural-urban migrants can be attributed to various causes. In the following part, the following aspects as possible explaining factors will be explored: education, income, expenditure, policy and cultural difference.

5.3.1 Education level

As we mentioned before there are different educational facilities and equipment. Thus permanent urban citizens and migrants have different educational opportunities.

Table 5.3 shows the structure of education level of permanent residents and rural-urban migrants in Wuhan. The figures clearly present that permanent resident educated well is far more than that of rural-urban migrants and most rural-urban migrants take lower or middle education. The differences of education between them consequently influence their income level and then residential condition.

The findings of the survey show that over half rural-urban migrants with agricultural Hukou are relatively well educated and approximate half migrants didn't get education better than that in primary school. However it should be noted that by definition those rural-urban migrants who get advanced education are not temporary people any more, because they get the status of permanent citizen.¹² According to the fifth census in 2000, 70% of the permanent urban residents are well educated. 22% permanent residents are educated in senior high school while only 8.9 rural-urban migrants get the same education. 13.1% permanent residents take advanced education.

¹² According to Hukou policy and education administration, those initially with agricultural Hukou get a chance to transfer their Hukou into urban Hukou formally when they pass the Entrance Examination of University. Thus those getting advanced education are not temporary rural-urban migrants but get the status of permanent urban citizens. That is why there are no migrants interviewed in the volume of college-educated and above.

Table 5.3 Education levels of permanent residents and rural-urban migrants

| | Permanent residents of Wuhan, in 1999 | Rural-urban migrants, 2003 |
|-------------------------------|--|-----------------------------------|
| Education level (%) | | |
| Primary school and illiterate | 30.0 | 48.5 |
| Junior middle school | 34.9 | 42.6 |
| Senior high school | 22.0 | 8.9 |
| College and above | 13.1 | 0 |

Source: data of permanent residents are from Year Book 2000 of Wuhan; data of rural-urban migrants are from field survey in 2003

5.3.2 Income level

As outside labourers, rural-urban migrants are limited in career and department selection. Thus their integrated income is far less than the permanent urban citizens'. In the survey the average income of rural-urban migrants is about 580 RMB per month in 2003 while in 1999 the average income of permanent urban citizens is about 980 RMB. Migrants' average income only accounts for 60% of permanent residents'. Table 5.4 presents the income level of permanent urban residents in Wuhan. Households with lowest income account for 10% of total households investigated, in turn those with lower income account for 10%, those with low-income account for 20%, the middle-income account for 20%, the high-income account for 20%, the higher income account for 10%, and the highest income account for the rest 10%.

Table 5.4 Income levels of permanent urban residents in Wuhan

| | Sum | Households with lowest income | Households with lower income | Households with low income | Households with middle income | Households with high income | Households with higher income | Households with highest income |
|--|-----|-------------------------------|------------------------------|----------------------------|-------------------------------|-----------------------------|-------------------------------|--------------------------------|
| Household researched (households) | 500 | 50 | 50 | 100 | 100 | 100 | 50 | 50 |
| Per employee monthly disposable income (RMB) | 980 | 480 | 630 | 760 | 890 | 1050 | 1340 | 2190 |

Source: From the sample survey of 500 households, Year Book 2000 of Wuhan

In the questionnaires, rural-urban migrants' income was divided into 4 classes, rather than following the way of Year Book. Low income: <500 RMB; middle income: 500-799 RMB; relatively higher income: 800-1199 RMB; and high income: >1200 RMB. These classes reflect the monthly income level for every migrant.

Table 5.5 presents the income level of rural-urban migrants. Over half migrants have income less than 500 RMB every month. More than half migrants concentrated on the classed of lowest and lower income of permanent residents and income level of 83% migrants is lower than the middle class line of permanent residents.

Table 5.5 Income levels of rural-urban migrants

| Income Level | Rural-urban migrants required (per-son) | Rural-urban migrants required (percentage %) |
|--------------------|---|--|
| <500 RMB/month | 56 | 56.0 |
| 500-799 RMB/month | 27 | 27.0 |
| 800-1199 RMB/month | 13 | 13.0 |
| >1200 RMB/month | 4 | 4.0 |
| Total | 100 | 100.0 |

Source: from field survey in 2003

As mentioned before the income difference is related to education level. From the survey, we found the proportion of rural-urban migrants with primary education or illiterate out of those with low income was up to 68.1%. But those of high income and relatively higher income were only 6.4%. Contrarily, the proportion of rural-urban migrants with senior high school education out of high and relatively higher income was up to 77.8% while none of them got low income.

Advanced education means more employment chances and higher income; poor education means less employment chances and lower income. In the survey, it was found that those with little education mostly deal with physical jobs and those engaged in technical work and commercial trade mostly were educated well in senior high school or training school of the same level to high school.

5.3.3 Structure of expenditure

In the field survey, we found that for most rural-urban migrants the primary problems are children's education and then family support. Due to the low income of rural people in both urban areas and rural areas, migrants have to cut down their living expenditure to save money. Besides the questionnaires, some key informants also provide their expenditure information in details. In the following, 3 typical cases is presented in the way of bill:

Case 1: Male, 39 years old, temporary carrier, from inner province

Monthly income: about 780 RMB

Living expenditure of his own in Wuhan: 320MB

Rent: 50 RMB (for accommodation)

Administration fee: 20 RMB (including 10 RMB per month for Residential Permit)

Food: 210 RMB (breakfast 1 RMB, lunch 4 RMB and 2.5 RMB for supper daily)

Tobacco: 20 RMB per month

Phone call: 17 RMB

Traffic fee: 3 RMB (mainly by walk)

Remittance: 460 RMB

Living expenditure for son: 200 RMB (his son is in high school)

Gift for wife: 20 RMB (clothes)

Estovers for his mother: 50 RMB (his mother is supported by his brother, sister and him together)

Incidental expenses: 60 RMB (10 RMB was fine of breaking traffic rules; 50 RMB was extorted)

Deposit: 130 RMB (saved as educational fee for his children)

Case 2: a couple, husband 33 and wife 32, vegetable-vendor, from inner province. (the following income and expenditure is all for both husband and wife)

Monthly income: about 1100 RMB

Living expenditure: 313 RMB

Rent: 70 RMB

Food: 210 RMB¹³

Traffic fee: 25 RMB

Phone call: 8 RMB

Remittance: 680 RMB

Educational fee: 100 RMB (for two children in primary school)

Living expenses: 100 RMB (for their children and their parents in rural family)

Deposit: about 450 RMB (for children's education expenditure in the future)

Case 3: female, 17 years old, catering waiter, from An'hui province

Monthly income: 400 RMB (the employer deduct 150 RMB as accommodation and repast fee)

Allowance for herself: 50 RMB

Remittance: 350 RMB (to support her elder brother in university and parents in rural family)

The three cases are representative of rural-urban migrants in various ages, genders and family background. But they seem to have similar structure of expenditure. From the cases, it concluded that the primary expenditure of rural family is on children's education. If one rural family need to support one or two children to get relatively advanced education, the whole family must turn to get income in urban area to support the educational expenditure. Migration is the most popular way to solve the family financial deficit. Also all the family, including the migrants, need to cut down daily expenditure, the first item cut down is relaxation, medical care and others expenses. At the end the expenditure is limited to only ensure enough food and accommodation support. Due to the relatively higher price of products and services, finally accommodation means nothing but shelter for the rural-urban migrants.

¹³ Compared with case 1, the repast expensed of the couple is the same to the former informant. In this case, because the couple works together, normally they cook by themselves or by wife which is cheaper than cheapest restaurant. While the first informant get lunch in the cheap restaurant which is decided by his carrier without fixed working space and time.

5.3.4 Housing policy

During the investigation of settlement situation in Beijing, Shanghai and Guangzhou of 2000, those who settled down by renting houses respectively accounted for 19.7%, 25.6% and 21.9% of the total population (Statistical Bureau, 2000). In other big cities the tenants also accounted for a high proportion of the total population.

Rural-urban migrants were the main consumers in renting-house market. But for them low-class houses or apartments are needed to deal with temporary or long-time accommodation due to the poor income. However, for local government, the potential renting markets means chaos in population administration and social security. In order to administrate effectively rural-urban migrants, national and local government issued a series of rules and acts to regulate their settlement action. In some degree, this way reduce the burden of administration for government, but in the meantime, also add the additional expenditure for rural-urban migrants. In the Rules of Rural-urban Migrants Administration, it was saying that:

“Unit or private house owners should not provide accommodation-renting to rural-urban migrants without Temporary Residence Permit or those in procreant age without Marital and Procreant Certificate or Unmarried Certificate...”(Administrative Rules of Rural-urban Migrants, 2002).

In order to get a legal accommodation, rural-urban migrants must face up a series of rules, certificates and additional fee. In addition, related rules and acts also were issued to limit house owners to select their leaseholders. They also face up the boring procedure of getting a series of certificate and additional expenditure. The relatively higher cost and trouble always wear out the passion of owners to follow the formal and legal procedure. Normally they would like to deal with rural-urban migrants privately or they give up their rural-urban leaseholders. In addition, increasing rent also transfer some burden from owners to leaseholders. But for rural-urban migrants with pursuit to cut down living expenditure, private deal is the most valuable way to solute accommodation, in spite of the danger of fight with laws.

5.3.5 Cultural difference between rural people and urban people

Some rural-urban migrants selected the urban fringe not only because the physical factors but also because of the differences of rural-urban cultural background. In China, due to the split of rural population and urban population, rural people have depended on the self-supporting agricultural production for a long time. Different productive way made different life styles. Countryside complex of rural-urban migrants, especially new comers, lead them to select urban fringe as dwelling location.

The countryside complex reflects on several aspects:

1. Language. Due to the long-time division of population, rural-urban migrants form their own language habit different from the mandarin used as official language and with which all urban residents are familiar. The unique local accent usually made rural-urban migrants easily be distinguished from original urban residents and form an invisible bar lying between rural people and urban people. In the survey, we found that interviewees suffered from their accent for less or more. Some permanent residents always like to laugh at their accent and language habit consciously or unconsciously. In addition, city is the location into which advanced technology and abundant materials converge, while

most rural areas remain the undeveloped status. In both places, citizens depend on different way to make lives, and then the topics that they concern about are different from rural areas to urban areas. Based on that situation, rural-urban migrants spontaneously concentrate together or even concentrate on the urban fringe, which is relatively close to rural areas.

2. Residential view. At present, the development of rural area is far below the urban area. Except power supply has been popular for a long time in rural area, other infrastructures like water supply system, road net, drainage facilities and so on, few of them can be found. Under this condition, rural people have their own way to meet the daily demand. For example, the heating energy used by rural people mostly is from natural plants and crops. Relatively speaking, the living way remains traditional and laggard. But rural people formed their economical view on settlement. In the rural area, housing is a complete system of daily work and rest, also a shelter for family members. The housing style in rural is simpler when compared to that in urban area. In urban area during the past two, three decades, housing view, design and construction has gone through huge changes. The function linked to housing has been more complicated than before. But for rural people who live in the remote countryside in which the housing structure and function almost remains the initial style, their housing views clearly differ from that of urban residents. During the interview, we found most migrants unconsciously keep their initial settlement style on ideologies and behaviours. But the reasons are different from one interviewee to another. For those with well economic basis, potential housing view made them imitate their housing style in rural area. For most migrants with low income, they reduce their settlement expenditure consciously under the financial pressure.

Cultural difference between rural people and urban people reflect not only on the countryside complex but also on the various aspects of life. The huge gap in developed degree of rural and urban areas lead to ideological and physical difference. That difference combined with the long-time priority endowed to permanent urban residents makes them look down to the rural people and also to the rural-urban migrants. The discrimination from original residents force rural-urban migrants to form their relatively isolated residential spaces.

Under the pressure of both low-income and discrimination, rural-urban migrants have no way to avoid the poor residential quality.

5.4 Summary

A strong difference of the living environment between permanent residents in Wuhan and rural-urban migrants could be observed from the statistical materials in Year Book and the information collected in field survey. As the citizens with the same nationality, the long-time binary population policy severely divided citizens into two parts: rural population with rural Hukou and urban population with urban Hukou. The two parts has formed their respective living styles, language habit and cultures in the long-time isolation. Living levels of two parts also are distinguished because government gave different support to every part. Anyhow the final difference of living level should trace back to the binary population structure marked with Hukou.

Although the present rural-urban migration discovers that government try to seal the two parts of population together, Hukou as the main limitation on population movement will be working for a long time.

The unique Hukou system in China is beginning to recover the basic function of population registration and administration. Since 1992, some administrative rules and policies related to the Hukou class have been cancelled gradually. At present, Hukou in China have following uses:

1. To identify the classed of Hukou. In order to administrate population effectively, Chinese citizens are divided into permanent and temporary Hukou in regard of their Hukou registration location and their real living location. With regard of the administrative districts of their registration location, Chinese citizens also are divided into agricultural Hukou (rural Hukou) and non-agricultural Hukou (urban Hukou).
2. From the three aspects of citizen identification, relatives' relationship and legal dwelling place to register the most basic social features of citizens.
3. To record Hukou transfer and population mobility and according to national situation to harmonize and administrate the population migration.
4. To issue identification card.

Hukou system is trying to reform by cancelling the unequal treatment for citizens with different Hukou types. Hukou system is expected to recover its basic function of household registration. If the limitation on population mobility is eliminated now, what will happen for rural-urban migration?

According to this research, the fast and large-scale improvement of living condition what is expected by most rural-urban migrants won't happen in a short time. Hukou, as the mark of binary population structure in China, had influenced the lives of people for about 50 years. The deep influence it has to people on ability won't vanish directly with abandoning Hukou. The influence will continually work to the coming generation and even generations. For the current generation, rural people have been in the worse situation due to their ability and technology when compared to urban people. Even under the equal competition of market economics, most rural people still have few choices on occupation.

Also the equally social welfare system and wage system brought by the Hukou reform certainly help to improve the residential quality of rural-urban migrants. But that won't change the living situation of rural-urban migrants essentially. The improvement will be realized gradually after the Hukou Reform

Chapter 6 Conclusion

6.1 Summary of the case analysis

Rural people, no matter migration or not, always has been one of the largest groups with low social-economic status in the current China. Since Hukou system has been established, this binary population structure has been reinforced. Rural people have been divided from urban permanent residents since then. In the development process, national government transferred some burden to the rural population. Until now, the urban people still enjoy more privileges than rural people. At present, social welfare and priority still haven't included the rural people and rural-urban migrants. These factors lead to a situation where the rural people are inferior to the urban people in social-economic status and when they migrate into city without Hukou transfer. In this way their inferior status is more pronounced than before. In this research, the differences in residential condition between migrants from two different areas in Wuhan (old built-up area and urban fringe), as well as the gap of residential condition between rural-urban migrants and urban permanent residents has been investigated.

1. Rural-urban migrants living in old built-up area and urban fringe face different residential conditions in details, although their comprehensive residential conditions have no clear differences if expressed in one overall index, as developed as part of this research. According to the indicators used to measure the residential quality, basic equipment enjoyed by rural-urban migrants in old built-up area is slightly better than in urban fringe while concerned about housing quality, old built-up area is slightly worse than urban fringe. In residential density, both parts have the same average housing space, although in old built-up area more migrants have very narrow or quite capacious housing spaces, but in urban fringe most migrants have equal housing spaces around the mean value. About road system, there are more and serious problems on road in old built-up area, but there are more accessible than urban fringe. As for environmental pollution, both parts suffer from different sources. Old built-up areas suffer more air and noise pollution than water pollution. The former is mainly from industrial production and urban commercial and traffic actions. The latter is mainly because plenty of industrial and daily drainage is infused into natural water-body or because of destruction from human being by unsuitable water engineering and construction. Urban fringe suffers more water pollution than air and noise pollution. The differences are quite related to their geographical location. In addition, both parts suffer from daily garbage produced by local residents themselves, due to the shortage of regular and effective cleaning services.
2. Immigrants with weak force, rural-urban migrants naturally can't enjoy as much as urban permanent residents who have enjoyed more priority since the form of Hukou system. In this research we found that residential condition between rural-urban migrants and urban permanent residents is remarkable as expected before. When taking the residential condition of urban permanent residents as reference criteria, the permanent residents can be arrayed in the shape of pyramid in regard of the residential condition. Most migrants range from 10% to 20% from the bottom of the pyramid. In other words, rural-urban migrants almost settle

down in the worst condition. The poor status of rural-urban migrants is mainly ascribed to their poor social-economic status. First, before their migration rural people have been inferior to other groups in social-economic status. The 2 to 3 times larger average income of urban areas as compared to and rural areas give the migrants a give migrants inferior position as from the start of their living in the city. Besides unequal policy and treatment brought by Hukou reinforces their inferior social position. Although migrants experience some increase of private income after migration, their inferior position and disparity of various aspects are more remarkable than before. Previously, without the direct conflict and competition in living space and facilities the disparity remained unclear. When plenty of rural-urban migrants live with urban permanent residents in the same urban spaces, the conflict became visible. No matter national government or local government, both of them first consider the stability of urban areas and urban people, and then rural area and rural people. Because of their title of migrants, rural-urban migrants still cannot be accepted as the formal residents, with direct repercussions on their social-economic status. Under the pressure form both society and economic, the residential condition of rural-urban migrants is consequently far worse than urban permanent residents.

6.2 Suggestions for follow-up research

Except the settlement location, there are other factors, which influence the residential quality of rural-urban migrants. For example those who have been in city for a long time normally have better residential condition than those who have been in city for a short time. Rural-urban migrants from different regions also have different residential quality. Groups divided by sex, age, career and education level normally face up different residential quality. Due to limited sample data and time, this research didn't touch these factors. The following research can investigate the residential quality from these aspects.

Due to the limited time and facilities, some factors about residential quality have been overlooked during the process of data collection. Also due to the shortage of materials about the urban permanent's residential condition, in the chapter 5, only 4 factors were selected in comparison between rural-urban migrants and urban permanent residents. The shortage of data influences the research result in some degree.

The method used to quantify the residential quality of rural-urban migrants in old built-up area and urban fringe only illustrate there are differences between the two groups or the differences are not very large. But the figures out of the method cannot reflect the degree of residential condition one to one. In other words, we found there are differences but we didn't know how much.

The limitation on method should be considered deeply in the following research. As for the limitation on data, at present rural-urban migration has been the hottest topic for social researchers in China and statistical department has put more attention on this field. That means in the future, the research on the group will be easier than before.

Appendix 1: Definition of terms

Agricultural population: refers to those who make living mainly depending on agricultural production as well as those who leave rural area to deal with non-agricultural production but with rural Hukou (household registration) left in original location.

Non-agricultural population: refers to those who make living mainly depending on non-agricultural production, like people engaged in industrial department and commercial department etc. Both agricultural population and non-agricultural population are distinguished by the kinds of Hukou.

Urban population: it's an informal term. Generally speaking urban population means those who live in the urban areas and familiar with the urban life style and cultural situation, without thinking of Hukou.

Rural population: This general term is the counterpart of Urban Population. It means people who live in the rural area and familiar with the rural life style and cultural background.

Hukou (household registration): it's a formal household registration system for population administration in China, by which every Chinese citizen should be registered. For those living in cities and in towns with a public security station, each household was issued a household registration booklet, whereas in rural areas, only a collective registration booklet was issued to each cooperative. The household registration booklet and the content recorded on it.

Appendix 2: Tables and lists

Table 1. Housing space for permanent urban residents in Wuhan

| Year | 1993 | 1995 | 1996 | 1997 | 1998 | 1999 |
|--|-------|------|-------|-------|-------|-------|
| Per capita housing area (square meter) | 9.6 | 10.8 | 11.2 | 11.6 | 12.2 | 12.8 |
| Increase (square meter) | ----- | 1.2 | 0.4 | 0.4 | 0.6 | 0.6 |
| Growth rate (%) | ----- | 13% | 3.57% | 3.45% | 4.92% | 4.67% |

(Source: from Year Book 2000 for Wuhan)

Table 2. List of variables used to measure residential quality in Hong Kong of 1980s

| | |
|--|----|
| <u>A: residential density</u> | |
| V1-Residential space per person (in sq. ft.) | 1 |
| <u>B: Type of housing:</u> | |
| V2-% Modern houses (Houses-with-Garden) | 2 |
| V3-%multistory apartment housing | 3 |
| V4-%Resettlement Estates & government-aided low-cost housing | 4 |
| V5-%Subdivided bed-spaces, cubicles, cocklofts, etc | 5 |
| V6-%Temporary housing (squatters, etc.) | 6 |
| <u>C. Domestic facilities:</u> | |
| V7-%Grading of the condition of building | 7 |
| V8-Index of housing facilities | 8 |
| <u>D. Physical condition of buildings:</u> | |
| V9-Grading of the condition of buildings | 9 |
| V10-%Delapidated houses | 10 |
| V12-%Buildings built before 1957 | 11 |
| V13-Density of buildings | 12 |
| V14-Plot ratio | 13 |
| <u>E. Degree of mixing in land use:</u> | |
| V17-Mixing ratio of industrial / residential land uses | 14 |
| V18-Mixing ratio of commercial / residential land uses | 15 |
| V19-Index of land-use mixing | 16 |
| <u>F. Aspects of residential environment:</u> | |
| V11- % Blighted area | 17 |
| V15-Road density (rate of road penetration) | 18 |
| V16-Index of potential fire risk | 19 |
| V20-Area of parks & recreational space per 1,000 people | 20 |
| V21-Number of pedestrians | 21 |

| | |
|---|----|
| V22-Cleanliness of the streets | 22 |
| V23-Number of hawkers | 23 |
| V24-Visual blights | 24 |
| V25-Smell pollution | 25 |
| V26-Sound pollution | 26 |
| V27-Number of Substandard shops & workshops | 27 |
| V28-Incidence of tuberculosis | 28 |
| V29-Incidence of crime | 29 |

Appendix 3: Questionnaire

Questionnaire

1. Age _____

- | | |
|------------|---|
| A under 19 | 1 |
| B 20-29 | 2 |
| C 30-39 | 3 |
| D 40-49 | 4 |
| E 50-59 | 5 |
| F over 60 | 6 |

2 Respondents' gender _____

- | | |
|----------|---|
| A male | 1 |
| B female | 2 |

3 Connubiality _____

- | | |
|-----------|---|
| A single | 1 |
| B married | 2 |

4. Where are you from? _____

- | | |
|--------------------|---|
| A Inner Province | 1 |
| B Outside Province | 2 |

5 Education level _____

- | | |
|------------------------------------|---|
| A primary school | 1 |
| B junior school | 2 |
| C high school and technical school | 3 |
| D Bachelor and above | 4 |
| E others | 5 |

Employment and income

6 What is your job? _____

7 Income level: _____ per month

- | | |
|------------------|---|
| A under 500 RMB | 1 |
| B 500-800 RMB | 2 |
| C 800-1200 RMB | 3 |
| D above 1200 RMB | 4 |

Characteristics of inhabitation

8 Inhabitation style _____

- | | |
|-------------------|---|
| A renting | 1 |
| B collective dorm | 2 |

| | |
|--|---|
| C buying house | 3 |
| D without fixed accommodation | 4 |
| 9 Where are you living in Wuhan at present? _____ | |
| 10 How much do you need to spend on the renting? _____ per month | |
| A Free | 1 |
| B under 150 RMB | 2 |
| C 150-300 RMB | 3 |
| D 300-500 RMB | 4 |
| E above 500 RMB | 5 |
| 11 Residential space _____ m ² , the number of residents _____, average housing space per capita _____ m ² per capita | |
| 12 The age of the building _____ | |
| A under 5 years | 1 |
| B 5-15 years | 2 |
| C 15-30 years | 3 |
| D above 30 years | 4 |
| 13 Sunshine conditions of housing _____ | |
| A without sunshine for whole day | 1 |
| B poor sunshine condition | 2 |
| C good sunshine condition | 3 |
| D excellent sunshine condition | 4 |
| 14 Ventilation conditions of housing _____ | |
| A without ventilation equipment | 1 |
| B poor ventilation condition | 2 |
| C good ventilation condition | 3 |
| D perfect ventilation condition | 4 |
| 15 Water supply situation _____ | 1 |
| A without water supply facilities | 2 |
| B many households share a water faucet | 3 |
| C private water supply | |
| 16 Sanitation facilities _____ | |
| A without sanitation equipment | 1 |
| B public sanitation equipment | 2 |
| C private sanitation equipment | 3 |
| 17 Kitchen facilities _____ | |
| A without kitchen | 1 |

| | |
|--|---|
| B communal kitchen | 2 |
| C private kitchen | 3 |
| 18 The distance from the nearest public traffic station is _____ minutes' walk. | |
| A under 5 | 1 |
| B 5-10 | 2 |
| C 10-15 | 3 |
| D above 15 | 4 |
| 19 form of inner road-net within the community _____ | |
| A confusing | 1 |
| B spontaneous | 2 |
| C perfect | 3 |
| 20 What are the main problems on roads? _____ | |
| A road is muddy | 1 |
| B road is narrow | 2 |
| C road is occupied | 3 |
| D chaotic function | 4 |
| E lack of drainage facilities | 5 |
| 21 What are the main problems on environmental pollution? _____ | |
| A solid waste pollution | 1 |
| B air pollution | 2 |
| C water pollution | 3 |
| D noise pollution | 4 |
| 22 What are the main problems on community security? _____ | |
| A theft | 1 |
| B assault and battery | 2 |
| C robbing | 3 |
| D others | 4 |

Appendix 4: China cities and Hukou history

1 China cities and migration control

In China, at present cities are divided into five groups in regards of the total number of non-agricultural population in the cities' administrative region:

<1> Super cities: with population over 2 million;

<2> Outsize cities: with population over 1 million but below 2 million;

<3> Big cities: with population over 500 thousand but below 1 million;

<4> Middle cities: with population over 200 thousand but below 500 thousand;

<5> Small cities: with population below 200 thousand.

Until fifth census in 2000, 13 super cities appeared in China. Among them Wuhan is the fourth biggest one with 8.31 million population. In this research big city is employed to present cities with population over 1 million.

Advocating absorbing surplus labor force from rural area by middle and small cities, government issued a series of acts about migration. Current household registration reform is executed under the guidelines of “severely restrict migration into big cities¹⁴ and encourage migration into local middle and small cities”(Urban Construction Department, 1997: 1)

In 1997 State Council approved and carried out a project about Hukou administration reform which definitely stipulated that those who came to cities with pursuit of jobs in second or third industry, technicians and managers hired by local governmental organs departments, corporations or enterprises, and legal house owners who buy commercial houses or build houses by themselves and their direct relatives can apply for local non-agricultural Hukou (household registration).

In February 2001, State Council approved new act, which cancel original control of transferring Hukou by planned targets to those who apply for local non-agricultural Hukou. Urban area is trying to open the door for migrants from rural area, and more and more peasants will surge into urban area for making living in the future.

For a long time, planned transferring Hukou targets under control of National Planning Committee, always were 2‰ of local non-agricultural Hukou in administrative region,s which affect the normal

¹⁴ Here big city is an informal title and refers to big cities as well as bigger cities.

and legal migration of people because planned targets and assignment didn't fit the need of different regions.

As far as big cities are concerned, Hukou remains to be the invisible wall between local citizens and immigrants and will not be broken in the near future. That's why most of immigrants of the past two decades keep in status of temporary migrant, especially rural-urban migrants. At present, those who flows or settle in big cities is up to 80 million and 100 million at peak. The bigger and more prosperous a city is, the more immigrants are attracted. In 2002, the Research about Seven Biggest Center Cities in China showed that Wuhan with population of 8.31 million had 1.15 million migrants; as political center of China, Beijing with population of 13.82 million had 2.63 million immigrants; and in Shanghai, the economic center of China, with population of 16.74 million had 3.87 immigrants.

Moreover, under the strict control in big cities, not only poor rural-urban migrants but also those who have stable job and income and even legally fixed accommodation cannot enjoy enough urban source and social welfare and have obstacle on marriage and reproduction since without local non-agricultural Hukou.

2. Hukou control history and rural-urban migration trend in China

For a long time in China, Hukou (household registration) has been taken as a main way to control population migration.

From 1949 to 1958, Chinese people could move freely from one place to another. A total of 77 million people moved from their native cities, towns and villages to other parts of China from 1954 to 1956. In November 1955, the State Council issued regulations related to Hukou under which Hukou were classified into two categories: rural residencyship and urban residencyship. Those with urban permits received a grain supply and subsidy, and urban employees enjoyed free medical service.

In 1958, a new regulation was issued under which rural permits could be changed into urban permits. To do so, one needed a recruitment notice from an urban labour department or university, or similar permission.

In December 1962, the Ministry of Public Security issued a new regulation under which moving from small cities to large ones, especially Beijing, Shanghai, Tianjin, Wuhan and Guangzhou, was strictly controlled.

In 1975, all such restrictive regulations disappeared from the Constitution. Local governments issued quotas on the number of Hukou they would issue each year.

In June 1997, the State Council announced new policies under which people with rural residency could apply for urban residency if they had stable non-farming jobs, stable sources of income and accommodation in urban areas for at least two years. The policies were experimented with in some big cities but were cancelled by the end of 1999.

In July 1998, the State Council issued opinions on the management of residence registration, stating that the system should be made more flexible.

In July 2000, the city of Ningbo in Zhejiang Province issued a regulation allowing all migrants to obtain permanent residency.

According to the change of the policies, we can find that the control on population migration from HuKou (household registration) is weakening and government has converted the main aim of stopping migration to open the urban gate for most or even all peasants.

When cities open their door, the problem of rural labour surplus is more serious than before. According to prediction, the total number of population will increase to 1.3 billion and rural labour surplus will get 150 million in 2000. Until 2010, the total population will increase to 1.4 billion and rural labour surplus will probably be over 200 million.

In 1980's the rural labour surplus is about 10 million. Mainly depending on township to absorb agricultural people in 1979, about 7.8 million agricultural people transferred into industry and service industry. At the same time approximate 50 million peasants went out to work and most of them have been transferred into non-agricultural industry. In addition every year some agricultural people migrated into city with urban-residency because of employment, matriculation or land expropriated by government. This part was rural-urban migrants under national plans. According to statistics from 1987 to 1989, the total number of non-agricultural people transferred from agricultural people added up to 50 million (Xie, 2000: 37).

In 1995 agricultural labour force need was about 180 million (Cheng, 1995) when predicted according to agricultural land of the time while those who were engaged in agricultural industry were about 330 million (Year Book, 1995). If about 50 million agricultural people who went out to work were taken as completely employed, then the rural labour surplus was about 100 million the same to the middle of 1980's.

Appendix 5: The procedure of calculating the residential quality

►First step: to calculate weight points for every category

1. Residential quality:

| Average housing space per capita | Weighting points | Old built-up area | | Urban fringe | |
|----------------------------------|------------------|-------------------|------------|---------------|------------|
| | | Sample number | Percentage | Sample number | Percentage |
| >=14 m ² | 4 | 14 | 20.3% | 6 | 19.4% |
| 10-14 m ² | 3 | 23 | 33.3% | 10 | 32.3% |
| 6-10 m ² | 2 | 20 | 29.0% | 13 | 41.9% |
| <6 m ² | 1 | 12 | 17.4% | 2 | 6.4% |

Old built-up area: $0.203*4+0.333*3+0.290*2+0.174*1=2.565$ $2.565/4=0.641$

Urban fringe: $0.194*4+0.323*3+0.419*2+0.064*1=2.647$ $2.647/4=0.662$

2. Housing quality:

| Items | Old built-up area | Urban fringe | Weight points | Weight points for variables |
|--------------------|-------------------|--------------|---------------|-----------------------------|
| House age | | | | 1 |
| <5 years | 15.9% | 34.4% | 4 | |
| 5-15 years | 66.7% | 50.0% | 3 | |
| 15-30 years | 15.9% | 15.6% | 2 | |
| >30 years | 1.4% | 0% | 1 | |
| Sunshine | | | | 2 |
| Perfect | 18.8% | 6.3% | 4 | |
| Good | 27.5% | 46.9% | 3 | |
| Poor | 31.9% | 40.6% | 2 | |
| No sunshine | 21.7% | 6.3% | 1 | |
| Ventilation | | | | 3 |
| Perfect | 15.9% | 9.4% | 4 | |
| Good | 34.8% | 59.4% | 3 | |
| Poor | 39.1% | 31.3% | 2 | |
| No ventilation | 10.1% | 0% | 1 | |

①House age:

Old built-up area: $0.159*4+0.667*3+0.152*2+0.014*1=2.969$ $2.969/4=0.742$

Urban fringe: $0.344*4+0.5*3+0.156*2+0*1=3.188$ $3.188/4=0.797$

②Sunshine:

Old built-up area: $0.188*4+0.275*3+0.319*2+0.217*1=2.432$ $2.432/4=0.608$

Urban fringe: $0.063*4+0.469*3+0.406*2+0.063*1=2.534$ $2.534/4=0.634$

③ Ventilation:

Old built-up area: $0.159*4+0.348*3+0.391*2+0.101*1=2.563$ $2.563/4=0.641$

Urban fringe: $0.094*4+0.594*3+0.313*2+0*1=2.484$ $2.484/4=0.621$

The three variables weighted according the important degree: house age: 0.088; sunshine: 0.243; ventilation: 0.669.

Housing quality for old built-up area:

$$(0.088, 0.243, 0.669) \bullet \begin{bmatrix} 0.742 \\ 0.608 \\ 0.641 \end{bmatrix} = 0.642$$

Housing quality for urban fringe:

$$(0.088, 0.243, 0.669) \bullet \begin{bmatrix} 0.797 \\ 0.634 \\ 0.621 \end{bmatrix} = 0.639$$

3. Basic equipment:

| Items | Old built-up area | Urban fringe | Weight points |
|---------------------------|-------------------|--------------|---------------|
| Water supply (%) | | | |
| Private tap | 45.6% | 48.4% | 3 |
| Communal tap | 52.9% | 38.7% | 2 |
| Others (or no tap) | 1.5% | 12.9% | 1 |
| Sanitation (%) | | | |
| Private sanitation | 35.3% | 41.9% | 3 |
| Communal sanitation | 41.2% | 38.7% | 2 |
| Others (or no sanitation) | 23.5% | 19.4% | 1 |
| Kitchen (%) | | | |
| Private kitchen | 42.4% | 45.2% | 3 |
| Communal kitchen | 11.1% | 29% | 2 |
| No kitchen | 46.5% | 25.8% | 1 |

① Water supply:

Old built-up area: $0.456*3+0.529*2+0.015*1=2.441$ $2.441/3=0.814$

Urban fringe: $0.484*3+0.387*2+0.129*1=2.335$ $2.335/3=0.785$

② Sanitation:

Old built-up area: $0.353*3+0.412*2+0.235*1=2.128$ $2.128/3=0.709$

Urban fringe: $0.419*3+0.387*2+0.194*1=2.225$ $2.225/3=0.742$

③ kitchen:

Old built-up area: $0.424*3+0.111*2+0.465*1=1.959$ $1.959/3=0.653$

Urban fringe: $0.452*3+0.29*2+0.258*1=2.194$ $2.194/3=0.731$

The variables weighted with points are: water supply: 0.669; sanitation: 0.243; kitchen: 0.088.

Basic equipment for old built-up area:

$$(0.669, 0.243, 0.088) \bullet \begin{bmatrix} 0.814 \\ 0.709 \\ 0.653 \end{bmatrix} = 0.774$$

Basic equipment for urban fringe:

$$(0.669, 0.243, 0.088) \bullet \begin{bmatrix} 0.785 \\ 0.742 \\ 0.731 \end{bmatrix} = 0.769$$

4. Road system:

| | Old built-up area | Fringe of city |
|-------------------|-------------------|----------------|
| Road problems (%) | | |
| Road is muddy | 52.9% | 38.7% |
| Road is narrow | 44.1% | 29.0% |
| Road is occupied | 20.6% | 6.5% |
| Chaotic function | 20.6% | 19.4% |
| Without drainage | 35.3% | 32.3% |

The five variables weighted with points are: road is muddy: 0.529; road is narrow: 0.260; road is occupied: 0.123; chaotic function: 0.058; without drainage: 0.030.

$$\text{Old built-up area: } (0.529, 0.260, 0.123, 0.058, 0.030) \bullet \begin{bmatrix} 0.529 \\ 0.441 \\ 0.206 \\ 0.206 \\ 0.353 \end{bmatrix} = 0.443 \quad 1 - 0.443 = 0.567$$

$$\text{Urban fringe: } (0.529, 0.260, 0.123, 0.058, 0.030) \bullet \begin{bmatrix} 0.387 \\ 0.290 \\ 0.065 \\ 0.194 \\ 0.323 \end{bmatrix} = 0.309 \quad 1 - 0.309 = 0.691$$

5. Environmental pollution:

| Environment pollution | Old built-up area | Fringe |
|-----------------------|-------------------|--------|
| Solid waste pollution | 48.5% | 35.5% |
| Air pollution | 41.2% | 12.9% |
| Water pollution | 5.9% | 25.8% |
| Noise pollution | 48.5% | 9.7% |

The four variables weighted with points are: solid waste pollution: 0.588; air pollution: 0.256; water pollution: 0.048; noise pollution: 0.108.

$$\text{Old built-up area: } (0.588, 0.256, 0.048, 0.108) \bullet \begin{bmatrix} 0.485 \\ 0.412 \\ 0.059 \\ 0.485 \end{bmatrix} = 0.445 \quad 1 - 0.445 = 0.555$$

$$\text{Urban fringe: } (0.588, 0.256, 0.048, 0.108) \bullet \begin{bmatrix} 0.355 \\ 0.129 \\ 0.258 \\ 0.097 \end{bmatrix} = 0.264 \quad 1 - 0.264 = 0.736$$

➔Second step: Comprehensive evaluation

Old built-up area:

$$(0.529, 0.123, 0.260, 0.058, 0.030) \bullet \begin{bmatrix} 0.641 \\ 0.642 \\ 0.774 \\ 0.567 \\ 0.555 \end{bmatrix} = 0.669$$

Urban fringe:

$$(0.529, 0.123, 0.260, 0.058, 0.030) \bullet \begin{bmatrix} 0.662 \\ 0.639 \\ 0.769 \\ 0.691 \\ 0.736 \end{bmatrix} = 0.691$$

Note: all of the weight points endowed to variables and categories is from both field work with suggestions of informants and experts on residential environment and housing design.

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