

# Research on Interactive Mechanism and Process of Population Flow and Industrial Agglomeration from the Perspective of Transportation Infrastructure

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**Abstract:** with Economic Agglomeration Becoming More and More Common in Social Development, and as a New Mode of Economic Growth, Industrial Agglomeration Mechanism Has Become a Hot Topic in Research. Urbanization Provides Resource Elements for Industrial Agglomeration, and Industrial Agglomeration Accelerates Urban Population Agglomeration. as an Important Resource for Regional Economic Development, Transportation Infrastructure Not Only Affects the Efficiency of Production Factors in the Region, But Also Affects the Spatial Distance and Transportation Cost of Social and Economic Activities between Regions. the Obvious Increase of Urban Population Will Generate a Large Demand for Urban Transportation. Urban Population Has Obvious Commuter Travel Characteristics and is the Main Participant in Urban Economic Activities. Provincial Capital Cities and Economic Center Cities At All Levels Are the Agglomeration Centers of Floating Population and Non-Agricultural Industries in the Province. Influenced by the Difference of Resources and the Law of Urban Development, the Results of Urban Agglomeration Have Different Scales and Types. Based on the Perspective of Transportation Infrastructure, This Paper Analyzes the Interaction Mechanism and Process of Population Flow and Industrial Agglomeration.

## 1. Introduction

Since the Reform and Opening Up, China's Interregional Population Flow and Industrial Geographical Agglomeration Have Obvious Similarities. from a Nationwide Perspective, the Eastern Coastal Areas Are the Main Areas Where Population Immigration and Non-Agricultural Industries Are Concentrated. with the Rapid Development of Information and Transportation Technology, Any Region Can Obtain More Abundant Information through Information Technology and Products Can Flow At a Lower Cost. the Location of Enterprises Will Become More Free and Flexible [1]. Compared with Population Migration, Population Migration is Characterized by Relatively Long Time and Aims At Settlement. Influenced by the Differences in Resources and the Laws of Urban Development, the Results of Urban Agglomeration Have Different Scales and Types [2]. Urbanization Mainly Promotes Industrial Agglomeration by Promoting the Development of Industry and the Development of the Whole Region. the Material Foundation and Invisible Force of the City Itself Play an Important Role in the Development of Industry [3]. Since the Reform and Opening Up, with the Economic Development, the Active Market and the Relaxation of the Household Registration Restriction, the Population Migration Speed is Faster and Faster and the Scale is Larger and Larger [4]. the Different Types and Scales of Cities Affect the Type and Scale of Demand of the Industry, Which Ultimately Affects the Structure and Scale of Industrial Agglomeration.

As the Level of Informationization in the World Increases, Regional Exchanges Intensify and the Economy Develops At a High Speed. This Has Accelerated the Development of Urbanization and Motorization, and the Rapid Growth of Urban Scale [5]. from the Perspective of International Economic Development, the World Economy and Trade Are Mainly Concentrated in a Few Countries or Regions, and the Distribution is Seriously Uneven [6]. the Apparent Increase in Urban Population Will Generate a Large Demand for Urban Traffic. the Urban Population Has Obvious

Commuting Characteristics and is a Major Participant in Urban Economic Activities [7]. the Different Types and Scales of Industrial Agglomeration Determine the Type of Industrial Development and the Structure of Industrial Demand, and Ultimately Affect the Structure of Industrial Development [8]. the Cities with Larger Production Factors and Population Concentration Have Greater Market Space for Industrial Development, So the Type and Scale of Cities Directly Determine the Type and Scale of Industrial Development [9]. from the Statistical Results, Transportation Costs Are Gradually Decreasing in Both Developed and Developing Countries. Whether It is the Eastern Coastal Provinces with Relatively Developed Economy or the Central and Western Provinces with Relatively Backward Economy, the Provincial Capitals and Economic Centers At All Levels Are the Gathering Centers of Floating Population and Non-Agricultural Industries in the Province. Based on the Perspective of Transportation Infrastructure, This Paper Analyzes the Interaction Mechanism and Process of Population Mobility and Industrial Agglomeration.

## 2. Analysis on the Key Issues of City Scale and Transportation Infrastructure

City scale refers to the aggregation difference in quantity and density of population, material, economy and other factors formed according to certain rules within a certain city space. Most development economists regard transportation infrastructure as production capital in the process of economic growth. Increasing its investment can promote the improvement of production efficiency, investment and economic growth. Since the reform and opening up, with China entering a golden period of economic development, China's transportation has entered the fastest period in history, which has made China one of the world's major transportation countries. With the development and expansion of the city scale, the demand for the flow of people and things is constantly increasing, and the social status of the transportation system is gradually improving, becoming the blood line of economic and social development. The interactive process of population flow and industrial agglomeration is actually a time-space change process of population share and industrial share, which directly leads to the increase of population share and industrial share in central areas. When spatial economics analyzes the spatial distribution of industries, it focuses more on the behavior of economic subjects at the micro level.

The development of urban transportation system in the direction of stronger supply capacity, more reasonable layout, smoother transition and more effective hierarchical structure has become a key issue in the development of urban economy and society. The integration of emerging information, control, communication and computer technologies with traffic engineering has formed various unique technologies in traffic infrastructure. Such as traffic control technology for urban roads and expressways, traffic information collection and fusion technology, route navigation and traffic information service technology, etc. Compare the existing system, convolutional code optimization system and transmission time, as shown in Table 1.

Table 1 Comparison of Existing Systems, Convolutional Code Optimization Systems, and Transmission Time

Operation mode	Existing system	Convolutional code optimization system	Transmission time
Polling	2.46	1.78	5.24
Radio	3.17	1.59	6.33

From the perspective of urban development, with the expansion of the scale of urban development, the marginal cost borne by the resources of Zhongtun and Zhongcheng gradually increases. Because population transfer often lags behind industrial transfer in reality, the changes of population share and industrial share in different regions of the economy are usually out of sync. Industrial agglomeration and the formation of industrial agglomeration areas will continuously give birth to a series of specialized industries, of which the tertiary industry develops rapidly. Only when capital or industry has entered a certain region and triggered economic growth and employment growth in the region can potential migrants have optimistic expectations of income and employment opportunities in the region. Transportation infrastructure has the function of agglomeration, which

can cause the immigration of manpower and capital from other regions, thus causing regional economic growth [10]. Whether the population is transferred from agriculture to modern industries such as industry or from rural areas to urban areas, it usually leads to trans-regional migration of population, especially trans-provincial migration. With the continuous improvement of urban functions and the continuous expansion of regions, urban development cannot be separated from transportation, which is one of the supply capabilities of urban development. Economic growth generates greater traffic demand. In order to alleviate the congestion problem, it is necessary to increase the investment and construction of traffic infrastructure.

### 3. Mechanism of Interaction between Urbanization and Industrial Agglomeration

#### 3.1 Urbanization Provides Resources for the Development of Industrial Agglomeration

Industrial agglomeration promotes the diversification of urban land use patterns, thus promoting the diversified development of urban spatial structure. In the core and region of the city circle, the agglomeration effect is still significant. Traffic pressure and city pressure are continuously oppressing the development of the city and the daily travel of residents. The development of industrial agglomeration requires a large amount of proprietary land, which will naturally improve and optimize the land use structure. This process will stimulate the expansion of the city. In the process of population migration across regions, both push and pull forces should be placed under the background of economic transformation of industrialization and urbanization. Traditional psychology and cultural concepts are important subjective factors that affect migration decisions, many of which will restrict the general public from making decisions on migration, especially long-distance migration. The division of labor and cooperation among different enterprises in the industrial agglomeration area is conducive to improving the labor efficiency of enterprises and the whole industry, and provides guarantee for the rapid development of industrial agglomeration.

The advantages of the city will attract high-quality talents to flow to and gather in the city, thus greatly improving the external competitiveness of industries and the overall quality of the city and accelerating the process of urbanization. Compared with the interregional flow of capital, the interregional flow of population is restricted by more exogenous factors. In our country, the minimum radius of circular curve should be considered in highway design. As shown in Table 2, the minimum radius data of circular curve specified by our country.

Table 2 Minimum Radius Of Road Circular Curve At All Levels (m)

Highway grade	Plain hillock	Mountain hills
1	420	120
2	230	55
3	120	30

The road profile is a plane that is vertically cut along the centerline of the road and then unfolded. The longitudinal section design line consists of straight lines and vertical curves. The maximum longitudinal slope is an important control index for the design of the road longitudinal section, which refers to the maximum slope value allowed for each level of road during the design of the longitudinal slope. The maximum slope allowed for each level of highway is shown in Table 3.

Table 3 Maximum Slope Of Highways At All Levels (%)

Highway grade	Plain hillock	Mountain hills
1	5	7
2	6	7
3	6	8

#### 3.2 Urbanization Fosters the Institutional and Cultural Environment for the Development of Industrial Agglomeration

Urbanization constantly innovates institutional culture in its rapid development process, and the institutional cultural environment needed for industrial agglomeration development is also

constantly created in this process. Industrial agglomeration can help enterprises to exchange technology and utilize human resources, and at the same time can enable enterprises to make full use of public facilities in industrial agglomeration areas. Cities provide an effective institutional culture environment for industrial agglomeration. Urban institutional culture has a significant impact on people's consciousness and behavior. At the initial stage of urban development, the urbanization process was not completed. At this time, the attraction energy brought by the development of the land is the main energy acquisition point for the city, including attracting population and industries. Industrial agglomeration based on specialized division of labor is conducive to promoting the transformation of industrial structure, improving the external competitiveness of industries, providing a material basis for urbanization, and finally accelerating the process of urbanization. The development of industrial agglomeration requires a fair competitive environment and a serious legal atmosphere, while the open market environment owned by the city provides a guarantee to meet the requirements of industrial agglomeration. Since population transfer lags behind industrial transfer, the changes of regional population share and industrial share do not occur synchronously, thus the spatial matching degree between population and industry shows periodic changes. A large number of enterprises and industries are concentrated in urban areas, thus causing the population to gather and related enterprises to enter.

#### **4. Conclusions**

For city scale, economic scale is the basic power, land space scale is the basic bearing condition, and population scale is the main manifestation of city scale. The traffic time factor has not only caused the spatial cost of population migration in China, but also formed the psychological cost of population migration. With the continuous development of city scale, it is difficult to adapt to the reality of city development to separate transportation from city. Transportation infrastructure and city scale are the unity of city supply and demand system. The improvement of transportation infrastructure can greatly improve the ability of population migration and expand the scale of population migration. The transportation infrastructure, especially the railway efficiency as the main means of transportation, more effectively reflects the actual transfer cost. The improvement of its efficiency can also reflect the actual transportation cost that affects population migration in a dynamic way, and objectively promote the free flow of elements, that is, the cross province migration of population. Industrial agglomeration needs the support of various mechanisms. The development of urbanization has a direct impact on the mechanisms needed by industrial agglomeration. The process of urbanization has a leading role in accelerating industrial agglomeration.

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