Polytechnic University of Catalonia Department of Urban Management and Valuation

Proposal of master thesis

Research on Relationship Between Urban Expansion and Migration of Shanghai

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With the development of the global economy, urban growth considering the city center as basic development point has expanded all around the world, for example, New York City and Los Angeles Metropolitan Areas, London Metropolitan Area, Tokyo metropolitan area, Beijing-tianjin-hebei metropolitan area and so on.

At the same time, population migration has become more and more popular. People try to move to other regions for jobs and opportunities. Actually, migration has become the most important reasons for population increase.
Prior to the reform and opening up policy of China, main development of Shanghai was restricted by the Concession;

After that, governments and administrations tried to expand the development areas of Shanghai, mainly changed some counties nearby into districts, constructed satellite towns;

However, urban sprawl gradually controlled the expansion and growth of the city, and traffic congestion, environmental destruction and land reduction have caused more and more concerns;

Right now, governments and citizens began to realize the importance of "Preservation" and "Conservation" as well as utilization of underground space.

<table>
<thead>
<tr>
<th>Year</th>
<th>Built-up area (km²)</th>
<th>population (million)</th>
<th>GDP (100 million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1514.52</td>
<td>23.0266</td>
<td>14875.8</td>
</tr>
<tr>
<td>2000</td>
<td>857.94</td>
<td>16.086</td>
<td>4098.64</td>
</tr>
<tr>
<td>1990</td>
<td>422.45</td>
<td>13.34</td>
<td>511.74</td>
</tr>
</tbody>
</table>

The expansion proportion of Shanghai city in 1994-2006

<table>
<thead>
<tr>
<th>Year</th>
<th>proportion of the total area/%</th>
<th>growth rate/%</th>
<th>growth rate compared with 1997/%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>11.895</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>12.396</td>
<td>0.5</td>
<td>0.000</td>
</tr>
<tr>
<td>2003</td>
<td>27.319</td>
<td>2.736</td>
<td>14.923</td>
</tr>
<tr>
<td>2006</td>
<td>35.015</td>
<td>7.696</td>
<td>22.619</td>
</tr>
</tbody>
</table>

Source: http://biz.163.com/special/c/00021ESL/chengshikuozh.html
Sustainable, high-speed, ultra-conventional development of the social economy accelerated China's urbanization, most of Chinese cities witnessed rapid development period with the characteristic of urban expansion. Taking Shanghai for example, from 1950 to 1970s, the built-up areas expanded 3.96km2 anually; from 1970s to 1998, expansion areas was 5.02km2; this number reached to 21.89km2 anually during 1988 to 1993; and 37.79 km2 annually during 1993 to 1998.

As one of the largest city in China, Shanghai attracts millions of population from other areas for jobs, opportunities and better life. The household population reached to 10.98 million in 1978 from 5.03 million in 1949, and this number increased 0.2 million in 15 years, and more than 14 million in 2010.

Generally, these gradually increased built-up areas offered spaces for migration and the development of industries and offices. In turn, growth of the population and social economy promoted the extension of the city areas. Researches and analysis on the relationship of urban expansion and population migration can help to master the substance for the city development and lay the foundation for the harmonious development of cities and population.
Shanghai (2010)

Shanghai sits at the mouth of the Yangtze River in the middle portion of the Chinese coast. The municipality borders the provinces of Jiangsu and Zhejiang to the north, south and west, and is bounded to the east by the East China Sea.

Shanghai is administratively equal to a province and is divided into 17 county-level divisions: 16 districts and one county.

Size: 6340 km²
Population: 22.65 million
Density: 6200 population/km²
In-migration: 1.72 million
Out-migration: 0.5 million

Source: Demographia World Urban Areas (Built-Up Urban Areas or World Agglomerations)

Source: [www.shanghai.gov.cn/shanghai/node27118/index.html](http://www.shanghai.gov.cn/shanghai/node27118/index.html)
The urban expansion of Shanghai from 1810 to 2000 and land cover in 2010
When it comes to Shanghai’s population and migration, we can easily see that the population presents a linear growth from the establishment of China, and this tendency is steady since 1960.

The second graph shows the trends of the in-migration, out-migration and mechanical growth of Shanghai since 1950.

Before 1978 (the reform and opening-up of China), three of these elements fluctuated, and there wasn't any reguality; but from 1978 to now, gradually decreased out-migration and steadily increased in-migration dominant the tendency, and the mechanical growth was positive.

On the surface, the migration is positively associated with urban expansion in Shanghai, when migration increased, urban space expanded. As a result, we can confirm that they certainly have some relationship inside.

Actually, population flow is one of the most important factors for the city development, and it is easy to find out that urban spatial expansion is one form for urban development and growth, and migration is also can be considered as population flow, so we can get the conclusion that population migration is essential for urban expansion, they are in close contact with each other.

But what kind of relationship do they have inside? The article is going to take Shanghai as example to do some deep discussion on these relationships.
general objective

Based on the rapid development we try to investigate the inside relationship between population migration and urban expansion in order to determine the right way for urbanization and try to find out some ideas and suggestions for strengthening the managements of floating population and help the governments for better population policies.
using historical data to identify the inside connections between them quantitively

build some basic models to explain the relationship between population migration and urban expansion

tracing the historical evolution of the urban expansion process of Shanghai as well as the changes of floating population of different periods

analyzing the relationship between migration and urban expansion based on the connections of population flow and urban development, try to find out the rational size for the urban expansion for a city and make some policies and managements for the population migration.

special objectives
Few articles and books have explained the relationship between migration and urban expansion directly, since urban expansion is one of the most important elements for urban growth and development, we can introduce the former connection to the connection between population flow and urban development. According to the existing papers, two research aspects about the connection can be concluded: theories and models, as well as empirical researches.

(1) theories and models

The world is steadily becoming more urban, as people move to cities and towns in search of employment, educational opportunities and higher standards of living. Some are driven away from land that, for whatever reason, can no longer support them. By the year 2005, urban areas are expected to be home to more than half of the world’s people.

<table>
<thead>
<tr>
<th>Inner city structure theory</th>
<th>Urban Development Theory</th>
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<tbody>
<tr>
<td>concentric zone theory</td>
<td>Growth pole theory</td>
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<tr>
<td>Fan theory</td>
<td>Core-peripheral structure</td>
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<td>Multi-core theory</td>
<td>Pole-axis theory</td>
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<td>Regional structure theory</td>
<td>Megalopolis theory</td>
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Theories of migration

The earliest model about the migration can be counted as the “laws of migration” from Ravenstein. In 1885, he published the article “The laws of migration”, and pointed out that most migrants travel short distances and with increasing distance the numbers of migrants decrease; migration occurs in a series of waves or steps; each significant migration stream produces, to a degree, a counterstream; urban dwellers are lass migratory than rural dwellers; the major causes of migration are economy. (Ravenstein, 1885)

Stouffer in 1940 put forwarded the theory that the volume of migration between two places is related not so much to distance and population size, but to perceived opportunities that exist in those two places and between them, and this is the famous “intervening opportunities”. (Samuel A. Stouffer, 1940)

After Zipf’s inverse distance law in 1949 (Zipf, George Kingsley, 1949), Julian Wolpert in 1960s put forwarded the the gravity model, which told the same ideas of the inverse distance law: the volume of migration is inversely proportional to the distance traveled by migrants, and directly proportional to the populations of the source and destination. (JULIAN WOLPERT, 1965)

D. J. Bague’s famous “push-pull” theory in 1950s believed that population movement is the result of two forces acting in different directions, one is the power to promote population movements, the other is the power of impeding the population flows. There are "push" factors for population mobility in the outflow places, meanwhile, there are also "pull" factors, but compared to "pull" power, the “push” power dominants the position. (D.J. Bague, 1956)
Lee in 1966 revised the simple "push-pull" model in two ways, the Lee model introduced the idea of intervening obstacles that need to be overcome before migration takes place; source and destination are seen as possessing a range of attributes; each would be migrant perceives these attributes differently, depending on personal characteristics, such as age, sex and marital status. (E.S. Lee, 1966)
Under the background that facing the serious unemployment in developing countries, most labours tried to go to urban areas for jobs, as a result the population migration has been blocked the development of society and economy, Todaro proposed his own model to explain the phenomenon: potential migrants weigh up both the costs and benefits of moving before taking any action; migrants act in economic self-interest. (Todaro. M.P., 1969)

After 1990s, the world population migration pattern has changed greatly, researches on this issue was flourishing with the emergence of new theories. Scholars challenge the assumptions of neoclassical theory of migration, and make breakthroughs based on evidences, some new theory was born. For example, the new economic migration theory, dual labor market theory (Piore, 1979) the world system theory (Wallerstein, 1991).
(2) Empirical analysis

Yang Yanyun in 2004 took Wuhan for example analyzed the relationship between inter-migration and urban spatial changes based on the data of 2000 population census, and summarized the types, characteristics and general tendencies of the population flow in Wuhan.

Kevin Honglin ZHANG, Shunfeng SONG used time-series and cross-section analyses explained the relations between rural–urban migration and urbanization.

Richard Waller analyzed the ecology, migration and urban expansion in east Africa, giving the characteristics of both ecology and migration, as well as the limitations of the expansion and their relative connections.

Wang Guixin, Mao Xinya and others compared three of the biggest metropolitan areas of China about the relationships of the migration and the economic polarized growth.

Zhong Wen in 2010 published one article which did studies on the relationship between population migration and urban developing spaces, and got the conclusion that urban development promotes migration, at the same time, the floating population can react to the development and formation of urban space.

Above all, we can conclude that all these empirical analysis are qualitative analysis, no models and theories were used inside, writers tried to find the inter relationship between migration and urban form according to some low-level indicators, but there isn't any models can be found rationally.
under the background of global economy, cities and population have witnessed rapid development: urban expansion and increase of migration, there are more and more researches and studies on their relationship.

explore the connections between migration and urban expansion

theories and models analysis about population migration and urbanisation, urban development

extended models and theories for relationships between migration and urban expansion

historical evolution of migration and expansion process in Shanghai

analyzing quantitively about the relationships and connections based on the theories and models above

try to identify rational size for the urban expansion for a city and make some policies and managements for the population migration

put forward the question

analyze the question

solve the problem

feedback
Part 1: Introduction. Part 1 tries to introduce the background, purpose, contents, methodology as well as the whole framework of the thesis.

Part 2: Literature Review. In the second part, I want to summarize and sort out the theories and models about population flow and urban development as well as their possible relationships so as to identify the connections between migration and expansion.

Part 3: General situation of Shanghai. This part takes Shanghai as example, summarizing the evolution of population flows using historical data of about the migrations, as well as changes of urban expansion spaces in Chinese history.

Part 4: Researches on the relationship. Based on the above analysis, we can find some secondary indicators and summarized some models and theories to investigate the relationship between migration and urban expansion.

Part 5: Conclusions. Making some conclusions about all the parts above (characteristics of the evolutions of migration and urban extension, connections of between them, and some special developments), and try to give some suggestions and comments for formulating and identifying rational size for urban expansion and making policies and managements for the population migration.
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<thead>
<tr>
<th>Activity</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
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<tr>
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<td>Literature Review</td>
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<td>Quantitative data collection</td>
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<td>Methodology Observation</td>
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<td>Conclusion</td>
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Thank you!
### Hypothesis

<table>
<thead>
<tr>
<th>Population Migration</th>
<th>Urban Expansion</th>
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</thead>
<tbody>
<tr>
<td>Population increase rate</td>
<td>Size of the built-up area</td>
</tr>
<tr>
<td>The proportion of in-migration in total population</td>
<td>Sprawl Intensity Index: $\beta_{i,n} = \left( \frac{ULA_{i,n} - ULA_{i,i}}{n} \right) / TLA_i \times 100$</td>
</tr>
<tr>
<td>Net variance of in-migration and out-migration</td>
<td>Level of urbanization</td>
</tr>
<tr>
<td>Direction of the flow of the migration</td>
<td>... ... ... ... ... ... ... ... ...</td>
</tr>
</tbody>
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**Contribution Rate Model:**

Cobb-Douglas function

$$Y = A_0 e^{nt} K^\alpha L^\beta$$

Solow residual method

$$\frac{\Delta A}{A} = \frac{\Delta Y}{Y} - \alpha \frac{\Delta K}{K} - \beta \frac{\Delta L}{L}$$